Northeast Canyons and Seamounts Marine National Monument

Final Management Plan and Environmental Assessment

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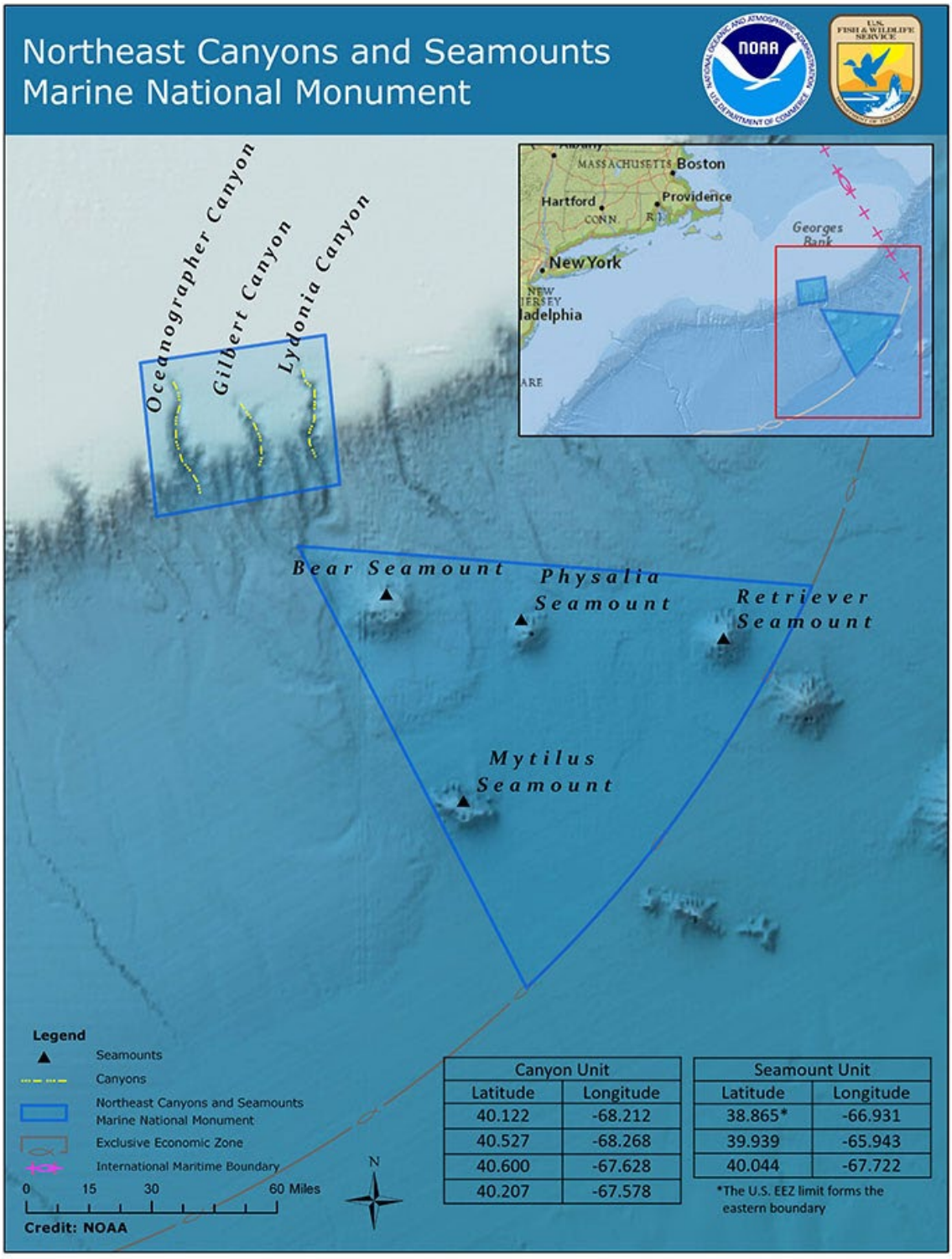


Figure 1 Map and coordinates showing the location of the Northeast Canyons and Seamounts Marine National Monument. The map shows the Monument's two separate units: the rectangular Canyons Unit, and the triangular Seamounts Unit.

List of Acronyms

AIS – Automatic Identification System

ALDFG – Abandoned, Lost, or Otherwise Discarded Fishing Gear

ASA – American Sportfishing Association

AUV – Autonomous Underwater Vehicle

CCP – Comprehensive Conservation Plan

EA – Environmental Assessment

EIS – Environmental Impact Statement

EPA – Environmental Protection Agency

FACA – Federal Advisory Committee Act

FONSI – Finding of No Significant Impact

FWS – U.S. Fish and Wildlife Service

GARFO – Greater Atlantic Regional Fisheries Office

ICCAT – International Commission for the Conservation of Atlantic Tunas

NEPA – National Environmental Policy Act

NOAA – National Oceanic and Atmospheric Administration

NOAA Fisheries – National Marine Fisheries Service

NODP – Northeast Ocean Data Portal

NWRS – National Wildlife Refuge System

PEIS – Programmatic Environmental Impact Statement

QR – Quick Response

ROV – Remotely Operated Vehicle

U.S. – United States

USCG – U.S. Coast Guard

USGS – U.S. Geological Survey

VMS – Vessel Monitoring System

List of Figures

The National Marine Fisheries Service (NOAA Fisheries) Greater Atlantic Regional Fisheries Office (GARFO), on behalf of NOAA, and the U.S. Fish and Wildlife Service (FWS), represented by the Northeast Region National Wildlife Refuge System (NWRS) program, have jointly developed this final environmental assessment in accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) to evaluate the potential beneficial and adverse effects of implementing a management plan for the Northeast Canyons and Seamounts Marine National Monument (Monument). The FWS and NOAA Fisheries, which together form the Monument management team, are joint lead federal agencies on this environmental assessment.

This final environmental assessment also documents how the final management plan presented in Volume 1 is compliant with the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Coastal Zone Management Act and Marine Mammal Protection Act, in addition to other relevant executive orders and policies.

Proposed Action

The FWS and NOAA Fisheries (Monument management team), as joint managers of the Monument, propose to adopt and implement a management plan to guide the work of the Monument for the next 15 years.

Volume 1 of this document is the final management plan, which is identified as the "preferred alternative."

Current NEPA regulations (40 CFR 1501.5) state that environmental assessments shall be no longer than 75 pages (excluding appendices) unless a senior agency official approves in writing an environmental assessment to exceed that limit. To meet this page requirement, the Monument management team has focused this environmental assessment on the analyses necessary to determine whether there could be significant adverse effects to the human environment as a result of the proposed action.

Purpose and Need

The purpose of the proposed action is to provide a clear framework for management and community stewardship of the Northeast Canyons and Seamounts Marine National Monument for the next 15 years, as well as direction and guidance for the work of Monument staff and allocation of resources. Its purpose is also to give stakeholders and the public the opportunity to collaborate with the Monument management team to shape the management and work of the Monument.

Effective, transparent management of the Monument is key to achieving conservation outcomes, as well as fulfilling the intent of Presidential Proclamation 9496, which established the Monument to protect its unique geologic features (deep-sea canyons and seamounts), provide opportunities for research and scientific exploration designed to further understanding of Monument resources and knowledge of the North Atlantic Ocean ecosystem and provide opportunities for activities that will further the educational value of the Monument.

A clear and concise management plan for the Monument, developed and shaped by public and stakeholder input, will enable the Monument management team to,

- focus on a single, guiding framework for management;
- build the partnerships necessary to steward the Monument;
- systematically fill data and information gaps about Monument resources;
- allow stakeholders and the public to participate in Monument stewardship; and
- adaptively manage the Monument in response to new information.

The need to develop and implement a management plan is derived from both legal mandates and well-established marine resource management and planning practices.

The Monument was established through Presidential Proclamation 9496 (Appendix A) issued on September 15, 2016, under the authority of the Antiquities Act of 1906. Proclamation 9496 tasked the Secretaries of Commerce and Interior with preparing a joint management plan for the Monument. Under this proclamation, the Secretaries are instructed to revise and update the management plan as necessary, and to work to continue advances in resource protection in the Monument area that have resulted from a strong culture of collaboration and enhanced stewardship of marine resources. An internal White House review of existing monuments and a subsequent 2020 Presidential Proclamation on modifying the Northeast Canyons and Seamounts Marine National Monument, which reversed the prohibition on commercial fishing in the Monument, led to a delay in the initial development of the Monument's management plan.

Presidential Proclamation 10287 (Appendix B), issued on October 8, 2021,

- reinstated the prohibition on commercial fishing in the Monument;
- instructed the Secretaries of Commerce and Interior to manage the Monument under the directives of the Monument's establishing Presidential Proclamation (9496); and
- **directed the Secretaries to develop a joint management plan for the Monument by September 15, 2023.**

In accordance with the National Wildlife Refuge System Administration Act and National Wildlife Refuge System Improvement Act of 1997, the Monument is required to have in place a comprehensive conservation plan and revise it every 15 years, as needed. Comprehensive conservation plans for units of the National Wildlife Refuge System are science-based and public-centered, relying on public participation and input. The Monument's final management plan will serve as a comprehensive conservation plan in fulfillment of this legal mandate.

Additionally, a Monument management plan is needed because management planning offers a critically important opportunity to engage Tribal Nations, Federal and state agencies, interested parties, and the public in developing a shared vision, as well as goals and objectives, for long-term conservation and protection of this special place.

For marine protected areas such as the Monument, which have been created using executive authorities, participation in management planning may be one of the first opportunities for the public to provide detailed input. It is well understood that the nature of community involvement in marine protected area management plays a strong role in how successful these areas are in conserving and protecting resources. Thus, development of a management plan is an important and necessary step in engaging and encouraging a community of stewards to care for the Monument and its unique, awe-inspiring ecosystems.

Participating Agencies

The U.S. Navy (Navy), Department of State and U.S. Coast Guard (USCG) are participating agencies in this management plan and environmental assessment under NEPA. They have consulted with the Monument management team, provided expert technical advice on activities being proposed to occur in the Monument, reviewed and provided language for inclusion in the management plan and environmental assessment and plan to meet regularly with the Monument management team as the management plan is implemented. These agencies all have open invitations to become formal members of the Monument management team at any point in time.

The Monument management team reached out to the U.S. Air Force to identify any potential issues and coordination needs, but as there are no anticipated changes to flight patterns over the Monument, there was not a need for the U.S. Air Force to be formally involved.

Activities Outside Scope

In evaluating the proposed action of adopting and implementing a management plan for the Monument, some issues are outside of the scope of this environmental assessment, including:

- **Evaluating the effects of activities prohibited in the Monument in its establishing Presidential Proclamation.** In accordance with the Council on Environmental Quality regulations, 40 C.F.R. § 1501.1, in determining whether NEPA applies, Federal agencies should consider, "whether the proposed activity or decision, in whole or in part, is a non-discretionary action for which the agency lacks authority to consider environmental effects as part of its decision-making process." Neither the FWS nor NOAA have discretion related to the enactment of the prohibitions in Presidential Proclamation 9496, which established the Monument. While the management plan identifies activities to ensure compliance with these prohibitions, neither NOAA nor the FWS have discretion over the prohibitions themselves and are not able to consider any alternatives to them. Consequently, these prohibitions are not subject to NEPA and their effects on the human environment are not considered within the scope of this environmental assessment. The prohibitions are:

  1. Exploring for, developing or producing oil and gas or minerals, or undertaking any other energy exploration or development activities within the monument.

  2. Using or attempting to use poisons, electrical charges or explosives in the collection or harvest of a monument resource.

  3. Introducing or otherwise releasing an introduced species from within or into the monument.

  4. Removing, moving, taking, harvesting, possessing, injuring, disturbing or damaging, or attempting to remove, move, take, harvest, possess, injure, disturb or damage, any living or nonliving monument resource, except as provided under regulated activities.

  5. Drilling into, anchoring, dredging or otherwise altering the submerged lands; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands, except for scientific instruments and constructing or maintaining submarine cables.

6. Fishing commercially or possessing commercial fishing gear except when stowed and not available for immediate use during passage without interruption through the monument (with the exception of the red crab fishery and the American lobster fishery, which are allowed through September 15, 2023).

- **Evaluating the effects of submarine cable maintenance and installation.**
  While listed as a regulated activity in the establishing proclamation, regulation of and analyzing the effects of submarine cable installation and maintenance are outside the scope of this management plan and environmental assessment. This topic will be addressed in a separate document (potentially a step-down plan and/or compatibility determination, as appropriate), a draft of which will be published for public comment.

  The Monument management team is engaged in ongoing discussions with the Department of State regarding the installation and maintenance of submarine cables in the Monument to ensure that the FWS's and NOAA's obligations under Presidential Proclamation 9496 and the National Wildlife Refuge System Administration Act of 1966 are met, consistent with international law. The Monument management team will also engage with the submarine cable industry on this issue to better understand the nature of submarine cable installation and maintenance work in the Monument and the best management practices used by industry to avoid impacts to sensitive marine resources.

  The Monument is managed in accordance with international law.

- **Evaluating the effects of shipping vessel traffic.**
  Presidential Proclamation 9496 states that the Monument shall not unlawfully restrict navigation, overflight, and other internationally lawful uses of the sea in the Monument. The management plan does not consider any regulation of shipping vessel movement in the Monument; and the environmental assessment does not evaluate the effects of shipping vessel traffic on marine resources. The management plan does identify information-gathering activities related to shipping vessel traffic, in partnership with the USCG.

- **Evaluating routine activities of an unusually large scale or scope.** There could be routine activities evaluated in this environmental assessment (such as a research project or filming project) that are proposed on an unusually large scale or scope. In these situations, the activities may no longer be considered routine, and the Monument management team may require additional evaluation under NEPA.

- **Evaluating unanticipated future proposed activities.** There are many new and emerging technologies being developed for use in the ocean environment; and it is not possible for the Monument management team to predict or analyze the effects of all the projects or activities that could be proposed in the Monument in the future. The environmental assessment evaluates the effects of the common types of activities that the Monument management team believe are likely to be undertaken in the Monument at this point in time. Supplemental planning documents and NEPA evaluations that tier off this environmental assessment may be required to address unanticipated activities that could be proposed in the future.

Background

Early information gathering and research for the management plan took place internally within the FWS and NOAA Fisheries from the time of the Monument's establishment in 2016 through 2021 and included gathering references and information on Monument resources and interagency discussions about management issues.

The FWS and NOAA Fisheries began ***formal pre-scoping*** for the management plan in late 2021. ***Pre-scoping*** involved the two agencies talking together about their existing permitting authorities over resources within the Monument; contacting Tribal Nations; talking with other interested Federal agencies, states, and other interested parties; planning the number, location and timing of public scoping meetings; developing a written Notice of Intent to announce public scoping; hiring a planner to draft the plan; and contracting with Kearns & West, a collaboration and strategic communications firm, to provide facilitation and planning support for public scoping meetings.

Public Scoping

Formal public scoping began on November 27, 2022, when the FWS published a press release announcing that NOAA and the FWS were developing a management plan for the Monument and were accepting public scoping comments in writing and verbally. Verbal comments were accepted at four public engagement sessions held on:

- Tuesday, December 6, 2022 (in person, Mystic Aquarium)
- Friday, December 9, 2022 (virtual)
- Monday, December 12, 2022 (in person, New England Aquarium)
- Monday, December 19, 2022 (virtual)

On December 28, 2022, the FWS and NOAA jointly published a Notice of Intent in the Federal Register formally announcing their intent to develop a management plan for the Monument and requesting ideas and comments from the public on topics related to Monument research, outreach and engagement, environmental education and resource conservation. Written comments were accepted until January 31, 2023. While the public meetings occurred before the Notice of Intent was published, verbal comments provided during the four public engagement sessions and any written comments received prior to the Notice of Intent were included and considered along with all the written comments received after the Notice of Intent was published.

In-person meeting attendees: 58

Virtual meeting attendees: 59

Number of written comments received: 981

A total of 117 people attended the four meetings. Fifty-eight people attended the in-person meetings and 59 attended the virtual meetings. Written comments could be provided by mail, email or handwritten comment card (accepted at the in-person public engagement sessions only). A total of 981 written submissions were received, 949 of which were duplicates of a single form letter from a letter writing campaign. In addition to the letter writing campaign, the Monument management

team received 22 written submissions by mail or email, and 10 handwritten submissions on comment cards.

Within the comments received, Kearns & West identified 765 unique statements offering suggestions or recommendations for the management plan. Out of those statements, the Kearns & West team identified 39 "key takeaway" recommendations, which are summarized in its report, "Northeast Canyons and Seamounts Marine National Monument Management Plan Public Scoping Key Takeaways" (Appendix D), which was published online on June 6, 2023. The Scoping Key Takeaways report includes as an appendix all of the verbatim comments that were submitted during public scoping. The public comments greatly informed the draft and final management plan.

Focus Groups

After the conclusion of the public scoping and comment period, Kearns & West hosted and facilitated, on behalf of the Monument management team, seven focus group meetings to gather additional information from topical experts needed to inform the management plan. The focus groups addressed four topics: research and exploration, communication and community engagement, best management practices and stewardship. The Monument management team needed more information from those with expertise in these four topics to add more detail to the objectives and activities in the draft management plan.

Representatives from 11 federally recognized and three state recognized Tribal Nations were invited to attend the focus groups, along with an additional 105 individuals from 68 organizations with specific expertise in marine research, environmental education, management of protected areas, marine recreational activities, and commercial fishing. A total of 42 individuals responded to the invitation, and 35 attended a focus group. No representatives from Tribal Nations responded or attended.

The focus groups were held virtually in February and March 2023, and each lasted 90 minutes. Kearns & West facilitated each discussion based on a series of questions relevant to each focus group topic and produced a summary report (Appendix E). The summary report includes the questions that were asked of each focus group and a summary of participant responses.

The feedback from both public scoping and the focus groups contributed substantially to the draft management plan, both by shaping the alternatives and making the plan more robust and detailed. The Monument management team greatly values the time that the public and focus group participants invested in helping develop the management plan.

Public Comment Period for Draft Management Plan and Environmental Assessment

The Monument management team published a draft management plan and environmental assessment for the Monument on September 12, 2023, with a request for public comment. Public comments were accepted from September 12 to October 26, 2023 (45 days). The Monument management team was particularly interested in comments, ideas, opinions, data and analyses related to the vision, goals, objectives and activities in the plan; any potential partners who should be referenced; the proposed permitting system; and the effects analysis.

During the public comment period, comments could be submitted verbally and in writing. Verbal comments were recorded during six public meetings. Three of the meetings were held in person

in Plymouth, Massachusetts (September 27, 2023), Providence, Rhode Island (October 10, 2023), and Portsmouth, New Hampshire (October 18, 2023). Three meetings were held virtually on October 4, October 13 and October 23, 2023.

Written comments were accepted electronically through the www.regulations.gov website and by mail. All written comments can be viewed and downloaded online by searching for docket FWS-R5-NWRS-2023-0154 on the www.regulations.gov website. Additionally, all written and verbal comments can be found in Appendix F.

Sixty-eight (68) people attended the public meetings and a total of a total of 12,219 written comments were submitted. Most of the written submissions (12,185) were from letter-writing campaigns. The largest letter writing campaign, led by Environment America, included 11,583 submissions.

The Monument management team considered all substantive comments received during the public comment period and wrote responses to those comments (Appendix G). The comments received were both informative and thought-provoking, helping the Monument management team refine and clarify language in the management plan and better understand the value of the Monument to partners, stakeholders and the public.

Proposed Alternatives

In accordance with NEPA, the Monument management team evaluated a reasonable range of alternatives for its proposed action, including a "no action" alternative:

Alternative 1: No Action, meaning no management plan would be adopted or implemented.

Alternative 2: Volume 1 final management plan and permitting system that leverages existing permitting programs and would require FWS or NOAA permits for many, but not all, activities in the Monument. (preferred alternative)

Alternative 3: Volume 1 final management plan with a different approach to permitting that would create and require a joint-agency access permit for all access to the Monument (in addition to any existing NOAA and FWS permitting requirements)

Proposed Alternative 1: No action, meaning no management plan would be adopted or implemented.

Proposed Alternative 1 is the "no action" alternative, which the Monument management team is required to evaluate under NEPA. Under the no action alternative, no management plan would be adopted and implemented for the Monument.

The Monument management team would still be responsible for managing the Monument under its respective authorities, but there would not be a written, publicly accessible plan that explains how that work would get done, and how coordination between NOAA and the FWS would occur. It is assumed that wildlife watching, diving, boating, educational trips, photography and filming, research and recreational fishing would all continue to occur in the Monument, as would many of the coordination, outreach and engagement activities described in the Volume 1

management plan. But there would not be a clearly identified approach to management, permitting, stewardship, research, exploration, engagement and outreach, including specific goals, objectives and timelines. Management and permitting issues would likely be dealt with on a case-by-case basis.

Proposed Alternative 2: Volume 1 final management plan and permitting system that leverages existing permitting programs and would require FWS or NOAA permits for many, but not all, activities in the Monument. *(preferred alternative)*

Proposed Alternative 2 is the Monument management team's **preferred alternative**. Under Alternative 2, the Monument management team proposes to adopt and implement the management plan and permitting system overview, as presented in Volume 1.

The Volume 1 final management plan includes a wide variety of activities organized under three broad program areas: Management & Stewardship, Research & Exploration, and Engagement & Education.

The permitting system described in the Volume 1 final management plan uses as a foundation existing NOAA Fisheries permitting structures already in place in the region that includes the Monument for recreational fishing, scientific research, educational trips that involve fishing, and photography and filming of marine mammals. NOAA Fisheries has detailed and comprehensive websites explaining its permitting processes and ocean user groups are familiar with these permitting processes. FWS special use permits are proposed to be required for some activities for which NOAA does not currently have existing permitting structures in place or for which the FWS is required to issue permits.

Under this alternative, no permits are anticipated to be required for wildlife watching, diving, and recreational boating trips in the Monument. Presidential Proclamation 9496 states specifically that, "nothing in this proclamation is intended to require that the Secretaries issue individual permits in order to allow such activities." Under Alternative 2 the Monument management team would work with partners to use written and verbal surveys and remote sensing technologies to understand use of the Monument and would work with user groups to build partnerships and develop voluntary information-sharing mechanisms.

Proposed Alternative 3: Volume 1 final management plan with a different approach to permitting that would create and require a joint-agency Monument access permit for all access to the Monument (in addition to existing NOAA Fisheries and FWS permitting requirements).

Under proposed Alternative 3, the Monument management team would adopt and implement the Volume 1 final management plan with changes to the permitting overview and permitting-related activities. This alternative was developed specifically in response to public scoping comments stating that uses of the Monument should be strictly monitored to ensure protection of sensitive ecosystems.

The Monument management team would take a different approach to permitting under Alternative 3 compared to that proposed in Alternative 2. Under Alternative 3, the Monument management team would develop a joint-agency Monument access permit that would be required for non-NOAA, non-FWS access to and use of the Monument, including for recreational fishing,

whale watching, bird watching, diving, recreational boating, research, photography and filming, and educational at-sea trips.

Under this alternative, the management plan activities presented in Volume 1 would be revised to focus more heavily on activities that involve:

- developing the joint-agency Monument access permit;
- informing the public and user groups about the requirement to apply for the joint-agency Monument access permit;
- issuing joint-agency Monument access permits; and
- ensuring compliance with the requirement to obtain a joint-agency Monument access permit.

Under this alternative, the application to get a permit for recreational access such as recreational fishing and wildlife watching would be an online process. Applying for joint-agency access permits for activities such as research, educational trips, and commercial filming would also be an online process but would require a more detailed application and additional review time by Monument staff (similar to that required for FWS special use permits).

This joint-agency Monument access permit would be required only for activities occurring within Monument boundaries and would be ***in addition*** to any permits that are currently required by NOAA Fisheries and the FWS. As an example, a charter boat taking anglers to catch recreational tuna in the Monument would need the mandated Highly Migratory Species Charter/Headboat permit from NOAA Fisheries for its activities, as well as a joint-agency Monument access permit.

The joint-agency access permit would not be intended to restrict recreational access but would be used to track and understand all uses of the Monument and ensure that anyone entering the Monument was aware of all prohibitions in the Monument.

More staff and a higher budget would be necessary to implement this alternative, which would focus more on enforcement and compliance than on community stewardship.

Alternatives eliminated from further consideration:

Establishing a formal advisory committee under the Federal Advisory Committee Act – Public involvement in and feedback on Monument management is key to effective management of this unique marine environment. During the public scoping period, the public expressed an interest in the formation of an advisory council for the Monument similar to those created for national marine sanctuaries. National marine sanctuary advisory councils are formed by NOAA under authorities specific to the National Marine Sanctuaries Act. The Monument, because it is not a national marine sanctuary, does not operate under the authorities of the National Marine Sanctuaries Act and cannot establish an advisory council using the same procedures.

To establish a formal advisory committee, the Monument would need to follow Federal Advisory Committee Act (FACA) rules and procedures. Establishing an advisory committee using this process is involved and time-consuming, requiring significant staff effort, along with an involved review process for applicants.

The Monument management team estimates that establishing an advisory committee in accordance with FACA could require up to 50% of the FWS Superintendent's and NOAA Fisheries Monument lead's time for at least the first two years of management plan implementation. Given the variety of other high priority work needed to manage the Monument and the other options available for fostering public involvement in Monument management, the Monument management team eliminated establishing a formal advisory council under FACA from further consideration. The Volume 1 final management plan identifies other ways the public and stakeholders can be involved in Monument management.

Banning recreational fishing from all or portions of the Monument – During public scoping and during focus group meetings, it was suggested that, if commercial fishing is not allowed in the Monument, then recreational fishing also should not be allowed, or should be heavily restricted. Presidential Proclamation 9496, which established the Monument, identifies recreational fishing as a regulated activity that may be permitted if the activity is consistent with the care and management of the objects within the Monument.

The purpose of the Monument is, in part, to provide opportunities to further the educational value of the Monument and connect people with its unique ecosystems. Recreational fishing presents an important opportunity to connect people with the Monument and increase their understanding of the species that depend on it. Additionally, the Monument is managed by the FWS as a unit of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act, which requires the FWS to ensure that opportunities are provided for compatible wildlife-dependent uses, such as fishing, and to provide increased opportunities for families to experience activities such as fishing and other traditional outdoor activities (16 U.S.C. 668dd) in the National Wildlife Refuge System.

At this time, the Monument management team has not found evidence to suggest that the level of recreational fishing in the Monument or the gear or practices associated with recreational fishing in the Monument are inconsistent with the care and management of the objects within the Monument, particularly the deep-sea coral communities.

The Monument management team's understanding is that recreational fishing in the Monument occurs almost solely in the Canyons Unit and is primarily geared toward rod and reel fishing for highly migratory species, which should not cause seafloor disturbance or significant impacts to species in the Monument, and which is intensely regulated through international conventions. The management team does not have concerns about impacts of recreational fishing to the unique geologic features of the Monument or the ecological communities that rely on these features.

Thus, additional restrictions on recreational fishing in the Monument – beyond those NOAA Fisheries may impose under its authorities under the Magnuson-Stevens Fishery Conservation and Management Act – are eliminated from further consideration. Under Alternative 3, there would be an additional permitting requirement for recreational fishing (and all recreational access) of the Monument, but that permit would be used to track recreational use of the Monument, not restrict it.

Partial or full re-opening of the Monument to commercial fishing – During public scoping comments were submitted requesting that the Monument management team consider fully or

partially re-opening the Monument to commercial fishing activities in the management plan. Presidential Proclamation 9496, which established the Monument, prohibits commercial fishing in the Monument (in some fisheries, through a phase-out process that was complete on September 15, 2023) and does not give either NOAA Fisheries or the FWS discretion to make changes to this prohibition. Thus, alterations to the commercial fishing prohibition are eliminated from further consideration in the management plan and environmental assessment.

Alteration to existing vessel traffic patterns in the Monument – Scoping comments raised concerns about the adverse impacts of shipping vessel traffic to marine species. Presidential Proclamation 9496, which established the Monument, does not categorize shipping as either a regulated or prohibited activity, but does state that,

"the management plan and their implementing regulations shall not unlawfully restrict navigation and overflight and other internationally recognized lawful uses of the sea in the monument and shall incorporate the provisions of this proclamation regarding U.S. Armed Forces actions and compliance with international law. No restrictions shall apply to or be enforced against a person who is not a citizen, national, or resident alien of the United States (including foreign flag vessels) unless in accordance with international law. Also, in accordance with international law, no restrictions shall apply to foreign warships, naval auxiliaries, and other vessels owned or operated by a state and used, for the time being, only on government non-commercial service, in order to fully respect the sovereign immunity of such vessels under international law."

At this time, the Monument management team does not have sufficient information related to either the environmental impacts of existing shipping vessel traffic in the Monument or the lawful mechanisms through which management of shipping vessel traffic in the Monument could occur. Thus, alterations to shipping vessel traffic in the Monument are eliminated from further consideration.

The Monument management team, in cooperation with the USCG, has identified activities in the management plan to analyze Automatic Identification System (AIS) tracking data from vessels transiting the Monument to better understand the nature of shipping vessel traffic in the Monument. The Monument management team will work with the USCG, marine mammal experts, pelagic seabird experts and the shipping industry to understand better whether impacts are occurring to Monument resources and will work in partnership to address impacts.

Affected Environment and Environmental Effects

What is the affected environment?

NEPA requires that Federal agencies define and describe the area (including biological, physical, cultural, socioeconomic, and historical resources) that will be affected by the proposed action and alternatives. In this case, the affected environment includes the area (including air, water, and seafloor) within the Monument physical boundaries. There are also onshore communities that are connected to the Monument socioeconomically, culturally, and historically. The onshore affected environment is considered to include the region from Maine to New York.

What activities are being evaluated?

A wide range of activities may take place in the Monument to differing extents under all three management plan alternatives. These activities fall within two general categories: management and program activities (onsite and onshore); and onsite use activities in the Monument.

Management and Program Activities

- **Onshore routine office and management activities**: attending virtual and in-person meetings (including driving); developing and publishing reports; data analysis; hosting public meetings; hosting volunteer steward trainings; developing needs assessments, management plan amendments, or step-down plans; developing financial agreements to fund Monument-related projects; reviewing permit applications and issuing permits; conducting media outreach through press releases and interviews; maintaining a web and social media presence.
- **Onshore educational and outreach activities:** Developing and funding construction of exhibits, attending and participating in person in a wide variety of events throughout the Monument region, visiting classrooms (including driving).
- **Onshore research activities:** Interviews, travel to and study of historical and cultural collections, data analysis (including study and cataloging of collected biological and physical samples, digitizing past dive footage and conducting analysis of recent dive footage).
- **Onsite field research and monitoring activities:** It is anticipated that between one and five onsite field research, stewardship and monitoring trips may happen in the Monument in any given year, depending upon funding. Field activities may include the use of telemetry on seabirds and marine mammals; ship-based acoustic bathymetric surveying using multi-beam and sidescan sonar; underwater filming, sample collection, and general exploration using underwater cameras (baited and non-baited), remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs); collection of biological and physical samples; ship-based and aerial (planes and uncrewed aerial systems) surveys; observational studies of wildlife; installation of permanent or semi-permanent monitoring buoys anchored to the seafloor.
- **Onsite marine debris and abandoned, lost or otherwise discarded fishing gear (ALDFG) mechanical removal:**
  Commercial fishing vessels or small boats may use multiple means to remove debris from the environment. Methods include grapples (pulling a hook and chain along bottom to snag debris on the bottom) to pick up lobster pots, winches on a surface vessel, or ROVs may be used for targeted removal. If grapples are used, they are paired with side scan sonar to ensure removal efforts are targeted and can avoid sensitive areas. The specific process used for ROVs may use a snipping device attached to the manipulating arm to cut line and a grabbing device to grasp material such as a net fragment; then a carabineer (metal hook) could be clipped onto a net or trap with the grabbing arm, and as the ROV is retrieved the line is transferred to the boat's hydraulic winch and the gear can be hauled to the surface. Side scan sonar may also be utilized to help locate derelict gear. Typically, the sonar used is commercially available low-powered, high-frequency sonar systems. Given that more assessment of marine debris and ALDFG in the Monument is needed, it is uncertain how frequent any marine debris and ALDFG removal might be.

- **Restoration of deep-sea corals:** Deep-sea coral restoration is a new and evolving stewardship practice. The Monument management team is not sure whether there is a need for deep-sea coral restoration in the Monument at this time, but it could be a management strategy in the Monument. Deep-sea coral restoration could involve collecting coral samples from the Monument to culture and grow in controlled aquaculture laboratories until they are a sufficient size to be outplanted in the Monument's deep-sea environment (using ROVs with robotic arms).
- **Onsite routine enforcement and compliance activities:** These efforts could include vessel trips in or flyovers of Monument, writing trip reports, investigative work including interviews and report writing. It is uncertain how many additional vessel trips or flyovers, beyond those currently taking place, would be needed to ensure compliance with Monument rules and regulations. Law enforcement agencies are resource constrained and prioritization of enhanced enforcement of Monument rules and regulations may require de-emphasizing other important regulations and priorities.

Onsite Use Activities

- **Onsite non-fishing recreational and visitor activities:** wildlife watching, blue water diving, sailing, boating, still photography and filming (for personal use), educational trips that do not involve fishing activities.
- **Recreational fishing activities:** headboat and charter boat (for-hire) recreational fishing trips for highly migratory species and private angling.
- **Onsite photography and filming (for commercial distribution):** filming of documentaries or other film genres for distribution, photography for publication or distribution.
- **Onsite education activities that involve fishing:** overnight trips aboard vessels to the Monument for students and teachers to provide hands-on instruction in the field of marine biology, ornithology, and oceanography, which could include fishing activities that do not disturb the seafloor, such as plankton tows, and other sampling of organisms, water quality monitoring and analysis, and observation of wildlife.

How are "effects" described and evaluated in NEPA documents?

In evaluating the effects of their proposed actions on the environment, NEPA asks Federal agencies to consider whether effects are,

Beneficial or adverse *– Will the action have a positive impact or a negative impact on the affected environment?*

Direct or indirect *– Will the action directly affect a resource? For example, anchoring a scientific monitoring buoy to the seafloor causes direct disturbance of the seafloor. Or will the action cause a chain reaction that will indirectly affect a resource? For example, driving fossil fuel-based vehicles to meetings will contribute to greenhouse gas emissions, which in turn will contribute to a warming climate, which in turn may contribute to changes in species' populations.*

Short-term or long-term *– Will the action cause an effect that is temporary and over quickly? Or will the action cause a permanent or long-term change to a resource?*

Cumulative in nature– *Cumulative effects are the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions (including action by Federal and non-Federal agencies and private parties).*

Significant or insignificant *- Federal agencies must also determine whether any adverse effects are significant or insignificant within the context of NEPA. In making a significance determination, agencies are asked to consider both the context and intensity of the proposed action(s). How severe will any adverse effects be? Will public health or safety be adversely affected? How permanent will any adverse effects be? Are there unique characteristics of the place where the activity is occurring? Are there endangered or threatened species or habitats that will be adversely affected? Are there ways to mitigate adverse impacts? Is there public controversy around adverse environmental effects that may occur? Is there uncertainty about the effects or unique risks associated with the proposed action? Are cumulative adverse effects expected? Will there be loss or destruction of significant scientific, cultural, or historical resources? Does the proposed action(s) violate any federal, state, or local law imposed for the protection of the environment?*

If a Federal agency finds in its environmental assessment that its proposed action(s) will have significant adverse effects to the environment, then it must complete an environmental impact statement to further evaluate those significant effects and identify ways to mitigate them. If the Federal agency finds that any expected adverse effects will be insignificant, the agency can issue a finding of no significant impact (FONSI) and move forward with implementing its proposed action(s).

Documents incorporated by reference

NEPA regulations (40 C.F.R. § 1501.5) instruct Federal agencies to keep environmental assessments brief and focused on the specific information the agency used to determine whether to prepare a FONSI or an environmental impact statement.

To assist in this effort, NEPA regulations (40 C.F.R. § 1501.12) also instruct Federal agencies to incorporate material, such as planning studies, analyses, or other relevant information, into environmental documents by reference to cut down on bulk without impeding agency and public review of the action.

The environmental effects discussion for this environmental assessment incorporates multiple other NEPA evaluations published by NOAA that evaluate the effects of a variety of research and recreational fishing activities within the geographic area that includes the Monument.

Physical Environment

The Monument is located approximately 130 miles southeast of Cape Cod, Massachusetts, within the North Atlantic Ocean. The Monument is comprised of two distinct units (the Canyons Unit and the Seamounts Unit) covering 4,913 square miles of ocean floor and waters of the continental margin, off the southeastern portion of Georges Bank (Fig. 1, inside cover).

*The **Pleistocene Era** was the time in the Earth's history that spanned from around 2.5 million years ago to 11,700 years ago. It is commonly referred to as the "Great Ice Age."*

The canyons, which are cut into the continental margin, were created by sediment mass movements during and following sea-level lows that largely occurred during the Pleistocene Era.

During the **Pleistocene Era**, the coastline of the eastern U.S. extended much farther seaward than it does today (Fig. 2). The seamounts are part of the New England Seamount chain, a chain of over twenty underwater extinct volcanic mountains (Fig. 3). There are three canyons that lie within Monument boundaries and cut deep into the continental shelf: Oceanographer, Lydonia and Gilbert, along with several smaller canyons that are confined to just the slope. These include Filebottom and Chebacco canyons. The Canyons Unit consists of a small portion of the continental shelf, the continental slope, and the three canyons that cut into the continental slope.

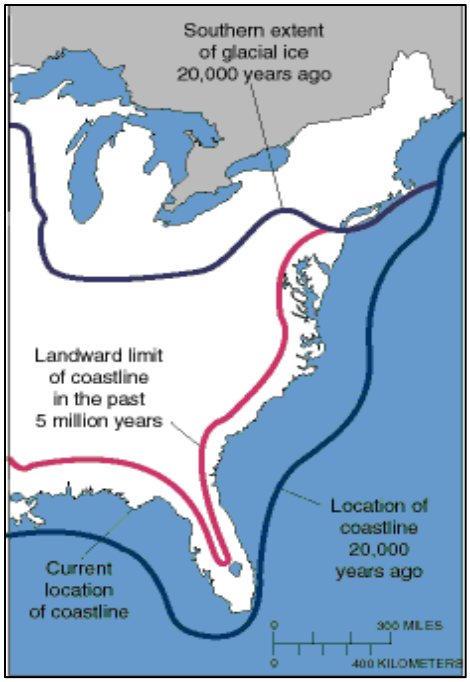


Figure 2 Graphic showing the location of the U.S. coastline during the Pleistocene Era, when the coastline extended much farther out into what is today the Atlantic Ocean (USGS).

There are four seamounts that lie within Monument boundaries and rise from the ocean floor: Bear, Physalia, Retriever and Mytilus. The Seamounts Unit consists of a portion of the continental slope, the continental rise, the abyssal plain and the four seamounts.

The shallowest seafloor depths in the Monument are located just north of the canyon heads and are around 92 meters (302 feet); and the deepest point in the Monument is 4,382 meters (14,377 feet) below sea level in the abyssal plain near the Monument's southernmost boundary (Auster et al., 2020). That is more than twice the depth of the Grand Canyon. Bear Seamount is the tallest of the four seamounts and its peak is 1,110 meters (3,641 feet) below sea level. Mytilus Seamount is the shortest of the four seamounts and its peak is 2,389 meters (7,838 feet or almost 1.5 miles) below sea level (Auster et al., 2020).

The physical environment in the Monument, including the submarine topography in the Monument (steep slopes, deep canyons, and tall undersea mountains) and various currents that meet in the Monument area, plays an important role in the high diversity and abundance of species and ecosystems within the Monument (Auster et al., 2020).

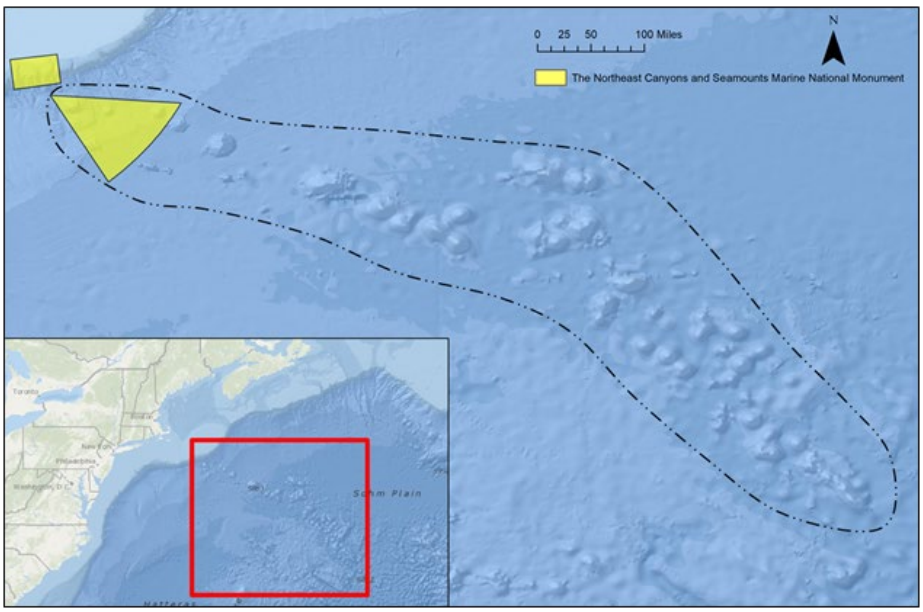


Figure 3 Map showing the Monument (the Seamounts Unit is shown as a yellow triangle and the Canyons Unit is shown as a yellow rectangle) within the context of the New England Seamount chain, which is surrounded by a dotted line and extends far out into the Atlantic Ocean.

Seafloor Composition and Geology

Continental Shelf

The outer continental shelf comprises a small portion of the Monument at the heads of the three canyons. The portion of the continental shelf that the Monument falls within is known as Georges Bank. Georges Bank was formed by the deposition of sediments left by retreating glaciers during the Pleistocene Era. Water depths within the bank are fairly shallow, ranging from 30 meters (100 feet) on its northwestern edge to around 200 meters (650 feet) on its southeastern edge (where the Monument is located).

Continental Slope and Continental Rise

The continental slope is the area in the Monument where the continental shelf slopes downward, descending at an average angle of 3-6 ° from the edge of the continental shelf until it becomes the continental rise. The base of the slope is defined by a marked decrease in seafloor gradient, which is the start of the continental rise.

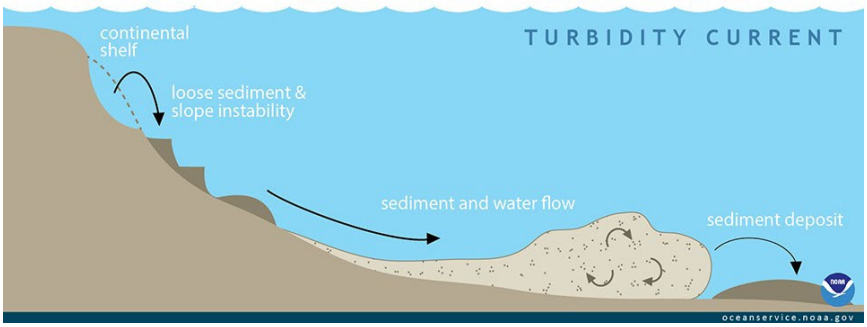


Figure 4 Labeled diagram showing the process that leads to a turbidity current (NOAA).

Over time, gravity causes the continental slope to act as a depositional site for sediment moving from the continental shelf. Sediment composition becomes gradually finer down the slope, towards deeper waters. As sediment accumulates on the slope, the material eventually

becomes unstable, resulting in sediment slumps, debris flow and possible turbidity currents. These mass wasting processes vary in scale, magnitude and may take place on a range of timescales. Slumps are typically characterized as involving short, localized, down-slope movement by a highly aggregated sediment mass; whereas turbidity currents are generally larger, faster moving events that can transport less aggregated sediments hundreds of miles (Fig. 4).

The continental rise begins at the base of the continental slope, where the seafloor gradient decreases. It is the boundary between the continental slope and the abyssal plain. Because of its position at the base of the slope and at the base of most submarine canyons, the continental rise accumulates enormous amounts of fine sediments. The continental rise is primarily shaped by mass wasting events, deposition from laterally flowing contour currents and the vertical settling of pelagic sediments (Heezen et al., 1966; Burke and Drake, 1974). A small portion of the Seamounts Unit, surrounding Bear Seamount, is comprised of continental rise habitat.

Submarine Canyons

There are three submarine canyons within the monument boundaries: Oceanographer, Gilbert and Lydonia Canyons (Fig. 5). These canyons are primarily cut into the continental slope and partially into the continental shelf and have a well-defined canyon axis and floor. These three canyons within the monument are "v" shaped in cross section, have steep walls, and are formed by erosion by rivers, mass-wasting processes on the continental slope and/or turbidity currents.

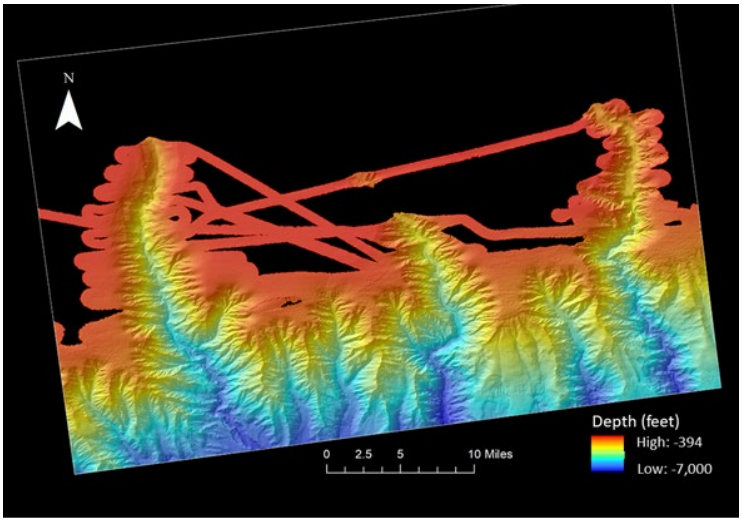


Figure 5 Bathymetric map showing depth of all three canyons in the Monument. (NOAA)

The material on the seafloor surface varies widely based on location within the canyons (for example, canyon walls versus floors). Canyon walls are typically characterized by rock outcroppings and stiff Quaternary clay. Although the underlying substrate of the canyon walls tends to be harder solid substrate, a thin layer of rippled unconsolidated silt and sand commonly covers the surface (Valentine et al. 1980).

Communities of burrowing bottom dwellers in the canyons have received less attention from researchers, reflecting, in part, sampling difficulties. One exception is a type of burrowing community known as a "pueblo village." These habitats consist of burrow complexes in hard

clay, often steeply sloped, in canyon walls. Burrowing is thought to be initiated by tilefish, but the habitats are also inhabited by lobsters, conger eels, Jonah crabs, squat lobsters, sea stars, and ocean pout in New England canyons. Similar habitats have been described from Hudson Canyon.

In contrast to the hard, intact substrate found on canyon walls, the canyon floor is primarily composed of unconsolidated sediment deposits such as gravel, sand, silt and mud (depending on the canyon). These unconsolidated sediments are lifted by ocean currents leading to enhanced mixing and transport. As a result of these strong ocean currents, submarine canyons act as conduits to transport unconsolidated sediment from the continental shelf to the deep sea (Allen and Durrieu de Madron, 2009). Extensive sediment transport and erosion can create changes to canyon topography and is typically caused by turbidity currents (Shanmugam, 2006).

Oceanographer Canyon is the deepest and largest of the three canyons within the Monument and cuts deeply into the continental shelf and the continental slope. Oceanographer Canyon's floor is covered with large sand dunes, up to three meters (almost 10 feet) high and 15 meters (almost 50 feet) long. This medium to coarse grain sand is transported from the continental shelf, down the canyon wall, onto the canyon floor where it is mobile along the axis of the canyon as a result of strong currents (Valentine et al*.,* 1980; Valentine et al*.,* 1984).

Gilbert Canyon incises the continental shelf and has two major branches. Similar to Oceanographer, the floor of Gilbert Canyon also has dunes and rippled sand. Lydonia is the second largest of the three canyons within the Monument and incises the continental shelf and the continental slope. Unlike Oceanographer and Gilbert Canyons, Lydonia Canyon's floor is covered with coarse silt instead of coarse sand. This silt can be as thick as 24 meters (80 feet) in some portions of the canyon (Twichell, 1983). The dunes and coarser sand substrate of Oceanographer and Gilbert Canyons indicate that these canyons have higher current activity than Lydonia Canyon (Valentine, 1987).

Abyssal Plain

The abyssal plain is described as the flat seafloor area beyond the continental rise. Within the Seamounts Unit, the abyssal plain surrounds Physalia, Retriever and Mytilus Seamounts (Bear Seamount is on the continental slope and continental rise, Fig. 6). The abyssal plain is generally characterized as ranging from approximately 3,048 to 6,096 meters (10,000 to 20,000 feet) in depth and has a flatter slope (e.g., 1:1,000; Heezen et al., 1959). Within the Monument, abyssal plain depths range from 3,048 meters (10,000 feet) to approximately 4,442 meters (14,575 feet).

The portion of the abyssal plain that is found within the Seamounts Unit is known as the Sohm Plain. The Sohm Plain covers approximately 350,000 square miles of the Atlantic Ocean and is generally described as being featureless as a result of the thick layer of sediment that covers the uneven surface. The substrate found on the Sohm Plain largely consists of finer sediments such as, clay, silt, and pelagic sediments interspersed with coarse sediment deposits called turbidites – originating from turbidity currents. The fine-grained sediment is believed to be primarily transported by the very slow settling of materials from the water column (McGregor, 1968; Piper et al., 1983).

Seamounts

Bear, Physalia, Retriever and Mytilus Seamounts are steep undersea mountains formed by volcanic activity. They are part of the New England Seamount chain that resulted from a mantle-plume hotspot, which has migrated eastward under the North American Tectonic Plate. Unlike islands, seamounts never break the surface of the water. The four seamounts within the Monument are largely conical in shape, although wave erosion over time has caused Bear and Mytilus seamounts to have plateaued or flat summits (Fig. 6).

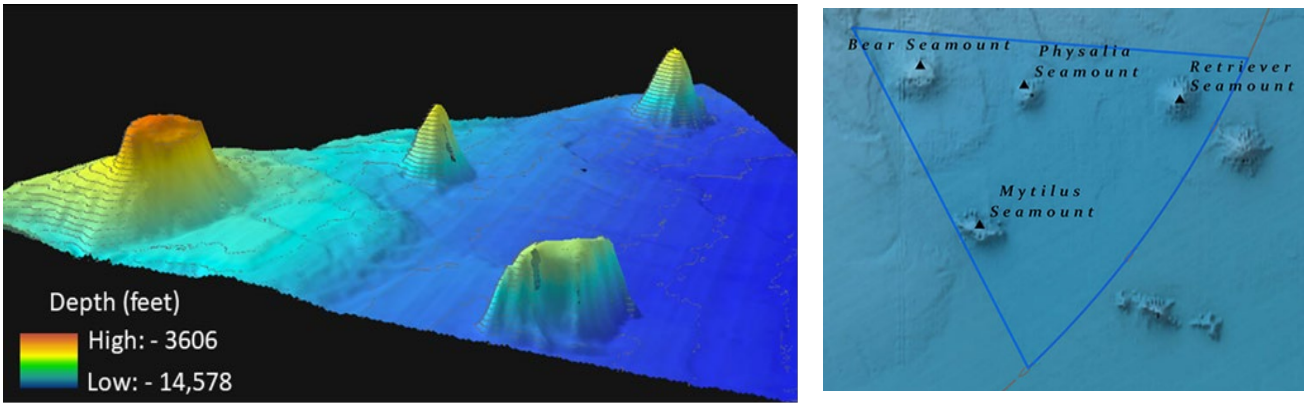


Figure 6 Three-dimensional graphic on the left showing the depth in feet for the Seamounts Unit next to a map (on the right) of the Seamounts Unit. Bear Seamount has a large, flat top and is the largest seamount. It is located furthest to the left in both graphics (NOAA).

The underlying foundation of the seamounts is volcanic in origin, so it is very different from the material that composes the continental margin. Seamounts are generally composed of hard basalt substrate, although fine-grained sediment is often found in topographic depressions that occur on the complex seamount topography.

The large distance between the seamounts and their extreme relief influence ocean current flow around them (Boehlert and Genin, 1987). Specific seamount characteristics that modify flow patterns include the spatial position on the seamount, depth, temperature and seamount features, such as ridges and walls. Flow patterns, along with variation in substrate type, result in extremely diverse physical microhabitats on and surrounding the seamount (Auster et al., 2005).

Bear Seamount is the westernmost and oldest of the New England Seamount chain – active around 100 million years ago. Unlike the other seamounts, Bear Seamount rises from the continental slope (Moore et al., 2003a). Thick sediment, outcrops of basaltic volcanic rock, and ***glacial erratics*** cover its summit. The Deep Western Boundary Current flows perpendicular to the New England Seamount chain and brings cold-water currents from the Labrador Sea. The eastern portion of Bear Seamount protrudes into this current (Moore et al., 2003a).

> ***Glacial erratics*** *are glacially deposited rocks that differ from the surrounding rock native to an area. Glaciers can pick up rocks and transport them over long distances before dropping them off in new homes.*

Physalia Seamount is almost directly east of Bear Seamount and as a result is younger. The summit of Physalia Seamount lies at a depth of approximately 1,898 meters (6,230 feet), while

the base of the seamount reaches down to depths of 3,352-3,657 meters (11,000-12,000 feet). Physalia Seamount rises from the Sohm abyssal plain and is largely conical in shape.

Mytilus Seamount is south of the other three seamounts. The summit of Mytilus Seamount lies at a depth of approximately 2,438 meters (8,000 feet), while the base of the seamount reaches down to depths of 3,810-4,114 meters (12,500-13,500 feet). Mytilus Seamount rises from the Sohm abyssal plain and has a largely flat summit, roughly 8.9 kilometers (5.5 miles) across.

Retriever Seamount is the furthest east of the four seamounts within the Monument boundaries, and as a result is the youngest. The summit of Retriever Seamount lies at a depth of approximately 1,950 meters (6,400 feet), while the base of the seamount reaches down to depths of 3,810-3,962 meters (12,500-13,000 feet). Retriever Seamount rises from the Sohm abyssal plain and is largely conical in shape.

Water Column

The open water column makes up a substantial component of the Monument. The water column in the Monument is primarily comprised of three horizontal regions, which are defined by depth and the associated amount of sunlight that penetrates through the seawater:

Epipelagic = uppermost zone = 0-199 meters or 0-656 feet

Mesopelagic = "twilight" zone = 200-1,005 meters or 660-3,300 feet

Bathypelagic = "midnight" zone = 1,006-3,992 meters or 3,300-13,100 feet

The epipelagic zone falls within the photic zone, meaning that these waters are exposed to enough sunlight to sustain photosynthesis. This upper layer of the ocean also interacts with the waves and wind at the surface, mixing the water and distributing the warmth from the sunlight. As a result of mixing, the epipelagic zone is nearly uniform in temperature (Day, 1999).

Below the epipelagic zone are the mesopelagic and the bathypelagic zones, which are considered to be in the aphotic zone. The aphotic zone is so named because very little to no sunlight penetrates through to these depths. The mesopelagic zone (200-1,005 meters or 660-3,300 feet) is known as the twilight zone because it receives very minute quantities of light and photosynthesis is not possible in this zone. The thermocline, a transitional area where water temperature decreases rapidly, occurs in the mesopelagic zone (Day, 1999). The depth and strength of the thermocline varies seasonally, and as a result strongly affects environmental conditions within the mesopelagic zone (Angel, 2003).

Below the mesopelagic zone is the bathypelagic zone (1,006-3,992 meters or 3,300-13,100 feet), also known as the midnight zone because there is no sunlight penetration. At these depths, temperature is much more constant, hovering around 39° F. Between the top of the mesopelagic zone (200 meters or 660 feet) and the bottom of the bathypelagic zone (3,992 meters or 13,100 feet), pressure increases 20-fold, from 20 to 400 atmospheres (Helfman et al., 2009).

Currents and Vertical Mixing of Waters

Ocean currents are the directed movement of water. They occur on the ocean's surface and at its deepest depths and they circulate nutrients throughout the ocean. The interaction of multiple ocean currents with the Monument's deep canyons and seamounts creates an ocean environment that supports high levels of biodiversity.

The Monument is situated where the warm, salty waters from the Gulf Stream Current meet the cold, fresh waters from Nova Scotia and offshoots of the Labrador Current (Fig. 7).

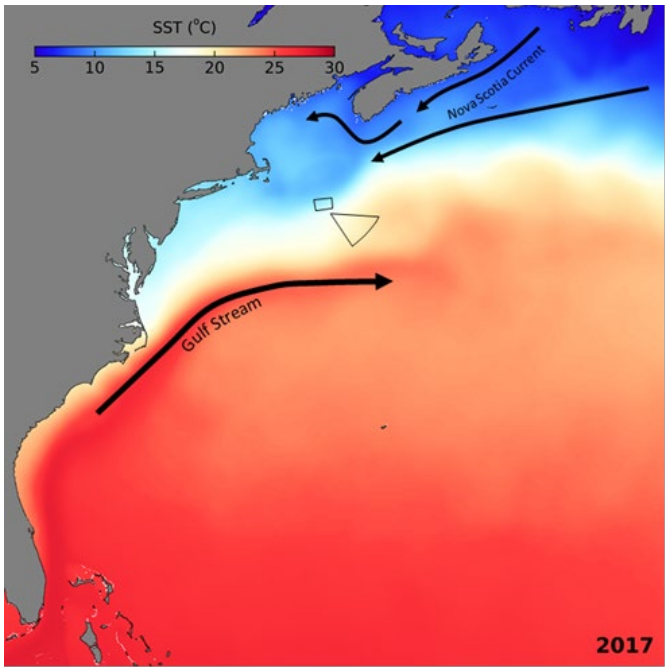


Figure 7 Graphic showing the convergence of warm, salty waters from the Gulf Stream Current with cold, fresh waters from the Nova Scotia Current and from other smaller currents splitting off from the large Labrador Current (Kavanaugh et al., 2017)

Georges Bank Currents

Currents on Georges Bank are comprised of three primary forms – which can occasionally occur simultaneously. The first current is a persistent, surface current which moves in a clockwise gyre around the bank. This gyre is considered to be semi-closed, retaining waters within Georges Bank, particularly during the summer months when waters are more stratified by temperature and salinity differences (Fig. 8).

The second form that occurs on the Bank is a strong semidiurnal tidal current (two high tides and two low tides each day). The third form of current is wind-driven; these occur as a result of storms (NOAA-NMFS, 2005). As a result of seasonal effects on storm direction and prevailing winds, these currents vary drastically in their direction and intensity (Li et al., 2015).

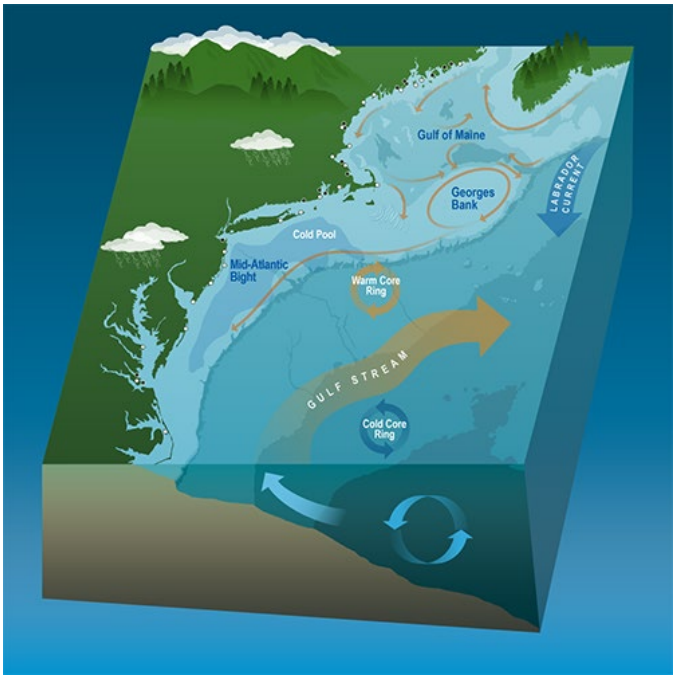


Figure 8 Graphic depicting the primary currents that circulate in and around Georges Bank (NOAA).

Slope and Shelfbreak Currents

Slope waters off the southeast flank of Georges Bank, where the Monument is located, are largely influenced by the Gulf Stream Current interacting with cooler Labrador slope waters (Townsend et al., 2006). The Gulf Stream is one of the strongest currents in the world, and is considered to be a warm surface current, largely driven by wind-induced processes. As the warm, saltier surface waters of the Gulf Stream merge with the cooler Labrador/Scotian Shelf waters, water density increases, causing the newly cooled, salty water to plunge downwards, leading to increased ocean mixing (Wunsch, 2002).

There is also substantial mixing that is caused by the ocean current flow patterns created by the topographic relief associated with seamounts and submarine canyons (Boehlert and Genin, 1987; Allen and Durrieu de Madron, 2009). Common ocean flow patterns associated with these topographic features include upwellings, and eddies (Auster et al. 2005; Allen and Durrieu de Madron 2009). Consequently, the seamounts and canyons cause additional mixing of waters within the Monument.

Warm-Core Rings

Gulf Stream water masses have been found to be dynamic and variable in their flow and in the formation of cold-core and warm-core rings (Richardson, 1983). Warm-core rings occur when cores of warm water, originating from the Gulf Stream, pinch off, becoming detached and surrounded by cooler slope waters (Fig.9). Cold-core rings form and detach to the south of the Gulf Stream. The largest frequency of warm core ring formations from the Gulf Stream Current is seen near the New England Seamounts (Auer, 1987).

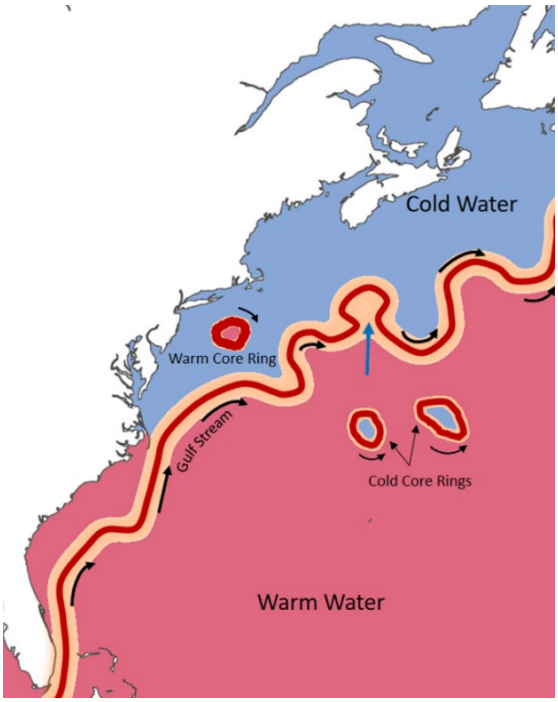


Figure 9 Diagram showing the warm Gulf Stream Current winding north into colder Labrador/Scotian Shelf waters. Occasionally, warm-core rings and cold-core rings will pinch off the Gulf Stream Current. The blue, north-pointing arrow shows a warm-core ring about to pinch off (graphic by Austin Rizzo, USFWS).

Warm-core rings have a large influence on the physical and biological oceanographic conditions that are found within the Monument. Approximately 1,828 meters (6,000 feet) in depth and 64 to 201 kilometers (40 to 125 miles) in width, warm-core rings move at an average speed of 3.2 miles a day (Ryan et al., 2001). There is considerable annual variability in the number of warm-core rings that form in a given year (Chaudhuri et al., 2009 a,b). While these warm-core rings are often an important factor in generating cross-shelf exchange of waters, their annual variability in occurrence can result in drastically different physical and subsequent biological oceanographic conditions (Hare et al., 2002).

Sea Temperature, Salinity, and Climate Change

Sea surface temperatures of the shelf water on Georges Bank and the slope water (off the shelf) are quite different. Shelf surface waters (at 20 meters or 65 feet) are generally much cooler year-round than waters off the shelf. This difference is largely a result of the cooler Labrador Current/Scotian Shelf waters flowing south onto the shelf, and the influence of warm Gulf Stream waters flowing north into the slope (Flagg, 1987). Reports indicate that temperatures in the Gulf Stream current in the Monument during summer months can exceed 27 degrees Celsius (80 degrees Fahrenheit).

Salinity throughout the Monument waters generally increases during the summer months because of lower precipitation and higher evaporation rates (Lentz et al., 2003). Salinity is also higher whenever the Gulf Stream meanders into the Monument waters or whenever a warm-core ring pinches off into the area (Andres, 2016).

Both sea temperatures and salinity in the Monument and the North Atlantic are being influenced by climate change. Climate change is leading to a decrease in salinity and "freshening" of deep waters in the North Atlantic Ocean (Dickson et al., 2002), while rapid warming in the Gulf of Maine is accompanied by an increase in salinity in those warming waters.

Over the last two decades, ocean temperatures in the northeastern U.S. have warmed faster than most of the global ocean. In particular, the Gulf of Maine, which is adjacent to Georges Bank, has warmed faster than 99 percent of the global ocean over the past two decades (Pershing et al., 2015) and this warming trend is expected to continue. The position of the Gulf Stream Current is moving north as a result of climate change, bringing warmer water to the region (Gonçalves Neto et al., 2021).

Ocean temperatures continue to warm at both the surface and bottom throughout the northeast shelf. Seasonal sea surface temperatures in 2021 matched or exceeded the record temperatures from 2012. The region has been experiencing more frequent and intense marine heatwaves over the last decade, including 2021. Marine heatwaves measure not just high temperature but how long the ecosystem is subjected to the high temperature (NOAA Fisheries, 2022a) In 2021, a large number of warm core rings were present in May and June, which likely partially contributed to the movement of warm, salty offshore waters onto the shelf (NOAA Fisheries, 2022a).

Climate change has the potential to significantly affect deep-sea ecosystems in the North Atlantic and there are growing concerns about warming temperatures, increased acidification and decreased oxygen availability in the deep sea. These types of changes can lead to reductions in food availability in the deep sea (Morato et al., 2019).

Ocean acidification, which is the lowering of the sea water pH (causing it to become more acidic) is a global phenomenon that is being increasingly studied in the North Atlantic and is a growing concern for deep-sea communities. The increase in ocean acidity is caused by increasing amounts of carbon dioxide getting dissolved into ocean water. This increase in acidity can eventually lead to conditions that eat away at the minerals used by shell-building organisms such as corals, snails and bivalves to build their shells and skeletons (Doney et al., 2009, Feely et al. 2009) Efforts to model habitat for deep-sea corals and fish under changing climate scenarios suggest that the availability of suitable habitat for some deep-sea species will shrink significantly over the next 80 years due to climate change (Morato et al., 2019). A climate assessment for habitats reported that deep-sea corals and sponges on seamounts and canyons of the continental shelf and slope ranked very high for climate vulnerability (Farr et al., 2021).

Oceanographically, the Monument is incredibly complex and the effects of climate change on water temperature, salinity and currents add to that complexity. There are many unknowns regarding the long-term effects of climate change on the many habitats in the Monument, from the surface down to the midnight zone.

Light and Soundscape

The lightscape and soundscape of the Monument has not been comprehensively assessed. There is some human-produced light in the Monument from vessels traveling through and overhead planes. However, there are no known fixed, lighted structures in the Monument.

Sound travels long distances underwater. The soundscape in the Monument is not free from human-produced sounds, which come largely from vessels (engines and sonar) and overhead flights. However, the soundscape in the Monument is believed to be quieter than other, busier ocean spaces.

Weather and Air Quality

There are multiple wind currents that help to determine weather patterns in the Monument, including the Gulf Stream Current, the Labrador current and the North Atlantic Current. The Monument is experiencing increasing air temperatures and changes in storm and weather patterns due to climate change.

There is not much information available for air quality specifically in the Monument. Mercury deposition from the air into ocean waters is a worldwide concern. At least one study has shown that the North Atlantic Ocean has high concentrations of total mercury as a result of air deposition (Sorenson et al., 2010). Accumulation of carbon dioxide, methane and other greenhouse gasses in the atmosphere, which leads to warming air and water temperatures, is also a concern worldwide.

Marine debris and other objects of human origin

Marine debris, ALDFG, submarine cables (primarily telecommunications cables that rest on the seafloor) and shipwrecks are also a part of the Monument's physical environment.

There are 15 submarine cables that traverse the Seamounts Unit. Additionally, there is at least one report of a shipwreck in the Monument, though its exact location is not known. Archaeologists expect that there are likely other shipwrecks in the Monument, but their locations have yet to be discovered.

The magnitude of floating marine debris, submerged marine debris and ALDFG in the Monument is uncertain and needs to be assessed. Marine debris has become an increasingly recognized worldwide problem due to its ubiquity and resistance to breakdown. Marine debris can be generated from land-based and sea-based sources. Research shows that plastic waste is present in almost every marine habitat, from the surface to the seafloor. An estimated eight million metric tons of plastic waste enter the world's ocean each year (NASEM, 2022). Fishing gear can also be lost in marine environments due to conflicts with other fisheries, vessel traffic and extreme weather (NOAA in draft, 2023). Vessels can become abandoned or derelict due to natural disasters and boat ownership neglect. All of these human-made objects can cause injury to marine species and habitats, but also can serve as habitat for marine species. More work, much of which is identified in the management plan, is needed to locate and understand the effect of these human-made objects in the Monument.

Special and Protected Habitats

While the Monument itself is a protected habitat, there are additional special and protected habitat designations within the Monument, including three Habitat Areas of Particular Concern.

Habitat Areas of Particular Concern are a specific type of Essential Fish Habitat, as defined under the Magnuson-Stevens Fishery Conservation and Management Act. Essential Fish Habitat is defined as the waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. The purpose of identifying Habitat Areas of Particular Concern is to focus conservation, management and research efforts on subsets of Essential Fish Habitat that are vulnerable to degradation or are especially important ecologically for federally managed fish and shellfish. The Habitat Areas of Particular Concern designation alone does not confer additional protection or restrictions to an area, but helps to focus conservation, management and research priorities.

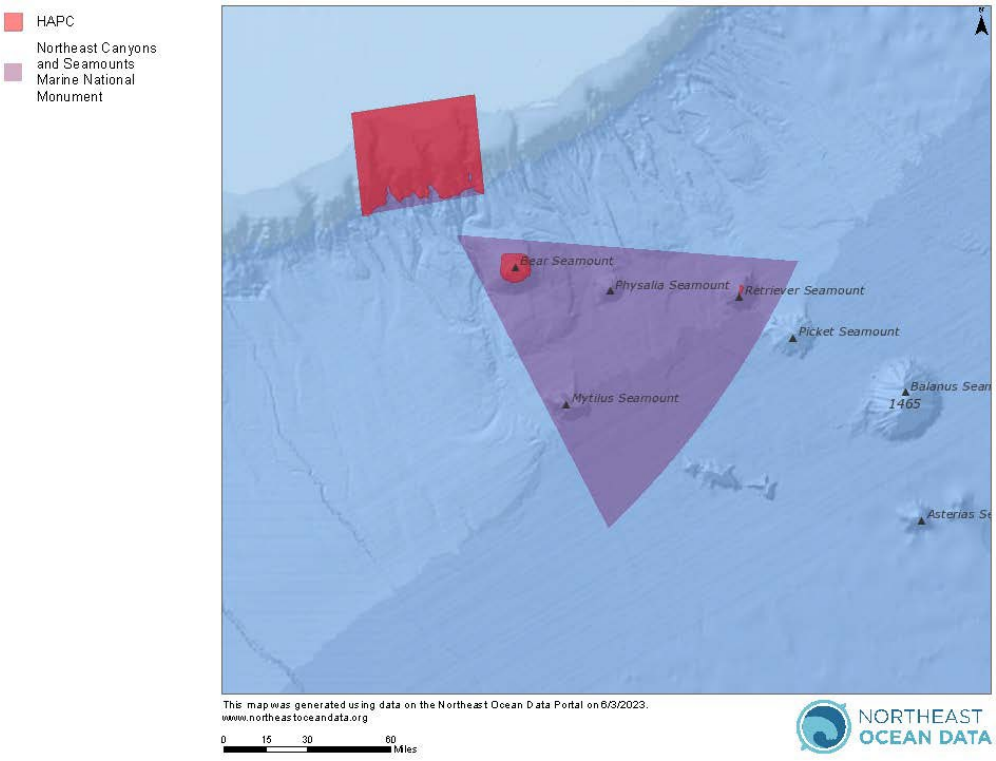


Figure 10 Map showing Habitat Areas of Particular Concern (abbreviated as HAPC and shown as red polygons) that fall within the Monument boundaries (NODP).

Additionally, the New England Fishery Management Council and NOAA Fisheries approved and implemented the Georges Bank Deep-Sea Coral Protection Area in 2021 (Fig. 11), which is a 65,146 square kilometer (25,153 square mile) area on the outer continental shelf in New England waters starting at 600 meters (1,968 feet) depth and includes approximately 82% of the Monument. This protection area was established to protect sensitive and vulnerable deep-sea coral habitats. The protections restrict the use of bottom-tending commercial fishing gear, with the exception of red crab pot gear, to protect deep-sea corals from interaction with and damage from such fishing gear. The Georges Bank Deep-Sea Coral Protection Area does not include a portion of the Canyons Unit that is around the canyon heads.

The Georges Bank Deep-Sea Coral Protection Area is adjacent to and complements the Frank R. Lautenberg Deep-Sea Coral Protection Area established by the Mid-Atlantic Fishery Management Council.

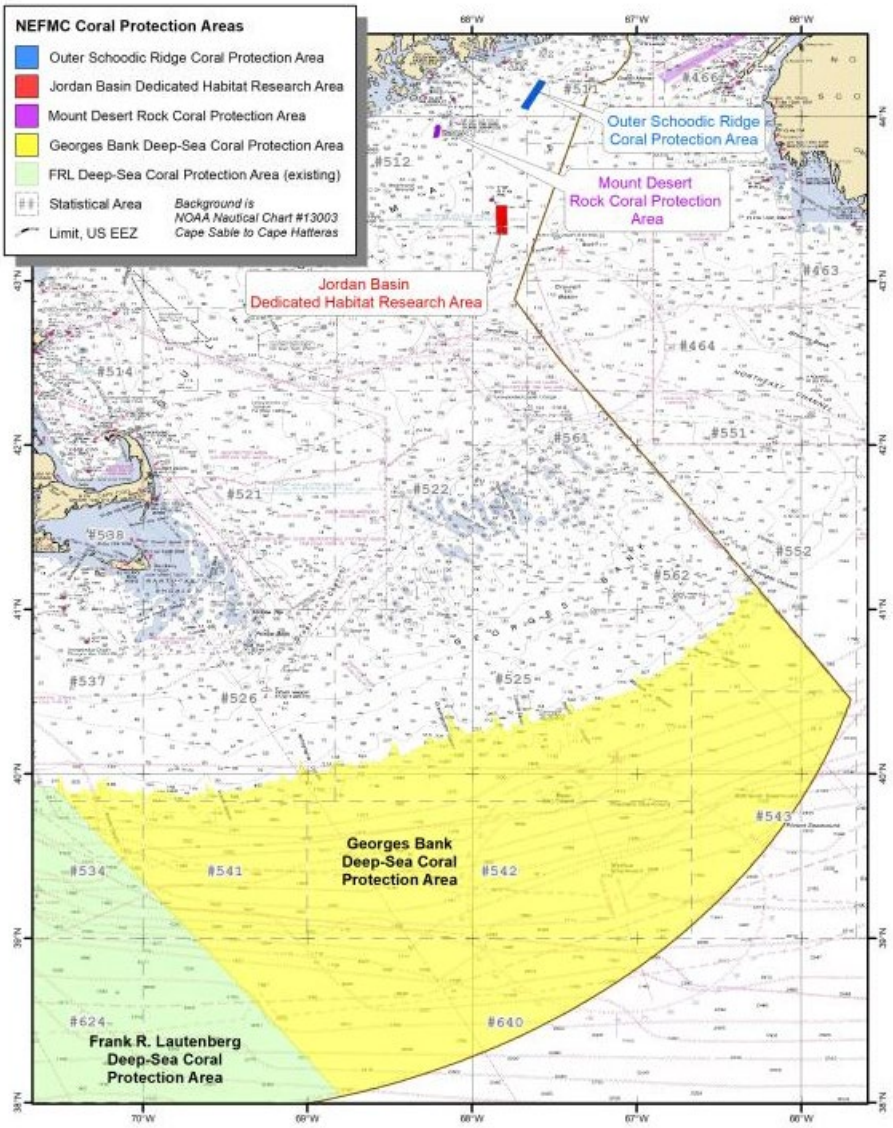


Figure 11 Nautical map showing the Georges Bank Deep-Sea Coral Protection Area in yellow, adjacent to the Frank R. Lautenberg Deep-Sea Coral Protection Area (NOAA Fisheries).

In 2017 the Northwest Atlantic Fisheries Organization agreed to protect the entire New England Seamount chain, amending the boundary of the area closed to bottom fishing to include all peaks in the chain. This proposal was introduced by the U.S. as a direct result of the Monument's designation. The protection of the entire chain will help in sustaining the biological connectivity and function of seamount communities at all depths.

Effects to the Physical Environment

Overall, there are no significant adverse effects (direct, indirect or cumulative) to the Monument's physical environment expected to occur as a result of any of the three alternatives. There are multiple beneficial effects anticipated from all three proposed alternatives to varying degrees.

EFFECTS SUMMARY:
No significant adverse effects to the physical environment anticipated under any of the three alternatives.

Beneficial effects to the physical environment anticipated under all three alternatives.

The anticipated effects of each of the Monument management plan activity categories are described briefly below. Some of these activities have been analyzed in previously published NOAA NEPA documents, which are referenced below.

Management and Program Activities

Onshore routine office and management activities, onshore educational and outreach activities, onshore research activities

These activities do not involve travel to or work in the Monument and there are no anticipated direct adverse effects to the Monument's physical environment from these activities under any alternative.

Indirect adverse effects to the physical environment are expected due to increases in car travel and public transportation travel (air, train, bus and subway) as the Monument staff grows and implements activities. This increased travel will result in air emissions that will have an adverse effect on climate change. Climate change is adversely affecting species and habitats in the Monument. Given the Monument's small staff, the adverse climate change effects are not expected to be significant. To mitigate these adverse effects Monument staff will:

- Use virtual meeting platforms when possible, particularly when the relationships between participants are well-established;
- Prioritize carpooling and using electric vehicles when available;
- Avoid air travel when feasible.

The Monument anticipates a variety of direct, indirect, cumulative and long-term beneficial effects to the Monument physical environment as a result of these activities. These beneficial effects include,

- An increase in awareness of ocean ecosystems and changes in everyday behaviors that benefit the ocean as a result of engagement and education activities;
- Improved partnerships and coordination that lead to more effective Monument management and stewardship;
- Increased understanding of impacts that may be occurring in the Monument.

Onsite field research activities

The effects of routine research activities on the physical, biological, cultural, historical and socioeconomic environment have already been evaluated in accordance with NEPA in detail in NOAA's Final Programmatic Environmental Impact Statement (PEIS) for Surveying and Mapping Projects in U.S. Waters for Coastal and Marine Data Acquisition. This PEIS

encompasses the Greater Atlantic Region out to the U.S. Exclusive Economic Zone, which includes the Monument, and evaluates the direct, indirect and cumulative effects on the physical environment (pages 79-90) of all the routine surveying and mapping work that is expected to take place in the Monument. It also discusses mitigation measures commonly taken to address adverse impacts. None of the activities proposed under any of the three alternatives would be anticipated to have significant adverse effects.

Additionally, NOAA's Marine Mammal Stranding and Health Program PEIS evaluates the effects of routine marine mammal health studies on the physical, biological, cultural, historical and socioeconomic environment. This PEIS describes and evaluates the common types of marine mammal health studies that might be conducted in the Monument and describes the mitigation measures that can be taken to mitigate any potentially significant effects. Consequently, no significant effects to any Monument resources are expected as a result of these activities.

There are a variety of short and long-term, and direct and indirect, adverse effects to the physical environment anticipated as a result of the research activities proposed to occur in the Monument, which are covered in the above-mentioned PEISs. These insignificant adverse effects can include seafloor disturbance from submersible vehicles used in research (short-term seafloor disturbance), the anchoring of scientific monitoring buoys to the seafloor (long-term seafloor disturbance), sediment sampling and alterations to the acoustic and visual landscape. Additionally, air emissions from research vessels that rely on fossil fuels are expected to contribute to climate change and some incidental spills of small amounts of waste are anticipated. These adverse effects are not expected to be significant, especially at the scale and frequency research trips are expected to occur in the Monument (one to five trips per year). Regular anchors are prohibited in the Monument, so seafloor disturbance from anchoring is not expected.

Overall, the Monument management team anticipates that there will be long-term, indirect, direct and cumulative beneficial effects to the Monument's physical environment from the proposed onsite field research activities in the Monument under all three alternatives.

Increased understanding of Monument ecosystems will inform management decisions, improve understanding of deep-sea ecosystems and could also lead to substantial contributions to medical science and marine technology. The visual products that result from onsite research activities, including underwater photography and films of marine species and habitats, will also help to connect people to the Monument and inspire a sense of stewardship in viewers.

These effects are anticipated under all three alternatives because research would occur in the Monument regardless of which alternative is selected.

Onsite marine debris and ALDFG mechanical removal

NOAA evaluated the impacts of marine debris research, assessment, prevention, reduction and removal activities throughout the U.S. in its Programmatic Environmental Assessment for the NOAA Marine Debris Program. This programmatic NEPA evaluation considers the full range of marine debris activities that may be implemented in the Monument and concludes that there are no significant adverse effects (direct, indirect or cumulative) to the physical environment from these activities.

It is uncertain the extent to which marine debris or ALDFG mechanical removal will be necessary in the Monument because the scale of these debris issues is not yet understood. Under proposed Alternatives 2 and 3, several activities would be implemented to assess and characterize impacts from marine debris and ALDFG in the Monument and determine whether removal is appropriate in all or some cases. This could lead to marine debris and ALDFG removal activities under either of these two alternatives.

Marine debris and ALDFG removal activities would only be undertaken in the Monument if there was a clear benefit to the physical and biological environment.

Restoration of deep-sea corals

There are no significant adverse effects to the physical environment from deep-sea coral restoration efforts other than those already described for onsite research. The vessels and underwater vehicles typically used in research activities would be utilized for restoration activities. It is uncertain the extent to which restoration of deep-sea corals could occur in the Monument under any of the three proposed alternatives.

Onsite routine enforcement and compliance activities

Routine enforcement and compliance activities related to the Monument onsite and onshore will have an overall beneficial effect to the physical environment because they will help to ensure compliance with the Monument's rules and regulations (which are highly protective of the physical environment).

There are no significant direct, indirect or cumulative adverse effects to the Monument's physical environment anticipated from the onsite routine enforcement and compliance activities that would occur under any of the three proposed alternatives. Regular anchors are prohibited in the Monument, so seafloor disturbance from anchoring is not expected.

There are insignificant adverse effects expected to climate change for these activities under all three proposed alternatives. The establishment of the Monument and its accompanying prohibitions created a need for increased attention from law enforcement. This may result in a greater law enforcement presence in the Monument and its vicinity, including vessel trips and flyovers. Increases in the number of vessel trips to and flyovers of the Monument could lead to additional fossil fuel air emissions and adverse direct effects to air quality and climate change.

It is difficult to know how many additional trips to the Monument might occur under the three alternatives. However, Alternative 3 proposes an additional permitting requirement for all access to the Monument, which could lead to a greater need for onsite law enforcement in the Monument. Law enforcement in the Monument can be accomplished virtually and NOAA's Office of Law Enforcement will continue to explore new avenues to better observe remotely vessel activity within the Monument.

To mitigate the adverse climate change effects associated with increased law enforcement activities, the Monument has proposed in the final management plan to,

- Utilize remote tracking technologies that do not require an on-water presence in the Monument, such as high-resolution satellite imagery and vessel tracking data, to the

greatest extent possible to track compliance with Monument prohibitions and permitting requirements.

Use Activities

Onsite non-fishing recreational and visitor activities; onsite photography and filming (for personal use); onsite education activities

There are no significant adverse effects (direct, indirect or cumulative) to the physical environment as a result of these activities, which would occur under all three alternatives. Adverse effects to climate change as a result of air emissions from vessels that run on fossil fuels are expected to be insignificant, given the relative infrequency of these trips. Regular anchors are prohibited in the Monument, so seafloor disturbance from anchoring is not expected.

Alternative 2 would allow these activities to occur in the Monument without a joint-agency Monument access permit, whereas Alternative 3 would require a joint-agency access permit to conduct these recreational activities in the Monument. It is possible that the need to apply for a permit under Alternative 3 could discourage some recreational users, resulting in less in-person recreational use of the Monument. If this were the case, the beneficial effects of in-person recreation would be reduced under Alternative 3, but the adverse effects related to air emissions would also be reduced (due to fewer visits to the Monument).

Virtual visitor experiences, which do not have the same climate footprint as a trip out to the Monument, are one way to mitigate the climate change impact of these onsite activities.

Recreational fishing activities

Based on the best professional opinions of NOAA Fisheries' management analysts and informal online review of fishing charter websites in the Northeast, the Monument management team believes that most recreational fishing in the Monument is for highly migratory species and occurs almost solely in the Canyons Unit of the Monument. Almost no recreational fishing activities have been documented in the Seamounts Unit.

NOAA Fisheries manages and permits the recreational fishing of many species, including highly migratory fish species, in the Atlantic and has evaluated the effects of recreational fishing for highly migratory species under its 2006 Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. The plan and subsequent amendments set recreational catch limits for these highly migratory species, protect their U.S. spawning habitats and outline how NOAA Fisheries will engage with the international fishery management community to regulate highly migratory fish.

This management plan and its subsequent amendments were developed in accordance with NEPA and the plan includes an environmental impact statement that analyzes of the effects of recreational fishing for these species on the physical, biological, cultural, historical and socioeconomic environment. This NEPA analysis did not identify any significant adverse effects to the physical environment as the result of the preferred recreational fishing management program for these species in the geographic area that includes the Monument.

The Mid-Atlantic Fishery Management Council developed and NOAA Fisheries implemented the Tilefish Management Plan, which included an environmental impact statement in accordance with NEPA, and subsequent amendments and policy frameworks. This analysis also does not identify any adverse effects to physical resources in the geographic area that includes the Monument as a result of the preferred recreational fishing management program for tilefish.

Fishing gear typically used to catch highly migratory species, if used correctly, should not cause significant adverse effects to the seafloor. Regular anchors are prohibited in the Monument, so seafloor disturbance from anchoring is not expected.

There may be insignificant adverse effects to the physical environment from lost fishing line and gear, acoustic disturbance and light alteration from vessels, trash or the accidental discharge of fuel and other substances. Additionally, air emissions associated with vessel trips out to the Monument and back would cause adverse effects by contributing to climate change. These effects are not expected to be significant given that recreational fishing effort in the Monument is expected to be lower than in other areas closer to shore that can be reached on day trips.

Alternative 2 would allow recreational fishing to occur in the Monument without a joint-agency Monument access permit (NOAA Fisheries' existing recreational permitting requirements would still apply), whereas Alternative 3 would require a joint-agency access permit to recreationally fish in the Monument (in addition to already-required NOAA Fisheries recreational fishing permits). It is possible that the need to apply for an additional permit under Alternative 3 could discourage some recreational users, resulting in less in-person recreational fishing in the Monument. If this were the case, the adverse effects to the physical environment, such as air emissions, would also be reduced.

Onsite photography and filming (for commercial distribution)

Onsite photography and filming (for commercial distribution), which can occur in the Monument with appropriate permissions, stipulations and approvals, is not expected to have any significant adverse effects to the physical environment (indirect, direct or cumulative).

There will be an insignificant adverse effect to the physical environment as a result of air emissions and light and acoustic disturbance associated with vessel trips out to the Monument. Regular anchors are prohibited in the Monument, so seafloor disturbance from anchoring is not expected.

There is no expected difference in the frequency of these activities under the different alternatives.

Onsite education activities that involve fishing

Onsite educational trips that involve fishing activities (such as plankton tows) are not expected to have any significant adverse effects to the physical environment. Regular anchors are prohibited in the Monument, so seafloor disturbance from anchoring is not expected. Seafloor disturbance (with a few exceptions for anchoring of scientific instruments and submarine cable installation and maintenance) is prohibited in the Monument, so bottom-disturbing fishing gear could not be used for educational purposes in the Monument.

There will be an insignificant adverse effect to climate change from the air emissions, acoustic disturbance and light disturbance and incidental gear loss and discharges associated with vessel

trips out to the Monument and back. These effects are not expected to be significant given the infrequency of educational trips out to the Monument (likely no more than one to three per year).

This activity would require a permit under all alternatives, so there is no expected difference in the frequency (and associated impacts) of these activities under the different alternatives.

Biological Environment

The Monument is home to diverse and abundant populations of marine mammals, seabirds, sea turtles, fish and invertebrates, several of which are listed as threatened or endangered under the Endangered Species Act. The Monument contains biodiversity hot spots for seafloor communities (including invertebrates, such as corals and sponges, as well as fish that live close to the seafloor), and is also home to unusual deep-sea chemosynthetic and xenophyophore communities (Auster et al., 2020). Those who have had the opportunity to visit the Monument report seeing hundreds of marine animals at or near the surface on their trips.

Xenophyophores *– large single-celled organisms than can grow up to 20 centimeters and grow on the ocean floor.*

Image: NOAA

So much of the Monument has yet to be explored and the exploration that has occurred has led to the discovery of new species. Understanding of ecosystem processes in the Monument is rapidly evolving. It is also clear that the larger marine ecosystems within which the Monument lies are experiencing changes due to climate change. Currents are shifting, temperatures are rising, waters are becoming more acidic, and species distributions are changing.

Chemosynthetic communities *Groupings of deep-sea organisms, including bacteria, tubeworms, mussels, and oysters, that feed off of dissolved gases, such as methane and sulfides, which seep up slowly through the seafloor.*

Phytoplankton

Biological productivity within the Monument and surrounding waters is strongly tied to the upwelling of nutrient-rich waters that fuels photosynthesis by phytoplankton. Phytoplankton, also known as microalgae, are the base of the ocean food chain. They are similar to terrestrial plants in that they contain chlorophyll and require sunlight in order to live and grow. Most phytoplankton are buoyant and float in the upper part of the ocean, where sunlight penetrates the water. In a balanced ecosystem, phytoplankton provide food for a wide range of sea creatures including zooplankton (microscopic animals including krill, sea snails and pelagic worms), shrimp and jellyfish, which in turn are food for species higher up on the food chain. The high abundance of phytoplankton in the Monument allows this ecosystem to support a high diversity and abundance of organisms, including many top predators.

The amount of photosynthesis (referred to as primary production) occurring along the northeast U.S. continental shelf, including Georges Bank, is very high compared to many other areas of the ocean. While primary productivity within Georges Bank is high, phytoplankton blooms are extremely seasonal, with peak events occurring from late winter through early spring (Townsend and Thomas, 2002; Wiebe et al., 2002).

Compared to the extremely high primary productivity of the shelf and the shelfbreak front, slope waters are typically much less productive because the deeper waters tend to be more stratified or separated. However, in the Monument the rugged topography associated with the canyons and seamounts creates upwellings that bring these deep nutrient rich waters up, leading to higher productivity in slope waters (Hickey, 1995).

Primary productivity in the deeper waters of the Monument that are not adjacent to the rugged topography of the seamounts or canyons is generally fairly low because of the strongly stratified waters that occur (Lozier et al., 2011).

Marine Invertebrates

Invertebrates are organisms that do not have an internal vertebral (spinal) column. Some marine invertebrates, such as lobsters or clams, form a hard exoskeleton or shell. There are many types of marine invertebrates in the Monument, including lobster, crab, shrimp, krill, mussels, oysters, clams, anemones, worms, octopus, squid, sponges, jellyfish, corals, sea urchin, seastars and countless others. There are several species of invertebrates in the Monument that are commercially important, including longfin squid, American lobster and Atlantic deep-sea red crab. A study in the Monument found a greater abundance of marine invertebrates (specifically, sponges, corals, sea urchins and seastars) in the canyons, but a greater number of different species (referred to as species richness) of marine invertebrates present in the seamounts (Mello-Rafter et al., 2021).

Marine invertebrates live in all layers of the ocean and play important roles in ecosystem processes in the Monument and throughout the ocean, many of which are just beginning to be understood. In the Monument, large swarms of krill have been observed during the daytime at the heads of the canyons at depths of 300-400 meters (984-1312 feet, Auster et al., 2020). These swarms hover about 50 meters (164 feet) off the seafloor and then rise toward the surface at night, providing food for fish, squid, and marine mammals. Lobster and other invertebrate "builders" burrow and shape the sediments along the canyon and seamount walls, changing the topography on a small scale that creates habitats for other organisms.

There are also unique deep-sea invertebrate communities in the Monument called chemosynthetic communities, comprised of tubeworms, oysters and mussels that use special bacteria to help them feed on dissolved gases (methane and hydrogen sulfide) released from cold seeps in the seafloor.

Deep-Sea Corals and Sponges

Deep-sea corals and sponges are perhaps the Monument's most well-known and charismatic invertebrates. The Monument is exceptional for its diversity and abundance of deep-sea corals (also known as cold-water corals), which scientists are still in the beginning phases of discovering and documenting in this area.

Deep-sea corals grow in deep (defined as greater than 50 meters or 164 feet), cold water, where there is no sunlight. Warm-water corals contain photosynthetic algae to meet their energy needs and facilitate their growth, but deep-sea corals do not. Because they live in the deep ocean, they are very long-lived, sometimes for hundreds or even thousands of years, and are very slow to recover from damage. They can occur as small, solitary individuals (for example, stony cup corals, consisting of one solitary polyp) or as structure-forming corals that provide vertical

structure above the seafloor that can be utilized by other species. The latter includes both branching corals that together form a structural framework (for example, "reefs" of the stony coral *Lophelia pertusa*), as well as individual branching coral colonies (for example, soft corals like sea fans).

The deep-sea coral habitats within the Monument have many co-occurring species, including sponges and anemones, which together form the foundation of deep-sea ecosystems. These ecosystems provide food, shelter from predators, breeding, spawning and nursery habitat for a number of different organisms. Between 2003 and 2014 during *Okeanos Explorer* ROV deep-sea dives conducted by NOAA, at least 58 species of coral were identified in the Monument, including several newly discovered species.

An overview of deep-sea coral and sponge communities in the northeast U.S., including the Monument, is provided in NOAA's State of Deep-Sea Coral and Sponge Ecosystems of the Northeast United States (Packer et al.*, 2017), which is found on pages 237 to 297 of the larger report, The State of Deep-Sea Coral and Sponge Ecosystems of the United States. NOAA's Deep Sea Coral Research and Technology Program is returning to the Northeast again to expand the baseline understanding of coral and sponge habitats in the Monument and surrounding deep-sea ecosystems from 2023-2026.*

Fishes

The varied habitats and strong, complex currents in the Monument support significant and diverse concentrations of fish species. Some species of fish in the Monument live near or at the deep-sea floor and spend part or all their lives there. Mesopelagic (mid-water) fish, including lanternfish and anglerfish, are those that inhabit the twilight zone and they are the most abundant group of vertebrate animals on the planet. These fish tend to feed near the surface at night and move deeper during the daytime to avoid being preyed upon by birds. They play a significant role in the transport of carbon from surface waters into the deep sea (Auster et al., 2020). Other groups of fish live and spend much of their time in the upper (epipelagic) layer of the ocean, closer to the surface.

The unique topography created by the New England Seamount Chain has led to even greater fish species diversity in the Monument. Scientists have noted that at least 17 fish species appear to have arrived at Bear Seamount by using the New England Seamount Chain as a dispersal corridor or "stepping stones" from the eastern Atlantic. Expeditions to Bear Seamount between 2003 and 2006 revealed several species of deep-sea fish that were new to science, and several more that are rare in the northwest Atlantic, normally only known to inhabit the eastern Atlantic (Hartel et al., 2008; Kelley et al., 2010).

There are two species of fish listed as threatened under the Endangered Species Act that are found in or migrate through the Monument: the giant manta ray and the oceanic whitetip shark. The giant manta ray is the world's largest ray with a wingspan of up to 9 meters or 30 feet. They are filter feeders and eat large quantities of zooplankton. Giant manta rays are slow-growing, migratory animals with small, highly fragmented populations that are sparsely distributed across the world. The main threat to the giant manta ray is commercial fishing, with the species both targeted and caught as bycatch in a number of global fisheries throughout its range. Manta rays are particularly valued for their gill rakers, which are traded internationally.

Oceanic whitetip sharks are large, pelagic sharks found in tropical and subtropical oceans throughout the world. They live offshore in deep water but spend most of their time in the upper part of the water column near the surface. The main threat to oceanic whitetip sharks is bycatch in commercial fisheries combined with demand for its fins. They are frequently caught in pelagic longline, purse seine and gillnet fisheries worldwide and their fins are highly valued in the international trade for shark products. As a result, its population has declined throughout its global range.

There are four groups of highly migratory species (tunas, swordfish, billfishes and sharks) in the Monument that migrate widely through the Atlantic and are managed both at the international and domestic scale under NOAA Fisheries' Atlantic Highly Migratory Species Management Division of the Office of Sustainable Fisheries.

The Monument supports populations of multiple commercially important fish species. Extensive fish species inventory, monitoring and research efforts have occurred on Georges Bank since the early 1900s and thus more is known about fish communities in the Georges Bank portion of the Canyons Unit than in the deeper parts of the Monument. Located in the northeast corner of the Canyons Unit, the Georges Bank portion, which is only a small fraction of the Monument, is especially important to groundfish species because of the shallower waters and fine-grained composition of the benthic substrate that provide ideal habitat. A 2003 study identified 591 fish species in waters shallower than 200 meters in the New England shelf region (Moore et al., 2003b).

Sea Turtles

Four species of sea turtle may occur in the Monument (foraging and/or migrating through): leatherback, loggerhead, Kemp's ridley and green sea turtles. Depending on life stage, sea turtles may occupy differing parts of the marine ecosystem. In general, for juvenile and adult life stages, leatherback turtles are most likely to occur in the area of the Monument, followed by loggerhead turtles. Kemp's ridley and green sea turtles, which occur primarily in nearshore, coastal continental shelf waters, have a lower likelihood of occurring in the Monument.

In the Greater Atlantic Region, the leatherback and Kemp's ridley sea turtles are listed as endangered under the Endangered Species Act. The loggerhead sea turtle (the Northwest Atlantic Ocean distinct population segment) and the green sea turtle (North Atlantic Ocean Distinct population segment) are listed as threatened under the Endangered Species Act.

These species tend to follow the Gulf Stream as they look for food during their long migrations. They primarily occupy the Monument from summer through fall, before migrating south (Mansfield et al., 2009). The leatherback sea turtle is an incredible diver and has been known to dive to depths up to 4,000 feet in search of its principal food item, jellyfish (Heaslip et al., 2012). Although researchers know that these sea turtle species use Monument waters, there has been very little research done on them in this area. Because of this, it is difficult to estimate abundances or determine habitat associations.

The primary threats to sea turtles within the Monument include interactions with recreational fishing gear, vessel collisions and marine debris resulting in entanglement or ingestion (Nelms et al., 2016). Exposure to underwater anthropogenic (human-caused) noise from ship-based

acoustic surveys of the Monument could also be a potential threat, depending upon the frequency of exposure and decibel levels used. Sea turtles also rely on terrestrial environments to complete their life history stages. The stressors that this taxonomic group experiences while on land and along the coast have an additive effect to the stressors experienced while in the deep-sea marine environment (Nelms et al., 2016).

Seabirds

The Monument is home to a diversity of pelagic seabirds, some of which never come even close to the shore of the mainland United States. Seabirds are one of the most threatened bird taxa in the world and are experiencing population declines in the Atlantic.

Marine birds are known to concentrate in upwelling areas of the Monument. These areas have high productivity and subsequent food availability, resulting in large concentrations of birds. Species of gulls, shearwaters, storm petrels, gannets, skuas and terns, among others, regularly occur in the Monument in large aggregations. Researchers have recently discovered that Atlantic puffins are overwintering in the Monument (Baran et al. 2022) because of the abundant food availability in the area. Prior to 2015, no one knew where these birds spent their winter months (Bryce, 2016).

A recent tracking study showed that the federally endangered Bermuda petrel, or cahow, is likely entering the Monument on foraging trips – over 500 miles from its nesting habitat in Bermuda (Raine et al., 2021). The Brookline Bird Club spotted a Bermuda petrel in the vicinity of Oceanographer Canyon in 2019. No critical habitat for the Bermuda petrel (cahow) has been identified in the Monument.

Another recent tracking study found that the black-capped petrel, which nests in the Caribbean and was recently listed as endangered under the Endangered Species Act, also uses the Monument (Satgé et al., 2022).

Although a variety of pelagic seabirds have been documented within the Monument, difficult sampling conditions and lack of accessibility have prevented an extensive species list from being completed. Seabird abundance modeling can provide an idea of where seabird species are more or less likely to be abundant in the Monument (Fig. 12).

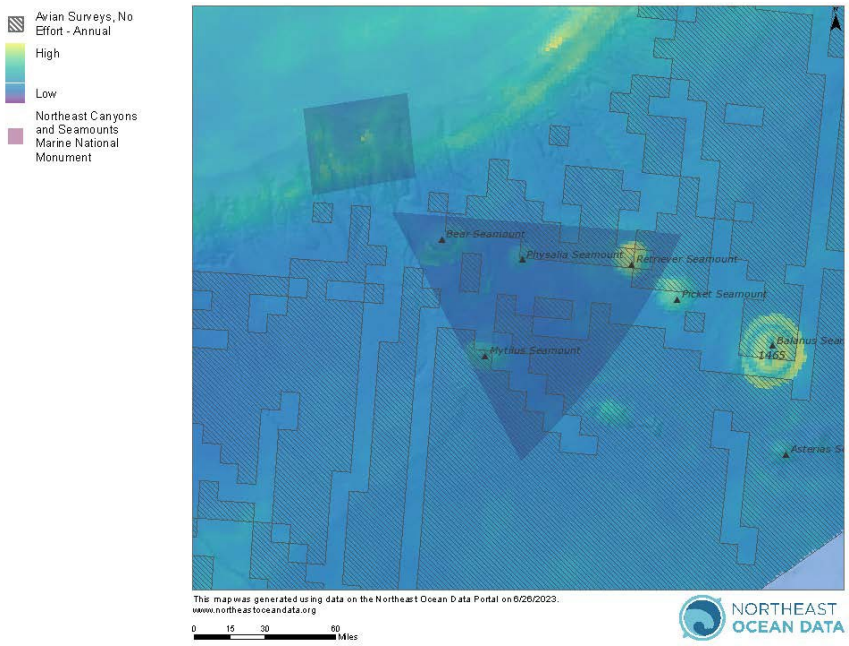


Figure 12 Map showing estimated offshore/pelagic seabird abundance in and around the Monument. The areas with hatch marks do not have survey data. (NODP)

Marine Mammals

The Monument is exceptional for its diversity and abundance of marine mammals (Fig. 13), including the endangered sperm whale, sei whale, blue whale and fin whale. The Monument is also home to three species of beaked whales, which are known to be some of the best divers on the planet, with a recorded maximum dive depth for the Cuvier's beaked whale of almost two miles (9,816 feet; Schorr et al., 2014).

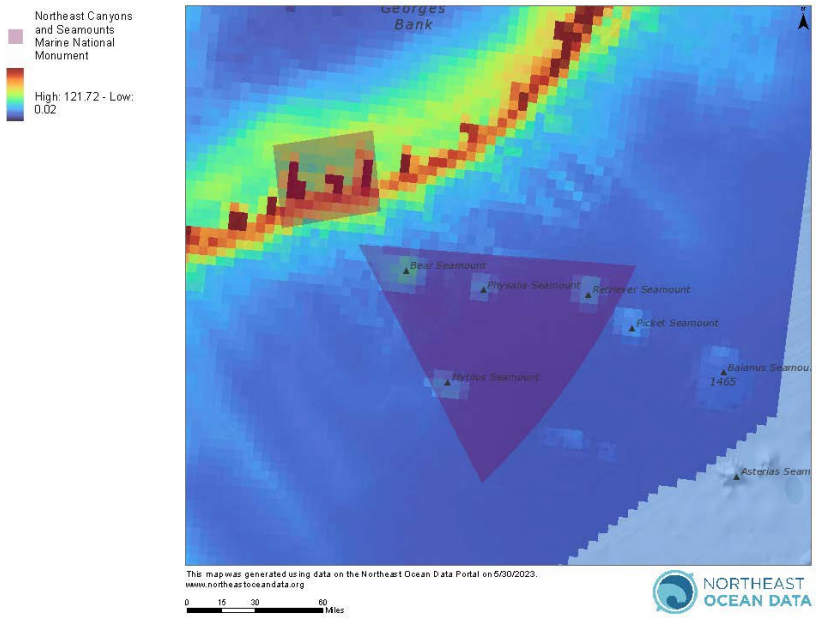


Figure 13 Map showing modeled marine mammal abundance in the Monument. High abundance areas are colored in red. The Monument boundary is shaded in dark purple. (NODP)

Many species of marine mammals are highly migratory, traveling thousands of miles between their winter breeding and calving grounds in warm, lower latitude waters and their summer feeding grounds in the cooler, high latitude waters. While the migration patterns vary among these species, their use of the Monument as a food source is consistent (New England Aquarium, 2018; NOAA-NFSC, 2018). Aerial surveys conducted in the Monument by the New England Aquarium during the summer months routinely spot hundreds of marine mammals, including beaked whales, sperm whales, fin whales and dolphins. In an aerial survey conducted in September 2018, researchers saw more than 600 marine mammals in 4 hours within the Canyons Unit of the Monument (New England Aquarium, 2018). In August 2020, New England Aquarium researchers spotted more than 950 animals in the Monument in three hours.

There are multiple stressors that pose harm to this taxonomic group. Research has found that marine mammals are sensitive to many forms of anthropogenic disturbance, including lethal and sub-lethal stressors. Some of the more common types of lethal stressors for marine mammal species include entanglement, boat strikes and pollutants (Pace et al., 2017). Sub-lethal stressors have also been found to have an impact on the behavior and physiology of individuals, over time impacting the fitness of many marine mammal populations (Ackleh et al., 2017). These stressors include exposure to human-caused noise (for example, vessel traffic) and effects related to climate change. In a study investigating cortisol levels (indicating stress) in a number of baleen whales (fin, humpback and blue whales) spanning the 20th century, researchers found that cortisol levels were tightly correlated with historical whaling activity and times of war. Researchers also noted a sharp spike in cortisol levels after the 1990s, believed to be related to rising water temperatures (Trumble et al., 2018).

Climate Change

Climate change affects both the physical environment and the biological environment. Regarding the biological environment in the Monument, it is expected that increasing ocean temperatures are affecting and will continue to affect some species' abundances, distributions, productivity and phenology (Nye et al., 2009; Dupigny-Giroux et al., 2018). The warming trend has been associated with many fish and invertebrate species moving northward and to greater depths within the ocean (Pershing et al., 2015) and that is expected to occur in the Monument as well. Sessile organisms like corals are unable to move, and so could be extirpated (removed from a particular area) or go extinct.

It is likely that phytoplankton blooms in the Monument are shifting in location and species composition, potentially resulting in bottom-up changes in food web structure (Barton et al., 2016; Chivers et al., 2017; Pershing et al., 2018). Researchers have also found that warming ocean temperatures have been linked to increased disease incidence and parasite loads in some groups of species (Burge et al., 2014; Maynard et al., 2016); and this could occur or be occurring in the Monument as well.

Marine organisms are particularly sensitive to either direct or indirect effects of ocean acidification. Fundamental physiological processes such as respiration, calcification (shell/skeleton building), photosynthesis, behavior and reproduction respond to the changes in carbon dioxide concentrations in seawater (Fabry et al., 2008).

Ocean acidification has been shown to directly impact a wide range of marine organisms that build shells from calcium carbonate, including corals, oysters, clams, mussels, snails, and phytoplankton and zooplankton (Doney et al., 2009; Feely et al., 2009). If the pH of the ocean gets too low, shells can begin to dissolve. Shell-building organisms are very important commercially, as habitat, and for the entire ocean food chain. There are growing concerns about increasing acidification in deep-water canyon systems, such as those in the Monument, which could impact slow-growing deep-sea coral and other shell-building invertebrates.

Many calcifying species exhibit reduced calcification and growth rates in laboratory experiments under high dissolved carbon dioxide conditions, whereas some photosynthetic organisms (both calcifying and non-calcifying) have higher carbon fixation rates under high dissolved carbon dioxide conditions (Doney et al., 2009). Additionally, increased ocean acidification has been shown to amplify the negative thermal effects caused by increased temperatures in some marine organisms (for example, larval bivalves) (Talmage and Gobler, 2011). While this general trend in ocean acidification has been seen worldwide, the exact way in which it is affecting Monument taxa and ecosystems is unknown.

There are currently many research programs around the world investigating ocean acidification. However, survey efforts vary spatially, with many of these efforts occurring along the coast and closer to reef and estuarine systems. More recently, research efforts have begun to focus on the effects of ocean acidification on deep-sea corals and their ecosystems.

Light and Soundscape

Many marine species, including marine mammals, turtles, fish and invertebrates, rely on their ability to hear for their survival. In an underwater environment, sound is often the most efficient means of communication and is the primary way that many marine organisms gather and understand information about their environment. Many marine species use sound to find prey, locate mates and offspring, avoid predators, guide their navigation, locate crucial habitat, and listen and communicate with each other (NOAA, 2018).

Changes in the physical, acoustic environment in the ocean can have implications for many marine species. In the last century, human activities in oceans have increased, and with those increases has come increased underwater noise. Sources of underwater noise in the Monument include vessel traffic and sonar used in research activities. Noise from these activities can travel long distances underwater, leading to increases and changes in ocean noise levels (NOAA, 2018).

Higher noise levels can reduce the ability of animals to communicate with potential mates, other group members, their offspring or feeding partners. Noise can also reduce a marine animal's ability to hear environmental cues that are vital for survival, including those key to avoiding predators, finding food and navigating to preferred habitats (NOAA, 2018). Most research investigating the effects of human-caused ocean noise on marine organisms has focused largely on marine mammals and fishes (Williams et al., 2015).

There have been several studies showing conclusive evidence that high-frequency and mid-frequency multibeam sonars are the most harmful acoustic noises to marine organisms, causing numerous mass mortality and stranding events for some species of marine mammals with sensitive hearing (Harris, 2017). However, low-frequency sonars can also have a significant

effect on marine mammal behavior. Responses of marine mammals to these devices have been documented and include sound source avoidance and changes in sound production patterns (Lurton and DeRuiter, 2011).

There has also been substantial research conducted looking into the effects of ocean noise produced by shipping vessels. Shipping is probably the main overall source of human-made noise in the marine environment, contributing to the 15-decibel increase in ambient noise levels in the ocean since 1950 (Soto et al., 2006). One of the biggest effects of noise produced by shipping activity is auditory masking, which occurs when interference from outside noises "masks" the ability of an individual to detect a particular noise it wishes to perceive.

Non-Native, Invasive Species

Non-native, invasive marine species can be transported long distances by ships and can spread after being introduced in a new location. A study conducted on Georges Bank found that an invasive colonial tunicate (*Didemnum vexillum*) is currently undergoing a massive population and range expansion in the Northeast and may pose a threat to deep-sea coral and sponge communities. The invasive sea squirt is found on hard substrates, and its explosive growth smothers immobile or slow-moving organisms, such as Atlantic sea scallops. Scientists believe that the species could contaminate new areas by inadvertent transportation on a ship hull, by the use of contaminated fishing gear (mobile or fixed), or by the washing of contaminated boat decks (Kaplan et al., 2017).

There are a few reasons why these non-native species are able to outcompete native species, altering marine ecosystems. Because many invasive species are fast-growing and responsive to resources, they may be able to outcompete native species (Occhipinti-Ambrogi and Galil, 2010). Additionally, in a study conducted by Sorte et al. (2010), researchers found that climate change will have a disproportionately negative impact on native species because introduced species tolerated significantly higher temperatures than native ones.

As a result of increased physiological stress associated with climate change, native species may experience decreased growth, decreased fitness, and increased susceptibility to pathogens. Additionally, researchers have also noted that a number of marine pathogens have experienced range expansions due to climate change. Because native species have not evolved with these invasive pathogens, their populations are more susceptible to disease.

Marine Debris

In addition to being part of the Monument's physical environment, marine debris is also part of the Monument's biological environment, as marine debris frequently becomes part of the marine ecosystem food chain.

In a recent study conducted in the Northwest Atlantic Ocean, researchers concluded that microplastics were found in nearly three out of every four mesopelagic fish caught – one of the highest levels globally (Wieczorek et al., 2018). These microplastics can cause significant issues for marine organisms that ingest them, including inflammation, reduced feeding and subsequent weight loss. An additional concern is that mesopelagic fish, which migrate vertically within the water column during the day, could spread microplastic pollution throughout the marine ecosystem by carrying microplastics from the surface down to deeper waters, affecting deep-sea organisms (Wieczorek et al., 2018).

Plastic marine debris can release chemicals after prolonged exposure with sunlight which are harmful to the endocrine system of a large number of marine organisms (Rochman et al., 2014). Floating plastics also provide substrate for the transport of sessile non-native organisms (Moret-Ferguson et al., 2010). There is currently little information covering the impacts of marine debris specifically on species and ecosystem functioning in the Monument.

Effects to the Biological Environment

Overall, there are no significant adverse impacts (direct, indirect or cumulative) to the Monument's biological environment expected to occur as a result of any of the three proposed alternatives. There are multiple beneficial effects anticipated from all three proposed alternatives to varying degrees. The anticipated effects related to each of the Monument activity categories are described briefly below.

EFFECTS SUMMARY:

No significant adverse effects to the biological environment anticipated under the three proposed management plan alternatives.

Beneficial effects to the biological environment anticipated under all three alternatives.

Management and Program Activities

Onshore routine office and management activities, onshore educational and outreach activities, onshore research activities

These activities do not involve travel to or work in the Monument and there are no anticipated direct adverse effects to the Monument's biological environment from these activities.

Indirect adverse effects to the biological environment are expected due to increases in car travel and public transportation travel (air, train, bus and subway) as the Monument staff grows and implements the management plan. This increased travel will result in air emissions that will have an adverse effect on climate change; and climate change is causing adverse effects to many species in the Monument. Given the Monument's small staff, the adverse climate change effects are not expected to be significant. To mitigate these adverse effects Monument staff will:

- Use virtual meeting platforms when possible, particularly when the relationships between participants are well-established;
- Prioritize carpooling and using government electric vehicles when available;
- Avoid air travel when feasible.

The Monument anticipates a variety of direct, indirect, cumulative and long-term beneficial effects to the Monument biological environment as a result of these activities. These beneficial effects include,

- An increase in awareness of marine species, and changes in everyday behaviors that benefit marine species as a result of engagement and education activities;
- Improved partnerships and coordination that lead to more effective Monument management and stewardship of marine species.

Of the three proposed alternatives, the no action alternative, which provides the least direction and guidance for Monument programs, is anticipated to have the least beneficial effect.

Alternative 2 (Volume 1 final management plan and permitting system) is anticipated to have the greatest beneficial effects because it will focus staff time on building a community stewardship program and utilizing volunteer stewards to share observations of marine mammals, seabirds, sea turtles and fish in the Monument.

Alternative 3 (Volume 1 final management plan with a requirement for a joint-agency permit for access to the Monument) is anticipated to have less of a beneficial effect on the biological environment than the preferred Alternative 2. This is because, under this proposed alternative, staff time would be more heavily focused on issuing and trying to ensure compliance with permitting requirements than on partnership-building and community stewardship.

Over the long term, a community stewardship program is expected to result in more ocean-friendly behavior changes and more volunteer stewards caring for the Monument. Requiring an access permit could have beneficial effects by discouraging some recreational use of the Monument and by assisting the Monument management team with tracking use of the Monument. But the Monument management team's ability to ensure compliance with an access permit program is uncertain, which could make the information gathered from the permitting program less useful.

Onsite field research activities

The effects of routine research activities on the physical, biological, cultural, historical and socioeconomic environment have already been evaluated in accordance with NEPA in detail in NOAA's Final Programmatic Environmental Impact Statement (PEIS) for Surveying and Mapping Projects in U.S. Waters for Coastal and Marine Data Acquisition. This PEIS encompasses the Greater Atlantic Region out to the U.S. Exclusive Economic Zone, which includes the Monument, and evaluates the direct, indirect and cumulative effects on the biological environment (including invertebrates, fish, sea turtles, seabirds and marine mammals) of all the routine surveying and mapping work that is expected to take place in the Monument. It also discusses mitigation measures commonly taken to address adverse impacts to marine species. None of the activities that would take place under any of the three management plan alternatives for the Monument would be anticipated to have significant adverse effects to biological resources.

Additionally, NOAA's Marine Mammal Stranding and Health Program PEIS evaluates the effects of routine marine mammal health studies on the physical, biological, cultural, historic and socioeconomic environment. This PEIS describes and evaluates in detail the common types of marine mammal health studies that might be conducted in the Monument and describes the mitigation measures that can be taken to mitigate any potentially significant effects to marine species, in particular the marine mammals being studied. As a result, no significant effects to any biological resources in the Monument are expected due to these activities.

There are a variety of short- and long-term, and direct and indirect adverse effects anticipated to the biological environment as a result of the research activities proposed to occur in the Monument, which are covered in the above-mentioned PEISs. These insignificant adverse effects can include injuries from vessel strikes, stress from physical biomonitoring procedures, injuries and/or mortality from collection of biological specimens, stress, and disorientation from light, and sound disturbance from vessels, planes, and drones.

Additionally, air emissions from research vessels that rely on fossil fuels are expected to contribute to climate change and some incidental spills of small amounts of waste are anticipated, both of which indirectly affect marine species by degrading habitat. There is always a risk that vessel traffic of any kind in the marine environment could result in the accidental introduction of non-native invasive species, but there are many vessel management strategies in place to reduce the risk of this occurring. These adverse effects are not expected to be significant, especially at the scale and frequency they will occur in the Monument (one to five research trips per year). Regular anchors are prohibited in the Monument, so injury to organisms living on the seafloor is not expected.

To mitigate adverse effects, the Monument management team will distribute guidance to all researchers on best practices for avoiding impacts to Monument species. Research projects may require individual consultations under the Endangered Species Act, Magnuson-Stevens Fishery Management and Conservation Act, Marine Mammal Protection Act and other laws prior to implementation.

Overall, the Monument management team anticipates that there will be long-term, indirect, direct and cumulative beneficial effects to the Monument's biological environment from the proposed onsite field research activities in the Monument. Increased understanding of marine species will inform management decisions of these species, including commercially important species. The visual products that result from onsite research activities, including underwater photography and films of marine species and habitats, will also help to connect people to the Monument, inspire a greater sense of stewardship and inspire ocean-positive behavior changes. These beneficial effects are anticipated under all three alternatives because research would occur in the Monument regardless of whether a management plan is adopted.

Onsite marine debris and ALDFG mechanical removal

NOAA evaluated the impacts of marine debris research, assessment, prevention, reduction, and removal activities throughout the U.S. in its Programmatic Environmental Assessment for the NOAA Marine Debris Program. This programmatic NEPA evaluation considers the full range of marine debris activities that may be implemented in the Monument and concludes that there are no significant adverse effects (direct, indirect, or cumulative) to the biological environment from these activities.

It is uncertain the extent to which marine debris or ALDFG mechanical removal will be necessary in the Monument because the scale of these debris issues is not yet understood. Under Alternatives 2 and 3, several activities would be implemented to assess and characterize impacts from marine debris and ALDFG in the Monument and determine whether removal is appropriate in all or some cases. This could lead to marine debris and ALDFG removal activities under either of these two alternatives.

Marine debris and ALDFG removal activities would only be undertaken in the Monument if there was a clear benefit to the biological environment. Should removal of marine debris and ALDFG cause significant damage to deep-sea corals, some of which are thousands of years old, the Monument management team would opt not to remove gear and would instead look to other strategies, such as deep-sea coral restoration, to improve deep-sea coral habitat in the Monument.

Restoration of deep-sea corals

There are no significant adverse effects to the biological environment from deep-sea coral restoration efforts other than those already described for onsite research. The vessels and underwater vehicles typically used in research activities would be utilized for restoration activities. Small samples of deep-sea corals, which would not cause significant injury, would be used to culture and grow these animals in a laboratory.

Onsite routine enforcement and compliance activities

Routine enforcement and compliance activities related to the Monument onsite and onshore will have an overall beneficial effect to the biological environment because they will help to ensure compliance with the Monument's rules and regulations (which are highly protective of the physical environment).

There are no significant direct, indirect or cumulative adverse effects to the Monument's biological environment anticipated from the onsite routine enforcement and compliance activities that would occur under any of the three proposed alternatives.

Regular anchors are prohibited in the Monument, so seafloor disturbance from anchoring is not expected. There are insignificant indirect adverse effects to biological resources expected as a result of air emissions for these activities under all three alternatives. The establishment of the Monument and its accompanying prohibitions on multiple uses created a need for greater compliance and enforcement activities in the area. This will likely result in more vessel trips and flyovers under all three alternatives. Increases in the number of vessel trips could also lead to more acoustic and light disturbance in the Monument, as well as potential vessel strikes of seabirds, marine mammals and sea turtles. To mitigate adverse effects, the Monument management team will distribute guidance to enforcement agencies on best practices for avoiding impacts to species that might be in the Monument.

It is difficult to know how many additional trips to the Monument might occur under the three alternatives. However, Alternative 3 proposes an additional permitting requirement for all access to the Monument, which could lead to more enforcement vessel trips than the other two alternatives.

To mitigate the adverse climate change effects associated with increased law enforcement activities, the Volume 1 final management plan proposes to utilize to the greatest extent possible remote tracking technologies that do not require an onsite presence in the Monument to track compliance with Monument rules and regulations.

Use Activities

Onsite non-fishing recreational and visitor activities; onsite photography and filming (for personal use); onsite education activities

The Monument management team anticipates an overall beneficial effect to the biological environment from these passive recreational and educational activities. The National Wildlife Refuge Administration Act identifies wildlife observation, photography, education, and interpretation activities as priority public uses on wildlife refuges because these activities connect people to nature and foster a sense of stewardship and conservation in participants.

Under Alternatives 2 and 3, there are activities focused on identifying potential volunteer stewards in the recreational community to gain their assistance in gathering information and species observations in the Monument.

There are no significant adverse effects (direct, indirect or cumulative) to the biological environment as a result of these activities, which would occur under all three alternatives. There are expected insignificant indirect adverse effects to marine species as a result of air emissions from recreational vessels that run on fossil fuels, as well as potential seabird and sea turtle vessel strikes (the risk of marine mammal vessel strikes is negligible so long as appropriate distances are maintained), and acoustic and light disturbance from vessels and incidental discharges. To mitigate potential adverse effects, staff will develop fact sheets on avoiding seabird vessel strikes, distancing from marine mammals and best practices for managing vessel lighting to distribute to those recreating and conducting education programs in the Monument.

While the Monument will continue to provide onsite recreational opportunities for visitors, activities in the final management plan under both Alternatives 2 and 3 will lead to the development of virtual visitor experiences that will not have the same climate footprint as a trip out to the Monument would.

Given the distance of the Monument from shore, an overnight trip is required in most cases to visit and recreate in the Monument. As a result, the intensity of recreational activity is not expected to be high under any alternative, particularly relative to other locations in the vicinity. Hydrographer Canyon, for example, which is just south of the Monument and quicker to access from some marinas, appears to receive more visitation than the Monument canyons, as do other portions of Georges Bank.

Under Alternatives 2 and 3, the Monument management team will be exploring remote methods of analyzing vessel presence in the Monument to better understand recreational use of the Monument. Should recreational and educational activities such as whale and bird watching, diving or pleasure boating dramatically increase in the coming years, the Monument management team would reevaluate the effects of these passive recreational activities.

Alternative 2 (preferred) would allow these visitor activities to occur in the Monument without a joint-agency Monument access permit, whereas Alternative 3 would require a joint-agency access permit to enter the Monument. It is possible that the need to apply for a permit under Alternative 3 could discourage some recreational users, resulting in less in-person recreational use of the Monument, but that outcome is uncertain. If there was less recreational use under Alternative 3, the beneficial effects of connecting people with the Monument would be reduced, and the adverse effects related to air emissions, light and sound disturbance, incidental discharges, and accidental vessel strikes would also be reduced.

Recreational fishing activities

Based on the best professional opinions of NOAA Fisheries' management analysts and informal online review of fishing charter websites in the Northeast, the Monument management team believes that most recreational fishing in the Monument is for highly migratory species and occurs almost solely in the Canyons Unit of the Monument. Almost no recreational fishing activities have been documented in the Seamounts Unit.

NOAA Fisheries manages and permits the recreational fishing of many species, including highly migratory fish species in the Atlantic and has evaluated the effects of recreational fishing for these species under its 2006 Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. The plan and subsequent amendments set recreational catch limits for these highly migratory species, protect their U.S. spawning habitats and outline how NOAA will engage with the international fishery management community to regulate highly migratory fish.

This management plan and its subsequent amendments were developed in accordance with NEPA and include an environmental impact statement that analyzes of the effects of recreational fishing for these species on the physical, biological, cultural, historical and socioeconomic environment. This NEPA analysis did not identify any significant adverse effects to the biological environment as the result of recreational fishing for these species in the geographic region that includes the Monument.

The Mid-Atlantic Fishery Management Council developed and NOAA Fisheries implemented the Tilefish Management Plan, which included an environmental impact statement in accordance with NEPA, and subsequent amendments and policy frameworks. This analysis also does not identify any adverse effects to biological resources as a result of recreational fishing for blueline or golden tilefish in the geographic area that includes the Monument.

The Monument management team anticipates insignificant direct adverse effects to the biological environment from recreational fishing activities in the Monument given the potential for vessel strikes to, and/or entanglement/hooking of species in the Monument, including those protected under the Marine Mammal Protection Act and Endangered Species Act. There may also be insignificant adverse effects to the biological environment from lost fishing line and gear, acoustic disturbance and light alteration from vessels, accidental vessel strikes, trash or the accidental discharge of fuel and other substances. Additionally, there will be an adverse effect to climate change from the air emissions associated with vessel trips out to the Monument and back.

Recreational fishing gear typically used to catch highly migratory species, if used correctly, should not typically disturb sensitive deep-sea species such as deep-sea corals. Moreover, recreational fishing gear for other species, such as lobster and crab, that could cause seafloor disturbance is not allowed in the Monument due to the Presidential Proclamation 9496 prohibition on seafloor disturbance. Regular anchors are prohibited in the Monument, so injury to seafloor species from anchoring is not expected.

The FWS has developed guidance for mariners in response to seabird vessel strikes and NOAA Fisheries has guidance on safe distances for viewing marine life and safely handling and releasing of sea turtles, giant manta rays and other protected species should they become hooked/entangled. Under management plan Alternatives 2 and 3, the Monument management team plan will distribute these materials to recreational anglers utilizing the Monument.

Even with best management practices in place, vessel strikes involving marine mammals and recreational fishing vessels are possible. However, the adverse effects associated with recreational fishing in the Monument are expected to be insignificant due to the remote nature of the Monument and the planned outreach to the recreational fishing community regarding best practices.

The National Wildlife Refuge Administration Act identifies recreational fishing as a priority public use on wildlife refuges because it connects people to nature and fosters a sense of stewardship and conservation. Recreational anglers play an important role in the conservation of fish and their habitat. The presence of anglers in the Monument is viewed as a long-term benefit. Under Alternatives 2 and 3, there are activities focused on identifying potential volunteer stewards in the recreational fishing community to gain their assistance in gathering information and species observations in the Monument, which could benefit the Monument management team's understanding of biological resources in the Monument over the long term.

Alternative 2 would allow recreational fishing to occur in the Monument without a joint-agency Monument access permit (applicable NOAA Fisheries recreational fishing permits would be required). Alternative 3 would require a joint-agency access permit (in addition to any required NOAA Fisheries recreational fishing permits) to fish recreationally in the Monument.

It is possible that the need to apply for the additional access permit under Alternative 3 could discourage some recreational anglers, resulting in less in-person recreational fishing in the Monument. But this potential outcome is uncertain. Given its distance from shore, it is assumed that private anglers and boat captains who lead charters out to the Monument have a high level of interest in and knowledge of the Monument and might not be dissuaded by an additional permit that could be obtained online. If a reduction in recreational fishing occurred under Alternative 3, the insignificant adverse effects associated with this activity could be reduced – but so also would the beneficial effects of recreational fishing.

Onsite photography and filming (for commercial distribution)

Onsite photography and filming (for commercial distribution), which can occur in the Monument with appropriate permissions, stipulations and approvals under the Marine Mammal Protection Act and the National Wildlife Refuge Administration Act and Recreation Act, is not expected to have any significant adverse effects to the biological environment (indirect, direct, or cumulative).

There will be insignificant, indirect adverse effects to the biological environment as a result of air emissions and light and acoustic disturbance associated with vessel trips out to the Monument, vessel strikes and accidental vessel discharges. To mitigate potential adverse effects, the management plan activities focus on developing fact sheets on avoiding seabird, marine mammal and sea turtle vessel strikes; distancing from marine mammals; and best practices for managing vessel lighting to share with those filming and photographing in the Monument.

This activity occurs infrequently in the Monument and there is not an expected difference in the frequency of these activities (or associated insignificant adverse effects) under the different alternatives.

Depending upon the nature of individual filming and photography projects, there may be a strong beneficial effect to the biological environment. For example, documentaries that teach people about the Monument's species and habitats and show the public awe-inspiring footage of the Monument may help to connect the wider public with the Monument and inspire a sense of stewardship for the Monument's species and habitats.

Onsite education activities that involve fishing

Onsite educational trips that involve fishing activities (such as plankton tows) are not expected to have any significant adverse effects to the biological environment. The species typically sampled in educational programs are not typically protected species and this sampling tends to be done on a small-scale, resulting in mortality rates that are not significant. Regular anchors are prohibited in the Monument, therefore seafloor disturbance to coral or other stationary species from anchoring is not expected. Seafloor disturbance (with a few exceptions for anchoring of scientific instruments and submarine cable installation and maintenance) is prohibited in the Monument, therefore bottom-disturbing fishing gear would not be allowed even for educational purposes in the Monument.

There could be direct and indirect insignificant adverse effects related to air emissions, light and acoustic disturbance, accidental vessel strikes and incidental vessel discharges associated with vessel trips out to the Monument and back that are similar to those already described for research activities. These effects are not expected to be significant given the infrequency of educational trips out to the Monument (likely not more than one to three each year). Additionally, to mitigate potential adverse effects, management plan activities focus on developing fact sheets on avoiding seabird, marine mammal and sea turtle vessel strikes; distancing from marine mammals; and best practices for managing vessel lighting to share with those recreating and conducting education programs in the Monument.

This activity would require a permit under all alternatives, so there is not an expected difference in the frequency of these activities (or associated adverse effects) under the different alternatives.

There are multiple beneficial effects to the biological environment from these activities expected under all three alternatives. Students visiting the Monument may become the marine scientists and managers of tomorrow. In-person experiences will increase their knowledge and understanding of the offshore marine ecosystems, inspire them, and foster a sense of shared stewardship.

Socioeconomic Environment

According to the 2022 U.S. census, there are 34,674,377 people living in the region near the Monument, which includes Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut and New York. This population represents 10.5% of the total U.S. population.

Communities with environmental justice concerns

There are many communities with environmental justice concerns in the Monument's onshore affected environment; and millions of people live in these communities.

Among the top commercial fishing communities in 2023 in the Monument's region, NOAA Fisheries identified two communities with significant environmental justice concerns: Boston, Massachusetts and New Bedford, Massachusetts. NOAA Fisheries did not identify any recreational fishing communities with significant environmental justice concerns in the Monument's region

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income, with respect to the development, implementation, and enforcement of environmental law, regulations and policy. - EPA

(Lucey et al., 2023 and Northeast Fisheries Science Center, 2023).

Environmental justice concerns systemically impact communities of color, low-income communities and Indigenous communities. Communities with environmental justice concerns experience disproportionate and adverse human health or environmental burdens.

These burdens arise from a number of causes, including inequitable access to clean water, clean air, natural places and resources for other basic human health and environmental needs; the concentration of pollution, hazardous waste and toxic exposures; and underinvestment in affordable housing that is safe and healthy and in basic infrastructure and services to support such housing, including safe drinking water and effective sewage management.

The cumulative impacts of exposure to those types of burdens and other stressors, including those related to climate change and the environment, further disadvantage communities with environmental justice concerns. People in these communities suffer from poorer health outcomes and have shorter life expectancies than those in other communities in our Nation. Moreover, gaps in environmental and human health data can conceal these harms from public view, and, in doing so, are themselves a persistent and pernicious driver of environmental injustice (Executive Order 14096, April 21, 2023).

For detailed information on the communities with environmental justice concerns in each State within the Monument's region, please visit the Environmental Protection Agency's (EPA) Environmental Justice Screening and Mapping Tool. This data visualization mapping tool allows users to explore data related to multiple indicators of environmental justice concerns, including socioeconomics, climate change vulnerability, health disparities and pollution sources, for individual communities, cities and counties in the region near the Monument.

Tourism

Recreational Fishing

Recreational fishing trips to "the Canyons" along the North Atlantic continental shelf are a cultural tradition for many anglers in the Northeast. The Monument management team has identified activities in the management plan to better understand recreational fishing in the Monument and build connections with the recreational fishing community.

Anecdotal evidence suggests that there are a variety of recreational fishing charter companies that may lead overnight trips out to the Canyons Unit to catch tuna and swordfish; however, it may be that more trips focus on Hydrographer Canyon, which is southwest of the Monument. The Monument management team believes that recreational fishing in the Monument primarily occurs in the Canyons Unit during the summer and fall months when highly migratory species can be found in the Monument following the warm Gulf Stream Current north.

The Monument management team does not believe that there is much recreational fishing occurring in the Seamounts Unit, given its distance from shore, but believes the Seamounts Unit may offer good recreational fishing opportunities to those able to travel there.

QR code for NOAA Fisheries Greater Atlantic Recreational Fishing website

NOAA Fisheries manages recreational fishing in the U.S. Exclusive Economic Zone in the North Atlantic under its authorities under the Magnuson-Stevens Fishery Conservation and Management Act and through the New England Fishery Management Council and Mid-Atlantic Fishery Management Council. Recreational catch of highly migratory species is managed on a multi-regional and international scale by NOAA Fisheries' Atlantic Highly Migratory Species Management Division in consultation with the Highly Migratory Species Advisory Panel. There are a variety of permitting and reporting requirements for recreational anglers in the Monument that vary by species, time of year and type of recreational fishing (private anglers, for-hire charter and party vessels), and more information can be found at, https://www.fisheries.noaa.gov/new-england-mid-atlantic/recreational-fishing/recreational-fishing-regulations-species. Recreational fishing regulations may change at any point during the year. Permit holders receive notifications of regulation changes by mail, but anyone can sign up to receive email updates or text alerts regarding changes to recreational fishing regulations.

Wildlife watching and pleasure boating

There is some sailing, boating and wildlife watching that occurs in the Monument, primarily in the Canyons Unit. There are local birding clubs that make one or two overnight trips to the Monument almost every summer to spot rare, highly pelagic seabirds that frequent the shelf break but do not come close to shore. There are also occasional overnight charter whale watching trips that visit the Monument, particularly the Canyons Unit. Looking at a map of pleasure craft sailing vessel transits in the Monument in 2022 (Fig. 14), it appears that there is more boating activity to the southwest of the Monument than in the Monument itself. It is possible that these pleasure craft transits may also involve recreational fishing. It is unclear the extent to which Monument designation will lead to increases in this type of tourism to the Monument.

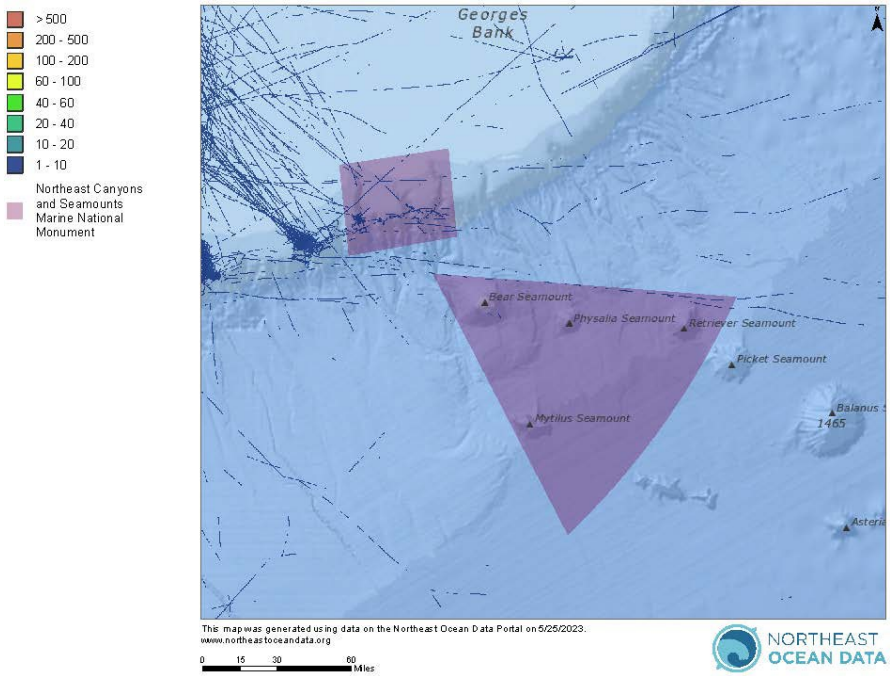


Figure 14 Map showing pleasure craft sailing vessel transit counts in and surrounding the Monument in 2022. (NODP)

Diving

Informal conversations with divers indicate that there may be an interest in blue water diving in the Gulf Stream Current in the Canyons Unit of the Monument during summer months in order to observe marine species. However, it is unclear whether there is any active diving occurring in the Monument at this time. This may be a tourism industry that develops in the future.

Offshore Wind

Offshore wind development is not permitted in the Monument. However, the offshore wind industry is growing rapidly in the Northeast and there is an active effort, being led by BOEM, to plan for and develop offshore wind energy in the Northeast.

The nearest offshore wind permitted projects, projects in review and currently approved lease areas are approximately 93 miles west of the Monument in the Nantucket Shoals area.

The Gulf of Maine offshore wind final wind energy area was announced in early 2024. The southern edge of this wind energy area is approximately 107 miles northeast of the Monument (Fig. 15).

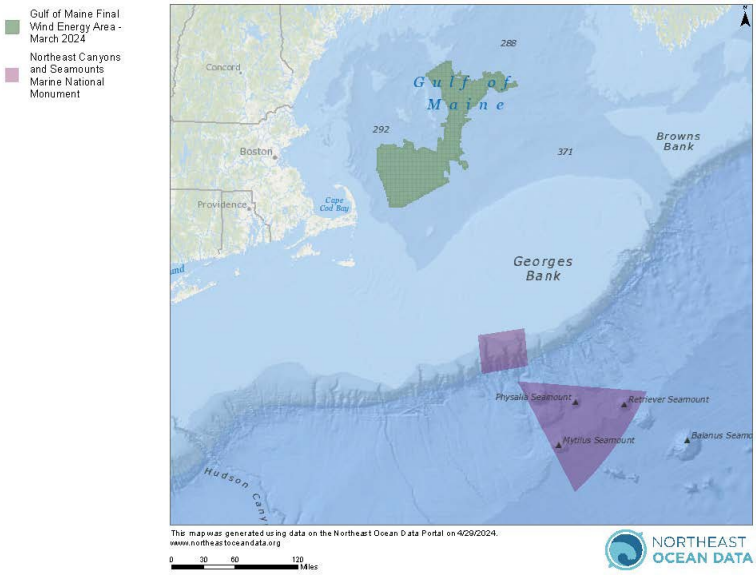


Figure 15 Map showing the 2024 Gulf of Maine final wind energy area, shaded in green, in relation to the Monument, shaded in purple. (NODP)

More than 20 offshore wind development projects are proposed for construction on the eastern seaboard, covering more than 1.7 million acres by 2030. An additional six lease areas (488,000 acres) were recently sold in the New York Bight. If all existing and proposed leases are developed in the Northeast, rapid buildout according to current development plans will have greater impact to the Mid-Atlantic region than the New England region, although some lease areas are in waters off Rhode Island and Massachusetts. Floating offshore technologies are likely to be used in the Gulf of Maine (NOAA Fisheries, 2022b).

Shipping

There is shipping vessel traffic through the Monument (Figs. 16 and 17), but it is of relatively low frequency and intensity relative to surrounding areas. There are no major shipping channels running through the Monument. There are no known navigation challenges or complexities in the Monument that could lead to an elevated risk of a collision or other vessel incident in the Monument. As a result, the USCG believes that the risk of a spill in the Monument is low.

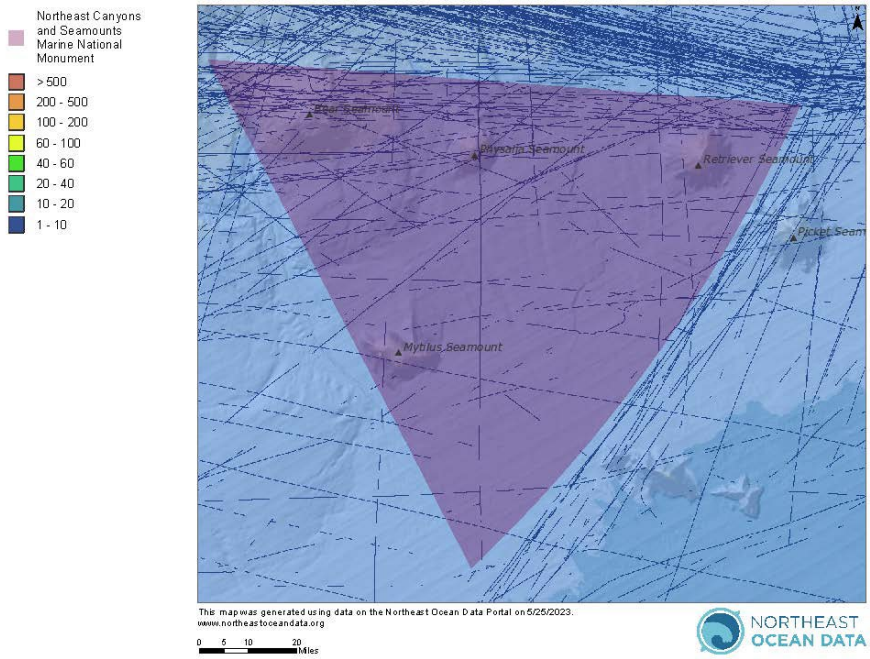


Figure 16 Map showing cargo vessel transit counts through the Seamounts Unit of the Monument during all of 2022. (NODP)

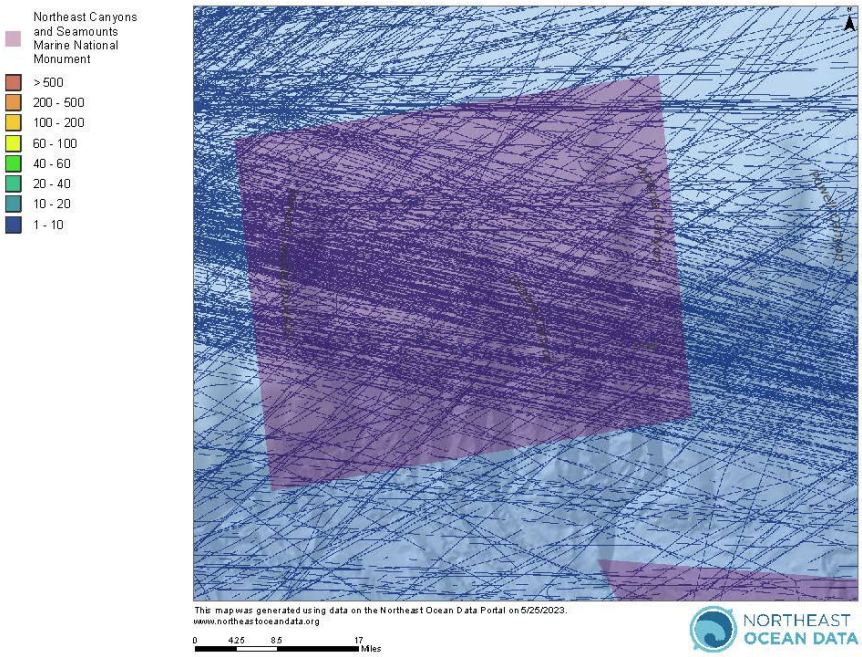


Figure 17 Map showing cargo vessel transit counts through the Canyons Unit of the Monument during all of 2022. (NODP)

Submarine Cables

There are 15 known submarine cables that run through the Monument, all of them in the Seamounts Unit (Fig. 18).

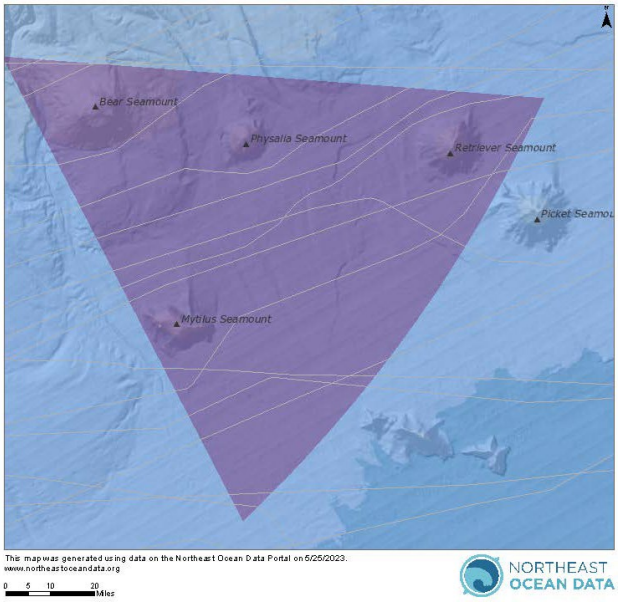


Figure 18 Map showing the 15 submarine cables that cross the Seamounts Unit. (NODP)

During public scoping, the North American Submarine Cable Association provided information on several active cables that run through or near the Monument, the owners of which are members of its organization (Fig. 19):

- Atlantic Crossing 1 (Segments A and C): connecting Germany, the Netherlands, the United Kingdom, and the United States;
- FLAG Atlantic-1 (North and South): connecting France, the United Kingdom, and the United States;
- Havfrue: connecting Denmark, Ireland, Norway, and the United States.

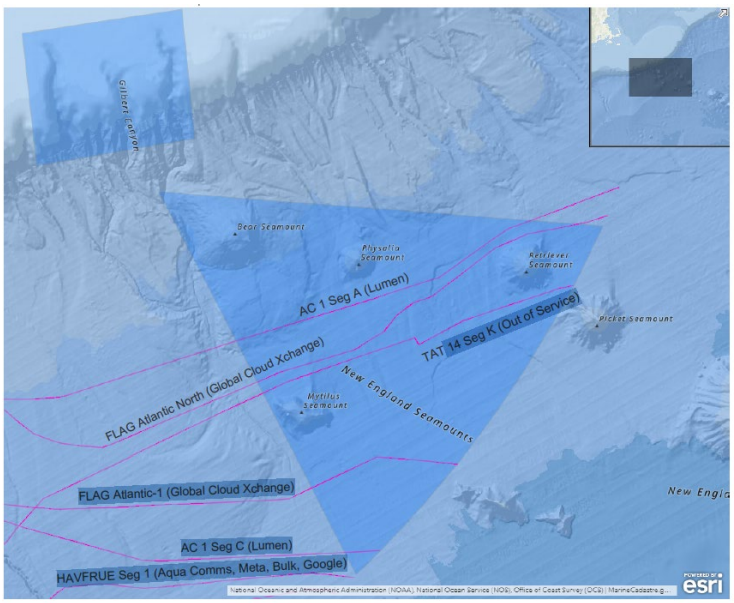


Figure 19 Map provided by the North American Submarine Cable Association showing the locations of undersea cables in and near the Monument owned and operated by members of its organization.

Military Activities

The Navy does not have any active ranges or operations areas that overlap with the monument. While the Navy's Atlantic Fleet Training and Testing area does encompass the Monument, there has not been any recent training or testing within the Monument boundary. The Navy anticipates its primary activity in the Monument will be transiting but may need to conduct a limited number of military readiness activities if required for national security purposes, consistent with the Atlantic Fleet Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement (https://www.nepa.navy.mil/aftteis). The Navy may also conduct research activities in a manner consistent so far as is practicable with the Monument's establishing Presidential Proclamation 9496. It is anticipated that the primary U.S. Air Force activity in the Monument will be overflights.

Urban Wildlife Partnership Cities

The FWS has a growing Urban Wildlife Conservation Program that works to expand access to green space, education and outdoor recreation for Americans living in and around cities. Individual cities can choose to partner with the FWS to develop their own Urban Wildlife Partnership program. In the Monument region there are four Urban Wildlife Partnership cities: Yonkers, New York; New Haven, Connecticut; Providence, Rhode Island; and Lowell, Massachusetts.

Effects to the Socioeconomic Environment

Overall, there are no significant adverse impacts (direct, indirect or cumulative) to the Monument's socioeconomic environment expected to occur as a result of any of the three proposed alternatives. There may be some indirect beneficial effects to the socioeconomic environment from the proposed alternatives through increased tourism, though this beneficial effect is uncertain, given the Monument's distance from shore.

EFFECTS SUMMARY:
No significant adverse effects to the socioeconomic environment expected under any of the three proposed alternatives.

Some potential beneficial effects to the socioeconomic environment under all three alternatives.

The Monument does not overlap with any locations proposed for offshore wind, nor does it overlap with active military training areas or major shipping lanes. None of the proposed alternatives would alter the current management of recreational fisheries, though Alternative 3 would require those who enter the Monument to fish recreationally to obtain an additional access permit, which could inconvenience anglers. But this permit would be used for tracking purposes, not to restrict access, so any adverse effect is expected to be insignificant. The anticipated effects related to each of the Monument activity categories are described briefly below.

Management and Program Activities

Onshore routine office and management activities, onshore educational and outreach activities, onshore research activities

There are no expected adverse effects to the socioeconomic environment associated with these activities. It is possible that the education and engagement activities proposed under Alternatives 2 and 3 could have an indirect beneficial effect to the tourism economy of the region. To those anglers, bird watchers, whale watchers, sailors and boaters who have been going to "the Canyons" for fish and wildlife watching since long before it was called a marine monument, the specialness of this place is well-known. Monument engagement and education programs may increase the awareness of this special place and gain the interest of a wider audience.

However, given the remote location of the Monument and the cost associated with going there overnight, it is anticipated that any increases in tourism would be negligible within the context of the marine tourism economy in the Northeast.

Onsite field research activities

The effects of routine research activities on the physical, biological, cultural, historical and socioeconomic environment have already been evaluated in accordance with NEPA in detail in NOAA's Final Programmatic Environmental Impact Statement (PEIS) for Surveying and Mapping Projects in U.S. Waters for Coastal and Marine Data Acquisition. This PEIS encompasses the Greater Atlantic Region out to the U.S. Exclusive Economic Zone, which includes the Monument, and evaluates the direct, indirect and cumulative effects on the socioeconomic environment of all of the routine surveying and mapping work that is expected to take place in the Monument. None of the activities proposed under any of the three management plan alternatives for the Monument would be anticipated to have significant adverse effects to the socioeconomic environment.

Additionally, NOAA's Marine Mammal Stranding and Health Program PEIS evaluates the effects of routine marine mammal health studies on the physical, biological, cultural, historic, and socioeconomic environment. No significant adverse effects to the socioeconomic environment were identified.

Onsite marine debris and ALDFG mechanical removal

NOAA evaluated the impacts of marine debris research, assessment, prevention, reduction and removal activities throughout the United States in its Programmatic Environmental Assessment for the NOAA Marine Debris Program. This programmatic NEPA evaluation considers the full range of marine debris activities that may be implemented in the Monument and concludes that there are no significant adverse effects (direct, indirect or cumulative) to the socioeconomic environment from these activities.

Restoration of deep-sea corals

There are no significant adverse effects to the socioeconomic environment anticipated from deep-sea coral restoration efforts.

Onsite routine enforcement and compliance activities

There are no significant adverse effects to the socioeconomic environment from routine enforcement and compliance activities.

Use Activities

Onsite non-fishing recreational and visitor activities; onsite photography and filming (for personal use); onsite education activities

There are no significant adverse effects (direct, indirect or cumulative) to the socioeconomic environment anticipated as a result of these activities, which would occur under all three alternatives. There could be a small boost to the tourism economy should the Monument become a more popular wildlife watching designation due to the outreach and engagement activities that would occur under Alternatives 2 and 3. However, relative to the size of the marine tourism economy in the Northeast, any additional economic gain from Monument tourism is likely to be negligible.

Alternative 2 (preferred) would allow these recreational and educational activities to occur in the Monument without a joint-agency Monument access permit, whereas Alternative 3 would require a joint-agency access permit to conduct these recreational activities in the Monument. It is possible that the need to apply for a permit under Alternative 3 could discourage some recreational users, resulting in less in-person recreational use of the Monument and fewer tourism dollars generated.

However, given the estimated small scale of non-fishing recreation in the Monument, any adverse economic effect is likely to be negligible. Additionally, the remote nature of the Monument, which requires an overnight trip that is higher in cost than a day trip, suggests that it will likely be a relatively small, dedicated group of tourist boaters, bird watchers, whale watchers and divers who visit the Monument on a regular basis. The need to acquire an additional permit

to enter the Monument, which could be applied for online, is not expected to be a significant deterrent to this group such that it would cause an adverse socioeconomic effect.

Recreational fishing activities

Based on the best professional opinions of NOAA fishery management analysts and informal online review of fishing charter websites in the Northeast, the Monument management team believes that most recreational fishing in the Monument is for highly migratory species such as tuna and swordfish and occurs almost solely in the Canyons Unit of the Monument. Almost no recreational fishing activities have been documented in the Seamounts Unit.

NOAA Fisheries manages and permits the recreational fishing of highly migratory fish species in the Atlantic and has evaluated the effects of recreational fishing for highly migratory species under its Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. The plan and subsequent amendments set recreational catch limits for these highly migratory species, protect their U.S. spawning habitats and outline how NOAA Fisheries will engage with the international fishery management community to regulate highly migratory fish.

This management plan and its subsequent amendments were developed in accordance with NEPA and the plan includes an environmental impact statement that analyzes of the effects of recreational fishing for these species on the physical, biological, cultural, historical and socioeconomic environment. This NEPA analysis did not identify any significant adverse effects to the socioeconomic environment in the geographic region that includes the Monument as the result of the selected management alternative for recreational fishing for these species.

NOAA Fisheries also developed the Tilefish Management Plan, which included an environmental impact statement in accordance with NEPA, and subsequent amendments and policy frameworks. This analysis also does not identify any adverse effects to the socioeconomic environment in the geographic region that includes the Monument as a result of the selected management alternative for recreational fishing for tilefish.

There would be no changes to existing NOAA Fisheries recreational fishing permitting requirements under any of the three alternatives. However, under Alternative 3, there would be an additional access permit requirement for all entry to the Monument.

All vessels entering the Monument, regardless of the activity they are engaged in, would be required to obtain a joint-agency Monument access permit. The primary purpose of the permit would be to track the different uses of the Monument. Alternative 2 would allow recreational fishing to occur in the Monument without a joint-agency Monument access permit.

It is possible that the need to apply for an access permit under Alternative 3 could discourage some recreational anglers, resulting in either fewer recreational fishing trips overall or fewer individuals recreationally fishing in the Monument. But this potential outcome is uncertain. The remote nature of the Monument, which requires an overnight trip that is higher in cost than a day trip, suggests that it will continue to be a relatively small, dedicated group of anglers who fish in the Monument on a regular basis. The need to acquire an additional permit to enter the Monument, which can be obtained online, is not anticipated to be a significant enough deterrent to this group that it would cause a significant decline overnight tourism.

The Monument management team anticipates that there could be a small beneficial effect to the socioeconomic environment from recreational fishing activities in the Monument under the preferred Alternative 2 (Volume 1 final management plan and permitting system). Under Alternative 2, no additional access permit would be required to enter the Monument to fish recreationally; and the engagement and education activities identified in the final management plan are likely to increase awareness of the Monument and the exciting recreational opportunities it offers, potentially leading to a small increase in tourism.

Onsite photography and filming (for commercial distribution)

Onsite commercial photography and filmingfor commercial distribution, which can occur in the Monument with appropriate permissions, stipulations and approvals under the Marine Mammal Protection Act and the National Wildlife Refuge Administration Act and Recreation Act, is generally expected to have a neutral effect on the socioeconomic environment, though it is possible that documentary films about the Monument and its unique habitats and species could generate more tourism interest in the Monument.

Onsite education activities that involve fishing

Educational activities that involve fishing are not expected to have any adverse socioeconomic effects.

Cultural and Historical Environment

Over 12,000 years ago, much of the continental shelf was exposed, dry land, including portions of the Canyons Unit. This land provided habitat for many cultures and prehistoric creatures during the last Ice Age, also known as the Pleistocene Era. Mammoths and other large mammals are known to have roamed along the canyon heads, which were also sites for Paleo-Indian cultures. Lower sea levels and melting glaciers exposed the land and torrents of melting glacier water carved the canyons into river valleys.

Informal conversations with archaeologists suggest that the once-coastal rivers flowing through Oceanographer, Gilbert, and Lydonia Canyons were actively used by Indigenous peoples. It is likely that there are archaeological sites in what is now the seafloor around the heads of three canyons (and around the heads of the other canyons along the continental shelf break). While this area is now 300 feet underwater, the cultural connections between present-day Indigenous peoples and this ancient landscape remain (Terrell, 2007).

As sea levels rose, new and different cultural connections between people and the Monument formed. The Monument's waters became well traversed by vessels from across the world. This led to a rich maritime heritage that encompassed a diversity of cultures. Historically the Monument's waters have been connected with trades such as fishing, whaling, and shipping, of which Tribal Nations and Indigenous peoples were an integral part.

The Monument contains historic shipping lanes used for trade during the 17th and 18th centuries and was an area of conflict during World Wars I and II, when allied shipping and military vessels were attacked by German U-boats (Terrell, 2007). Transatlantic immigrants from the 18th through the 20th century traveled through the Monument's waters, with a peak period being the

1830s through the 1920s. During this period, a number of vessels were lost and could lie within the Monument.

According to the Massachusetts Board of Underwater Archaeological Resources there is one documented shipwreck in the Monument from the 1980s (location uncertain), but archaeologists believe that there are likely other shipwrecks in the Monument, some of which could be discovered on exploratory and research expeditions. Because the shallowest depths in the Monument are around 300 feet (92 meters), recreational shipwreck salvaging is currently not technically feasible in the Monument.

Present-day Tribal Nations and Indigenous Communities

There are multiple Tribal Nation and Indigenous communities that may have cultural ties to the Monument and its resources. Tribal Nations that may have ties to the waters and submerged lands in the Monument include the Mi'kmaq Nation, formerly Aroostook Band of Micmacs; the Houlton Band of Maliseet Indians; the Mashantucket Pequot Tribal Nation; the Mashpee Wampanoag Tribe; the Mohegan Tribe of Indians of Connecticut; the Narragansett Indian Tribe; the Passamaquoddy Tribe – Indian Township; the Passamaquoddy Tribe – Pleasant Point; the Penobscot Nation; the Shinnecock Indian Nation; and the Wampanoag Tribe of Gay Head (Aquinnah).

There are also many other Indigenous communities in the Northeast that may have cultural ties to the Monument and its resources.

Effects to the Cultural and Historical Environment

Overall, there would be no significant adverse effects (direct, indirect or cumulative) to the Monument's cultural and historic environment expected to occur as a result of any of the three proposed alternatives. There may be some indirect beneficial effects to the cultural and historic environment from proposed Alternatives 2 and 3. Under those alternatives, there are specific activities identified to increase knowledge, understanding and public awareness of the cultural and historical significance of the Monument.

EFFECTS SUMMARY:
No significant adverse effects to the cultural and historical environment expected under any of the three proposed alternatives.

Beneficial effects to the cultural and historical environment expected under Alternatives 2 and 3.

Management and Program Activities

Onshore routine office and management activities, onshore educational and outreach activities, onshore research activities

There are no significant adverse effects to the cultural and historic environment associated with these activities under any of the three proposed alternatives.

It is possible that the education and engagement activities proposed under Alternatives 2 and 3, could have an indirect beneficial effect to the cultural and historical environment by increasing public awareness and understanding of the cultural and historical value of the canyons and seamounts.

Onsite field research activities

The effects of routine research activities on the physical, biological, cultural, historic and socioeconomic environment have already been evaluated in accordance with NEPA in detail in NOAA's Final Programmatic Environmental Impact Statement (PEIS) for Surveying and Mapping Projects in U.S. Waters for Coastal and Marine Data Acquisition. This PEIS encompasses the Greater Atlantic Region out to the U.S. Exclusive Economic Zone, which includes the Monument, and evaluates the direct, indirect and cumulative effects on the cultural and historical environment of all the routine surveying and mapping work that is expected to take place in the Monument. None of the activities proposed under any of the three management plan alternatives for the Monument were found to have significant adverse effects to the cultural and historical environment.

Additionally, NOAA's Marine Mammal Stranding and Health Program PEIS evaluates the effects of routine marine mammal health studies on the physical, biological, cultural, historical, and socioeconomic environment. No significant adverse effects to the historical and cultural environment in the Monument's region were identified.

While remotely operated underwater vehicles (ROVs) do occasionally touch down on the seafloor and kick up sediment, the likelihood of causing damage to an archaeological site is low given the low frequency of these occurrences and the small area they disturb. It is possible that in surveying the Monument, researchers using ROVs could happen upon a shipwreck. This would be considered a beneficial effect because researchers could record the location and take pictures of the wreck, which would contribute to our understanding of the history of the Monument. Both proposed Alternatives 2 and 3 include training for researchers working in the Monument on recognizing objects of historical and cultural value and avoiding impacts to them.

Onsite marine debris and ALDFG mechanical removal

NOAA evaluated the impacts of marine debris research, assessment, prevention, reduction and removal activities throughout the United States in its Programmatic Environmental Assessment for the NOAA Marine Debris Program . This programmatic NEPA evaluation considers the full range of marine debris activities that may be implemented in the Monument and concludes that there would be no significant adverse effects (direct, indirect or cumulative) to the cultural and historical environment from these activities.

Restoration of deep-sea corals

There are no significant adverse effects to the cultural and historical environment expected as a result of deep-sea coral restoration activities.

Onsite routine enforcement and compliance activities

There are no significant adverse effects to the cultural and historical environment expected from routine enforcement and compliance activities.

Use Activities

Onsite non-fishing recreational and visitor activities; onsite photography and filming (for personal use); onsite education activities

There are no significant adverse effects (direct, indirect or cumulative) to the cultural and historic environment expected as a result of these activities, which would occur under all three alternatives. Any cultural and historical resources in the Monument are at depths that would prevent interaction with any of these recreational or education activities.

There may be some beneficial effects of these activities to the cultural environment under Alternatives 2 and 3, particularly if the Monument management team is successful in creating opportunities for Tribal Nations and Indigenous communities with cultural ties to the Monument to visit the Monument in person on overnight trips. Finding ways to assist Tribal Nations and Indigenous communities in connecting with the Monument and its resources could greatly benefit the Monument's cultural environment.

Recreational fishing activities

Based on the best professional opinions of NOAA Fisheries' management analysts and informal online review of fishing charter websites in the Northeast, the Monument management team believes that most recreational fishing in the Monument is for highly migratory species and occurs almost solely in the Canyons Unit of the Monument.

NOAA Fisheries manages and permits the recreational fishing of many species, including highly migratory fish species, in the Atlantic and has evaluated the effects of recreational fishing for highly migratory species under its 2006 Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. The plan and subsequent amendments set recreational catch limits for these highly migratory species, protect their U.S. spawning habitats and outline how NOAA Fisheries will engage with the international fishery management community to regulate highly migratory fish.

This management plan and its subsequent amendments were developed in accordance with NEPA and include an environmental impact statement that analyzes the effects of recreational fishing for these species on the physical, biological, cultural, historical and socioeconomic environment. This NEPA analysis did not identify any significant adverse effects to the cultural and historical environment as the result of recreational fishing for these species in the geographic area that includes the Monument.

The Mid-Atlantic Fishery Management Council developed and NOAA Fisheries implemented the Tilefish Management Plan, which included an environmental impact statement in accordance with NEPA, and subsequent amendments and policy frameworks. This analysis also does not identify any adverse effects to the cultural and historical environment in the geographic area that includes the Monument as a result of recreational fishing for tilefish.

Recreational fishing is not expected to have any adverse effects to the cultural and historical environment. All anecdotal evidence suggests that recreational anglers in the Monument are focused on rod and reel fishing for highly migratory species. This gear, used appropriately, does not cause bottom disturbance in depths as great as the Monument's and would not pose a risk to shipwrecks or archaeological sites, given how deep any shipwrecks in the Monument would be located.

Because fishing is a deeply rooted tradition among Tribal Nations, Indigenous communities and non-Indigenous maritime communities throughout the Northeast, recreational fishing in the

Monument under all three alternatives is expected to have a beneficial effect on the cultural environment. Recreational fishing opportunities will provide opportunities to continue to connect culturally with the Monument through fishing.

Onsite photography and filming (for commercial distribution)

Onsite photography and filming (for commercial distribution), which can occur in the Monument with appropriate permissions, stipulations and approvals under the Marine Mammal Protection Act and the National Wildlife Refuge Administration Act and Recreation Act, is expected to have no adverse effects on cultural and historical resources. Should shipwrecks or other archaeological sites be discovered in the Monument, filming and photography of these sites would be closely managed through the permitting process to avoid any adverse effects.

It is possible that documentary films that focus on the historical and cultural values of the Monument, or on any historical or cultural archaeological sites discovered in the Monument, could have a beneficial effect on the historical and cultural environment by increasing public awareness and understanding.

Onsite education activities that involve fishing

Educational activities that involve fishing are not expected to have any adverse effect on the cultural and historical environment. There could be a beneficial effect to the cultural and historical environment should educational programs incorporate learning components about the cultural and historical values of the Monument.

Cumulative Effects

Cumulative effects are the incremental impact of the proposed action(s) when added to other past, present and reasonably foreseeable future actions (including action by Federal and non-Federal agencies and private parties). Cumulative effects can be both beneficial and adverse, though adverse cumulative effects are more important to consider and evaluate under NEPA.

Cumulative adverse effects

The ocean landscape is busier than many realize and is becoming busier every day. There are many commercial activities occurring or soon to be occurring in the vicinity of the Monument, including shipping, fishing and offshore wind development. The military has testing and training ranges in the North Atlantic, and there are also recreational and research activities occurring in and around the Monument.

The ocean is becoming noisier, with more sources of artificial light, and more human-made structures. The onsite research, exploration, recreational, educational, filming/photography and routine enforcement activities anticipated under all three proposed management plan alternatives will involve operating vessels to, from, and in the Monument. Using vessels in the Monument will cause many of the same adverse impacts within the Monument that those activities cause outside of the Monument.

Air emissions from fossil fueled engines; accidental discharges; lost gear that becomes marine debris; accidental seabird, marine mammal, and sea turtle strikes; seafloor disturbance from the use of scientific instruments; acoustic disturbance of marine mammals, seabirds, sea turtles, and fish; and light disturbance from vessels staying overnight in the Monument are all adverse

impacts associated with vessel use proposed inside the Monument that will contribute to the cumulative impact of vessel use in the region.

However, onsite recreational, educational, research, exploration, filming/photography and law enforcement activities proposed under all three proposed management plan alternatives would be occurring on a much smaller scale within the Monument relative to the commercial-scale activities occurring outside of the Monument. The Monument management team estimates a total of 1 to 10 research, educational and photography/filming trips may occur in the Monument each year. The Monument management team does not yet have a firm estimate of boating, wildlife watching and recreational fishing use in the Monument, but given that visiting the Monument requires an overnight stay for almost all vessels, it is likely that recreational use of the Monument is and will continue to be lower than other surrounding areas that are only a day trip from shore.

The no action alternative could lead to fewer research, stewardship, educational and enforcement trips each year, because there would be no management plan providing an organizational framework for Monument management team activities. Alternative 3, which would implement a Monument access permit requirement for all access to the Monument could lead to a few more vessel trips to the Monument to evaluate compliance (or fewer vessel trips if not as many people choose to recreate in the Monument due to the additional access permit requirement).

In the case of all three proposed alternatives, any cumulative adverse effects associated with management plan activities would be negligible and insignificant. The intensity, duration and frequency of the adverse effects that would occur in the Monument are so small relative to the scale on which these adverse effects occur in the surrounding ocean landscape, there would be no significant cumulative effect.

Cumulative beneficial effects

The activities likely to occur in the Monument under all three alternatives (though in a more structured, organized way under Alternatives 2 and 3 than under the no action alternative), may have cumulative beneficial effects when considered in conjunction with other marine protected area efforts in the North Atlantic. Stellwagen Bank National Marine Sanctuary is working on similar research, exploration, stewardship, engagement and education efforts. Additionally, an area around Hudson Canyon, another deep-sea Atlantic shelf canyon that is located off the coast of New York, is being considered for designation as a national marine sanctuary. To the north, Canada has established several different types of marine protected areas off the coast of New Brunswick and Nova Scotia.

Cumulatively, these marine protected areas can provide great benefits to science, as well as beneficial engagement and educational opportunities. The Monument can share and combine funding and staff resources with these other marine protected areas to conduct comparative studies, develop educational programming, and improve public awareness about ocean ecosystems.

Comparison of Alternatives

> ***Alternative 1**: No action, no management plan adopted or implemented.*
>
> ***Alternative 2**: Volume 1 final management plan and permitting system overview (preferred alternative)*
>
> ***Alternative 3**: Volume 1 final management plan with a different permitting approach that would create and require a joint-agency access permit for access to the Monument (in addition to existing NOAA Fisheries permitting requirements)*

There are some direct, indirect, short-term, long-term and cumulative adverse impacts associated with the management, stewardship, exploration, research, engagement and education activities proposed under all three proposed alternatives, though none are considered significant within the context of NEPA. Though the no action alternative would not develop or adopt a management plan, the FWS and NOAA Fisheries would still have obligations to manage the Monument under the no action alternative and it is assumed that many activities described in the other alternatives would still occur under the no action alternative.

The insignificant adverse effects associated with the proposed activities under all three alternatives include seafloor disturbance associated with scientific research activities; injury to marine organisms from the process of collecting samples for scientific identification and study; exacerbation of climate change from the operation of vessels that rely on fossil fuels; entanglement/hooking; vessel strikes; sound and light disturbance from research, recreational, and enforcement vessels; small accidental discharges from research, recreational and management vessels; and inconveniences to Monument tourist visitors under Alternative 3, which would require a separate access permit for all entry to the Monument. None of these adverse effects are expected to be significant.

The activities likely to take place under all three proposed alternatives are also expected to have beneficial effects by:

- Improving understanding of deep-sea canyons and seamount ecosystems to promote more informed stewardship and management decisions;
- Providing tourism opportunities, such as recreational fishing, wildlife watching and diving, that connect people to Monument resources, foster a sense of environmental stewardship and contribute to the marine tourism economy in the Northeast; and
- Improving understanding of cultural connections to the Monument as well as the maritime history of the Monument, which helps to connect people to the Monument and foster a sense of cultural stewardship and community.

The Monument management team has identified Alternative 2 (Volume 1 final management plan and permitting system) as the preferred alternative because it best meets the purpose of and need for adopting and implementing a management plan, most effectively manages compatible priority public uses under the National Wildlife Refuge Administration Act and will likely lead to greater beneficial effects than the other two proposed alternatives.

The no action alternative is not preferred because it would provide no publicly accessible framework for joint management of the Monument. This would create challenges for the public,

NOAA and the FWS. Permitting and other management issues would end up being determined on a case-by-case basis, requiring a significant investment of staff time. The public would not have a clear sense of its involvement in management and stewardship. Additionally, the Monument would not be in compliance with the National Wildlife Refuge System Administration Act or Presidential Proclamation 9496, both of which require management planning.

Alternatives 2 and 3 are both viable approaches to managing the Monument. That being said, the two alternatives take fundamentally different approaches to working with user groups, particularly recreational fishing, wildlife watching and boating communities. These two alternatives take profoundly different approaches to allocating staff time.

Currently, the Monument is supported by 1.5 full-time employees with additional support from one full-time temporary FWS employee and several other employees who work on the Monument is addition to their regular full-time duties. While it is possible that the Monument staff may grow over the life of the management plan, the Monument management team must think carefully about how staff time is best invested.

Decades of marine protected area management have demonstrated that community involvement in stewardship is key to achieving conservation and protection goals. A large-scale joint-access permitting program such as the one proposed under Alternative 3 would be difficult and time-consuming to design (likely requiring years) and enforce – particularly in a region as densely populated as the Northeast. The Monument's limited staff time would be consumed with trying to establish, create awareness of, and enforce the joint-agency Monument access permit (which would be required in addition to other existing permitting requirements).

It is unclear how long it would take before compliance with the joint-agency access permit requirement would be high enough to provide an accurate picture of uses in the Monument. Moreover, a permitting program of this nature, even though it would be intended to track and not restrict uses, could complicate relationships and efforts to promote community stewardship and build partnerships with user groups.

Alternative 2 utilizes permits more sparingly, relying on NOAA Fisheries' already robust permitting system for recreational fishing, educational programs that involve fishing activities, photography, filming, scientific research and study of marine mammals, and using FWS permitting authorities to permit a select group of activities, such as non-NOAA, non-FWS research, at-sea educational programs that do not involve fishing and commercial filming.

Rather than trying to track activities such as recreational fishing and wildlife watching through a permitting system, Monument staff would work to understand recreational use of the Monument using a community stewardship approach: developing relationships and partnerships with recreational users of the Monument, conducting use surveys and exploring emerging satellite and remote sensing technologies to track use. Recreational visitors to the Monument likely can visit the Monument more frequently than staff and could provide valuable ecological information about the Monument.

The Monument management team recognizes that, in addition to the researchers who work in the Monument, boaters, anglers and wildlife watchers who visit the Monument gain observational

knowledge about resources in the Monument that could be valuable to informing management. The Monument management team would like to work with these groups to develop a community stewardship program for the Monument.

Providing a clear framework for community stewardship is an integral part of the purpose and need for the proposed action of adopting and implementing a management plan for the Monument. Alternative 2 (Volume 1 final management plan and permitting system) presents the best path forward to meet that purpose and need.

Determination

The Monument management team considered all substantive comments received on the draft management plan and environmental assessment (see Appendices F and G) and will select its preferred alternative (2), the Volume 1 final management plan. The Monument management team concludes that there are no significant adverse effects associated with the proposed action of adopting and implementing a management plan for the Monument and will not need to develop an environmental impact statement to further evaluate the development of a management plan for the Monument. The Monument management team is publishing a FONSI (Appendix H) that summarizes the reasons why the FWS and NOAA have concluded that there are no significant environmental impacts projected to occur upon implementation of the final management plan.

☒ The action will not result in a significant impact on the quality of the human environment. See Appendix H Finding of No Significant Impact.

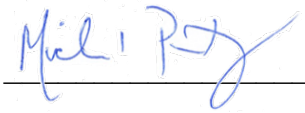
☐ The action may significantly affect the quality of the human environment and the Service will prepare an Environmental Impact Statement.

Signatures

5/17/2024

Wendi Weber
Regional Director
Northeast Region
U.S. Fish and Wildlife Service

Date



5/17/2024

Michael Pentony
Regional Administrator
Greater Atlantic Regional Fisheries Office
National Marine Fisheries Service

Date

Compliance with other relevant laws, regulations, and policies

Endangered Species Act – The FWS conducted an internal, intraservice consultation under Section 7 of the Endangered Species Act to evaluate broadly whether there will be effects to listed species and critical habitat from the activities proposed in the final management plan and issued a finding of not likely to adversely affect. Project-specific consultations will be required as the management plan is implemented. NOAA Fisheries will evaluate effects of proposed activities in the Monument to listed species and critical habitat on a project-by-project basis as projects under the management plan are proposed and implemented.

National Wildlife Refuge System Administration Act, as amended by the National Wildlife Refuge System Improvement Act of 1997 – The FWS manages the Monument as a unit of the National Wildlife Refuge System under this act. This final management plan and environmental assessment was developed in compliance with this act and serve as the comprehensive conservation plan that this act requires all units of the National Wildlife Refuge System to develop.

Refuge Recreation Act – This act and its subsequent amendments authorize the Secretary of the Interior to administer refuges, hatcheries and other conservation areas for recreational use, when such uses do not interfere with the primary purpose for which these areas were established.

Executive Order 6166 of June 10, 1933 – This order provided for the reorganization of some agencies under the Executive Branch and consolidated all functions of administration of public buildings, reservations, national parks, national monuments and national cemeteries within the Department of the Interior.

Public Law 98-532 – This law, passed in 1984, ratified and affirmed prior Federal reorganization plans.

Magnuson-Stevens Fishery Conservation and Management Act – The final management plan was developed in compliance with this act. There are no activities proposed under any of the three alternatives that would alter or interfere with fisheries management under this act.

Marine Mammal Protection Act – All onsite activities that have the potential to involve interaction with marine mammals will be required to have all necessary Marine Mammal Protection Act permits in place before commencing work in the Monument.

Coastal Zone Management Act – The Coastal Zone Management Act requires that federal agency actions with reasonably foreseeable effects on any land or water use or natural resource of the coastal zone be consistent, to the maximum extent practicable, with the enforceable policies of a coastal state or territory's federally approved Coastal Management Plan. The Monument management team has evaluated the potential effects of the proposed Monument management plan on coastal resources and uses and has determined that the proposed Monument management plan will not have effects on coastal resources and uses (referred to as a "negative determination"). The team submitted its negative determination to the Coastal Zone Management Act program coordinators in Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut and New York for consideration along with the draft management plan and environmental

assessment and requested a response within 60 days. New Hampshire, Connecticut, Rhode Island and New York all sent concurrence letters in response.

National Historic Preservation Act – The Monument management team has not identified any adverse impacts to historic resources associated with the development of the final management plan for the Monument.

The Advisory Council on Historic Preservation has advised the Monument management team that Sections 106 and 402 of the National Historic Preservation Act, which require Federal agencies to identify and assess the effects of their actions on historic and cultural resources, do not apply in the Monument. This is due to the fact that the Monument does not lie within a state boundary, nor does it lie outside of the U.S.

The Monument management team notified the Tribal Historic Preservation Offices of federally recognized Tribal Nations and State Historic Preservation Offices in Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut and New York when the draft management plan and environmental assessment was published with a request for input and comments. The management team will also notify them when the final management plan and environmental assessment is published.

Regardless of the applicability of Section 106 and 402, the Monument management team has identified multiple strategies in the management plan for partnering with Tribal and State Historic Preservation Offices to protect and interpret any historic or cultural resources that are discovered in the Monument.

Archaeological Resources Protection Act – No archaeological investigations or excavations are planned or anticipated in the Monument at this time.

Migratory Bird Treaty Act of 1918 – This act prohibits the take (including killing, capturing, selling, trading and transport) of protected migratory bird species without prior authorization by the FWS. The Monument management team will ensure that any projects or activities taking place in the Monument are conducted in compliance with this act and have any necessary permits or authorizations required under the Migratory Bird Treaty Act.

Executive Order 13175 Consultation and Coordination with Indian Tribal Governments – This order established and required regular and meaningful consultation and collaboration with Tribal officials in the development of federal policies that have Tribal implications. The Monument management team engaged Tribal Nations in the scoping process for the Monument's draft management plan and requested comments on the draft management plan from Tribal Nations. Additionally, the final management plan states under objective 2.3, "In accordance with Executive Order 13175 and in recognition of our government-to-government relationship, the Monument management team will consult with federally recognized Tribal Nations early and often regarding co-stewardship of the Monument and any Monument management decisions that could impact them."

Executive Order 13751 Safeguarding Nation from Impacts of Invasive Species – This order, issued in 2016, ensures the faithful execution of the laws of the United States of America to

prevent the introduction of invasive species and provide for their control, and to minimize the economic, plant, animal, ecological and human health impacts that invasive species cause. Presidential Proclamation 9496 prohibits the introduction of invasive species into the Monument.

References

Ackleh, A. S., R. A. Chiquet, B. Ma, T. Tang, H. Caswell, A. Veprauskas, and N. Sidorovskaia. 2017. Analysis of lethal and sublethal impacts of environmental disasters on sperm whales using stochastic modeling. Ecotoxicology 26: 820-830.

Allen, S. E. and X. Durrieu de Madron. 2009. A review of the role of submarine canyons in deep-ocean exchange with the shelf. Ocean Science 5: 607-620.

Andres, M. 2016. On the recent destabilization of the Gulf Stream path downstream of Cape Hatteras. Geophys. Res. Lett. 43: doi:10.1002/ 2016GL069966.

Angel, M. V. 2003. The pelagic environment of the open ocean. In: P. A. Tyler, editor. Ecosystems of the Deep Ocean. 1st ed. Amsterdam (The Netherlands): Elsevier Science B.V. p. 39-80.

Auer, S. J. 1987. Five-year climatological survey of the Gulf Stream system and its associated rings. Journal of Geophysical Research 92: 11709-11726.

Auster, P.J., Hodge, B., McKee, M., and Kraus, S., 2020. *A Scientific Basis for Designation of the Northeast Canyons and Seamounts Marine National Monument.* Frontiers in Marine Science, Volume 7, Article 566, doi: 10.3389/fmars.2020.00566.

Auster, P. J., J. Moore, K. Heinonen, L. Watling, A. Freiwald, J. M. Roberts, 2005. A habitat classification scheme for seamount lanscapes: assessing the functional role of deepwater corals as fish habitat. Cold-water Corals and Ecosystems. Berlin Springer. Pg. 761-769.

Baran. M.A., S.W. Kress, P. Shannon, D.E. Lyons, H.L. Major and A.W. Diamond, 2022. *Overwinter movement of Atlantic puffins (Fratercula arctica) breeding in the Gulf of Maine: inter- and intra-colony effects*. Journal of the Waterbird Society, Vol. 45, No. 1, pp.1 – 16.

Barton, A. D., A. J. Irwin, Z. V. Finkel, and C. A. Stock, 2016: Anthropogenic climate change drives shift and shuffle in North Atlantic phytoplankton communities. *Proceedings of the National Academy of Sciences of the United States of America*, 113: 2964–2969. doi:10.1073/pnas.1519080113.

Boehlert, G. W., and A. Genin. 1987. A review of the effects of seamounts on biological processes. In: Keating, B.H., P. Fryer, R. Batiza, and G. Boehlert (eds) Seamounts, Islands, and Atolls. Amer Geophys Union, Geophysical Monograph 43: 319-334.

Bryce, E. 2016. Audubon: Where do Maine's Atlantic Puffins go for the Winter? Accessed: 25 October 2018. https://www.audubon.org/news/where-do-maines-atlantic-puffins-go-winter.

Burge, C. A., C. M. Eakin, C. S. Friedman, B. Froelich, P. K. Hershberger, E. E. Hofmann, L. E. Petes, K. C. Prager, E. Weil, B. L. Willis, S. E. Ford, and C. D. Harvell, 2014: Climate change influences on marine infectious diseases: Implications for management and society. *Annual Review of Marine Science*, **6** (1), 249–277. doi:10.1146/annurev-marine-010213-135029.

Burke, C. A., and C. L. Drake (Eds). 1974. The Geology of Continental Margins. Springer-Verlag Berlin Heidelberg.

Chaudhuri, A., J. Bisagni, and A. Gangopadhay, 2009. a. Shelf water entrainment by Gulf Stream warm-core rings between 75o W and 50o W during 1978-1999. Cont. Shelf Res., 29, 393-406.

Chaudhuri, A., A. Gangopadhyay, and J. Bisagni, 2009, b. Interannual variability of Gulf Stream warm-core rings in response to the North Atlantic Oscillation. Cont. Shelf Res., 29, 856-869.

Chivers, W. J., A. W. Walne, and G. C. Hays, 2017: Mismatch between marine plankton range movements and the velocity of climate change. *Nature Communications*, 8: 14434. doi:10.1038/ncomms14434.

Day, T. 1999. Ecosystems: *Oceans*. New York (NY): Fitzroy Dearborn Publishers, 1999.

Dickson, B., Yashayaev, I., Meincke, J., Turrell, B., Dye, S., and Holfort, J., 2002. Rapid freshening of the deep North Atlantic Ocean over the past four decades. Nature, Vol. 416, pp.832 – 837.

Doney, S. C., V. J. Fabry, R. A. Feely, and J. A. Kleypas. 2009. Ocean acidification: the other CO_2 problem. Washington Journal of Environmental Law and Policy 6: 212-251.

Dupigny-Giroux, L.A., E.L. Mecray, M.D. Lemcke-Stampone, G.A. Hodgkins, E.E. Lentz, K.E. Mills, E.D. Lane, R. Miller, D.Y. Hollinger, W.D. Solecki, G.A. Wellenius, P.E. Sheffield, A.B. MacDonald, and C. Caldwell. 2018. Northeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA. doi: 10.7930/NCA4.2018.CH18

Fabry, V. J., Seibel, B. A., Feely, R. A., and Orr, J. C. 2008. Impacts of ocean acidification on marine fauna and ecosystem processes. – ICES Journal of Marine Science, 65: 414–432.

Farr ER, Johnson MR, Nelson MW, Hare JA, Morrison WE, et al. 2021. An assessment of marine, estuarine, and riverine habitat vulnerability to climate change in the Northeast U.S.. PLOS ONE 16(12): e0260654. https://doi.org/10.1371/journal.pone.0260654

Feely, R.A., S.C. Doney, and S.R. Cooley. 2009. Ocean acidification: Present conditions and future changes in a high-CO_2 world. *Oceanography* 22(4):36–47, https://doi.org/10.5670/oceanog.2009.95.

Flagg, C. N. 1987. Hydrographic structure and variability. *In*: R.H. Backus (ed), Georges Bank, MIT Press, Cambridge, Massachusetts, p. 125-138.

Gonçalves Neto, A., Langan, J.A. & Palter, J.B. 2021. Changes in the Gulf Stream preceded rapid warming of the Northwest Atlantic Shelf. Communications Earth & Environment 2, 74. https://doi.org/10.1038/s43247-021-00143-5

Hare, J. A., J. H. Churchill, R. K. Cowen, T. J. Berger, P. C. Cornillon, P. Dragos, S. M. Glenn, J. J. Govoni, T. N. Lee. 2002. Routes and rates of larval fish transport from the southeast to the northeast United States continental shelf. Limnology and Oceanography 47: 1774-1789.

Hartel, K. E., C. P. Kenaley, J. K. Galbraith, and T. T. Sutton. 2008. Additional records of deep-sea fishes from off greater New England, Northeastern Naturalist 15: 317-334.

Heaslip, S. G., S. J. Iverson, W. D. Bowen, and M. C. James. 2012. Jellyfish support high energy intake of Leatherback Sea Turtles (*Dermochelys coriacea*): Video evididence from animal-borne cameras. PLOS ONE 7: 10.1371/annotation/4722cac5-8305-4b03-b805-a59ced1eea49.

Heezen, B. C., C. D. Hollister, and W. F. Ruddiman. 1966. Shaping of the continental rise by deep geostrophic contour currents. Science 152: 502-508.

Heezen, B. C., M. Tharp, and M. Ewing. 1959. The floors of the oceans 1. The North Atlantic. Geological Society of America Special Papers 65: 17-35.

Helfman, G., B. B. Collette, D. E. Facey, and B. W. Bowen. 2009. The Diversity of Fishes. 2nd Ed. Oxford (UK): Wiley-Blackwell.

Hickey, B. M. 1995. 'Coastal submarine nayons'. Topographic effects in the ocean: proceedings of the eigth 'Aha Huliko'aWawaiian winter workshop. School of Ocean and Earth Science and Technology. University of Hawaii. Pp. 95-110.

Kaplan, K. A., D. R. Hart, K. Hopkins, S. Gallager, A. York, R. Taylor, and P. J. Sullivan. 2017. Evaluating the interaction of the invasive tunicate *Didemnum vexillum* with the Atlantic sea scallop *Placopecten magellanicus* on open and closed fishing grounds of Georges Bank. ICES Journal of Marine Science 74: 2470-2479. https://doi.org/10.1093/icesjms/fsx076.

Kavanaugh, M. T., J. E. Rheuban, K. M. A. Luis, and S. C. Doney. 2017. Thirty-three years of ocean benthic warming along the U.S. Northeast Continental Shelf and Slope; Patterns, drivers, and ecological consequences. Scientific Reports 2: 9399-9414.

Lucey, Sean (ed.) et al. 2023. State of the Ecosystem 2023: New England. https://doi.org/10.25923/9sb9-nj66

Marshall, P.A., Dowd, A.M., Luder, C., Maynard, J.A., Beeden, R. 2015. A Reef Manager's Guide to Fostering Community Stewardship. Gland, Switzerland: IUCN, https://www.iucn.org/resources/publication/reef-managers-guide-fostering-community-stewardship.

McGregor, B. A. 1968. Features at the Sohm Abyssal Plain terminus. Marine Geology **6**: 401-414.

Lentz, S. J., R. C. Beardsley, J. D. Irish, J. Manning, P. C. Smith, and R. A. Weller. 2003. Temperature and salt balances on Georges Bank February-August 1995. Journal of Geophysical Research 108: 1-17.

Li, M. Z., W. Yongsheng, R. H. Prescott, C. C. L. Tang, G. Han. 2015. A modeling study of the impact of major storms on waves, surface and near-bed currents on the Grand Banks of Newfoundland. Journal of Geophysical Research 120: 5358-5386.

Lozier, M. S., A. C. Dave, J. B. Palter, L. M. Gerber, R. T. Barber. 2011. On the relationship between stratification and primary productivity in the North Atlantic. Geophysical Research Letters 38. https://doi.org/10.1029/2011GL049414

Lurton, X. and S. DeRuiter. 2011. Sound radiation of seafloor – mapping echosounders in the water column, in relation to the risks posed to marine mammals. International Hydrographic Review. [Online] http://archimer.ifremer.fr/doc/00115/22607/20313.pdf.

Maynard, J., R. Van Hooidonk, C. D. Harvell, C. M. Eakin, G. Liu, B. L. Willis, G. J. Williams, M. L. Groner, A. Dobson, S. F. Heron, R. Glenn, K. Reardon, and J. D. Shields. 2016. Improving marine disease surveillance through sea temperature monitoring, outlooks and projections. Philosophical Transactions of the Royal Society of London 1689: pii: 20150208. doi: 10.1098/rstb.2015.0208.

Mello-Rafter K, Sowers D, Malik M, Watling L, Mayer LA and Dijkstra JA (2021) Environmental and Geomorphological Effects on the Distribution of Deep-Sea Canyon and Seamount Communities in the Northwest Atlantic. Front. Mar. Sci. 8:691668. doi: 10.3389/fmars.2021.691668

Moore, J. A., M. Vecchione, K. E. Hartel, B. B. Collette, J. K. Galbraith, R. Gibbons, M. Turnipseed, M. Southworth, E. Watkins. 2003. Biodiversity of Bear Seamount, New England seamount chain: results of exploratory trawling. Journal of Northwest Atlantic Fishery Science 31: 363–372.

Moore, J. A., K. E. Hartel, J. E. Craddock, J. K. Galbraith, 2003. An annotated list of deepwater fishes from off the New England region, with new area records. Northeastern Naturalist 10: 159-248.

Moret-Feruson, S., K. L. Law, G. Proskurowski, E. K. Murphy, E. E. Peacock, and C. M. Reddy. 2010. The size, mass, and composition of plastic debris in the western North Atlantic Ocean. Marine Pollution Bulletin 60: 1873-1878.

NASEM. (National Academies of Sciences, Engineering, and Medicine). 2022. Reckoning with the U.S. Role in Global Ocean Plastic Waste. Washington, DC: The National Academies Press. https://doi.org/10.17226/26132.

New England Aquarium, Anderson Cabot Center for Ocean Life, September 2018. 600+ Animals in 4 Hours: Biodiversity Abounds in the Monument. Accessed: 24 October, 2018. https://www.andersoncabotcenterforoceanlife.org/blog/september-aerial-survey-canyons-and-seamounts/

Nelms, S. E., E. M. Duncan, A. C. Broderick, T. S. Golloway, M. H. Godfrey, M. Hamann, P. K. Lindeque, B. J. Godley. 2016. Plastic and marine turtles: a review and call for research. ICES Journal of Marine Science 73: 165-181.

NOAA. (National Oceanic and Atmospheric Administration). 2018. What is ocean noise? National Ocean Service website, https://oceanservice.noaa.gov/facts/ocean-noise.html. Accessed 11/15/18.

NOAA Fisheries, 2022. Changing Oceanographic Conditions and Environmental Justice Concerns In The Northeast Shelf. NOAA Fisheries website, https://www.fisheries.noaa.gov/feature-story/changing-oceanographic-conditions-and-environmental-justice-concerns-northeast-shelf. Accessed 5/8/2023.

NOAA Fisheries, 2022. Programmatic Environmental Impact Statement for Marine Mammal Health and Stranding Response Program: Final Programmatic Environmental Impact Statement, https://repository.library.noaa.gov/view/noaa/47576 .

NOAA National Ocean Service, 2013. Programmatic Environmental Assessment (PEA) for the NOAA Marine Debris Program (MDP), https://marinedebris.noaa.gov/reports/marine-debris-program-programmatic-environmental-assessment.

NOAA National Ocean Service, 2022. Final Programmatic Environmental Impact Statement (PEIS) for Surveying and Mapping Projects in U.S. Waters for Coastal and Marine Data Acquisition, https://oceanservice.noaa.gov/about/environmental-compliance/final-surveying-mapping-PEIS-sections.html .

Northeast Fisheries Science Center (U.S.) (2023). State of the Ecosystem 2023: Mid-Atlantic. https://doi.org/10.25923/vy6j-w454

Nye, J. A., J. S. Link, J. A. Hare, and W. J. Overholtz. 2009. Changing spatial distribution of fish stocks in relation to climate and population size on the Northeast United States Continental Shelf. Marine Ecology Progress Series 393: 111-129.

Occhipinti-Ambrogi, A., and B. Galil. 2010. Marine alien species are an aspect of global change. Advances in Oceanography and Limnology 1. https://doi.org/10.1080/19475721003743876.

Pace, R. M. III, P. J. Corkeron, S. D. Kraus. 2017. State-space mark-recapture estimates reveal a recent decline in abundance of North Atlantic right whales. Ecology and Evolution 7: 8730-8741.

Pershing, A. J., M. A. Alexander, C. M. Hernandez, L. A. Kerr, A. Le Bris, K. E. Mills, J. A. Nye, N. R. Record, H. A. Scannell, J. D. Scott, G. D. Sherwood, and A. C. Thomas, 2015: Slow adaptation in the

face of rapid warming leads to collapse of the Gulf of Maine cod fishery. *Science* 350: 809–812. doi:10.1126/science.aac9819.

Pershing, A.J., R.B. Griffis, E.B. Jewett, C.T. Armstrong, J.F. Bruno, D.S. Busch, A.C. Haynie, S.A. Siedlecki, and D. Tommasi, 2018: Oceans and Marine Resources. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA. doi: 10.7930/NCA4.2018.CH9

Piper, D. J. W., D. A. V. Stow, W. R. Normark. 1983. The Laurentian Fan: Sohm abyssal plain. Geo-Marine Letters 3: 141-146.

Raine, A.F., C. Gjerdrum, I. Pratte, J. Madeiros, J.J. Felis, J. Adams, 2021. Marine distribution and foraging habitat highlight potential threats at sea for the endangered Bermuda petrel *Pterodroma cahow*. Endangered Species Research, Vol. 45: 337 – 356.

Richardson, R. L. 1983. Gulf Stream Rings. In: Robinson A. R. (eds). Eddies in Marine Science. Topics in Atmospheric and Oceanographic Sciences. Springer, Berlin, Heidelberg

Rochman, C. M., T. Kurobe, I. Flores, and S. J. Teh. 2014. Early warning signs of endocrine disruption in adult fish from ingestion of polyethylene with and without sorbed chemical pollutants from the marine environment. Science of the Total Environment 493: 656-661.

Ryan, J. P., J. A. Yoder, and D. W. Townsend. 2001. Influence of a Gulf Stream warm-core ring on water mass and chlorophyll distributions along the southern flank of Georges Bank. Deep-Sea Research II 48: 159-178.

Satgé, Y.G., B.S. Keitt, C.P. Gaskin, B. Patteson, P.G.R. Jodice. 2022. Temporal and spatial segregations between phenotypes of the Diablotin Black-capped Petrel Pterodroma hasitata during the breeding and non-breeding periods. BioRxiv preprint doi: https://doi.org/10.1101/2022.06.02.491532 .

Schorr, G. S., E. A. Falcone, D. J. Moretti, R. D. Andrews. 2014. First long-term behavioral records from Cuvier's Beaked Whales *(Ziphius cavirostris)* reveal record-breaking dives. PLoS One 9: e92633. https://doi.org/10.1371/journal.pone.0092633.

Shanmugam, G., 2006, Deep-water processes and facies models: Implications for sandstone petroleum reservoirs: Amsterdam, Elsevier, Handbook of petroleum exploration and production, v. 5, 476 p.

Sorte, C. J., S. L. Williams, R. A. Zerebecki. 2010. Ocean warming increases threat of invasive species in a marine fouling community. Ecology 91: 2198-2004.

Soto, N. A., M. Johnson, P. T. Madsen, P. L. Tyack, A. Bocconcelli, and J. F. Borsani. 2006. Does intense ship noise disrupt foraging in deep-diving Cuvier's Beaked Whales (*Ziphius cavirostris*). Marine Mammal Science 22: 690-699.

Talmage and Gobler. 2011. Effects of elevated temperature and carbon dioxide on the growth and survival of larvae and juveniles of three species of Northwest Atlantic Bivalves. PLoS ONE 6(10): e26941. https://doi.org/10.1371/journal.pone.0026941.

Terrell, B.G. 2007. Fathoming Our Past, Historical Contexts of the National Marine Sanctuaries. NOAA National Marine Sanctuary Program, Silver Spring, Maryland. 68 p + xi, https://repository.library.noaa.gov/view/noaa/10726 .

Townsend, D.W. and M. Thomas. 2002. Springtime nutrient and phytoplankton dynamics on Georges Bank. Mar. Ecol. Prog. Ser. 228: 57-74.

Townsend, D. W., A. C. Thomas, L. M. Mayer, M. A. Thomas, and J. A Quinlan. 2006. Chapter 5: Oceanography of the Northwest Atlantic Continental Shelf (1,w)[1]. In: *The Sea*, Volume 14A, Eds: A. R. Robinson and K. H. Brink. Harvard University Press, Cambridge.

Trumble, S. J., S. A. Norman, D. D. Crain, F. Mansouri, Z. C. Winfield, R. Sabin, C. W. Potter, C. M. Gabriele, and S. Usenko. 2018. Baleen whale cortisol levels reveal a physiological response to 20th century whaling. Nature Communications 9: 4587. doi: [10.1038/s41467-018-07044-w].

Twichell, D. C. 1983. Geology of the head of Lydonia Canyon, U.S. Atlantic outer continental shelf. Marine Geology 54: 91-108.

Valentine, P. C., J. R. Uzmann, R. A. Cooper. 1980. Geology and biology of Oceanographer submarine Canyon. Marine Geology 38: 283-312.

Valentine, P. C., R. A. Cooper, and J. R. Uzmann. 1984. Submarine sand dunes and sedimentary environments of Oceanographer Canyon. Journal of Sedimentary Petrology 54: 704-715.

Valentine, P. C. 1987. The Shelf-slope Transition--canyon and Upper Slope Sedimentary Processes on the Southern Margin of Georges Bank: An Examination of Sedimentary Environments in Water Depths of 150-600 Meters and of how They are Determined by the Interaction of Available Sediment, Bottom Currents, and Sea-floor Morphology. Department of the Interior, U.S. Geological Survey, 1987.

Wiebe, P., R. Beardsley, D. Mountain, and A. Bucklin. 2002. U.S. GLOBEC Northwest Atlantic/Georges Bank Program. Oceanography 15: 13-29.

Wieczorek, A. M., L. Morrison, P. L. Croot, A. L. Allcock, E. MacLoughlin, O. Savard, H. Brownlow, and T. K. Doyle. 2018. Frequency of microplastics in mesopelagic fishes from the Northwest Atlantic. Frontiers in Marine Science 5. https://doi.org/10.3389/fmars.2018.00039.

Williams, W., A. J. Wright, E. Ashe, L. K. Blight, R. Bruintjes, R. Canessa, C. W. Clark, S. Cullis-Suzuki, D. T. Dakin, C. Erbe, P. S. Hammond, N. D. Merchant, P. D. O'Hara, J. Purser, A. N. Radford, S. D. Simpson, L. Thomas, and M. A. Wale. 2015. Impacts of anthropogenic noise on marine life: Publication patterns, new discoveries, and future directions in research and management. Ocean and Coastal Management 115: 17-24.

Wunsch, C. 2002. What is the thermohaline circulation? Science 298: 1179-1181.

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