EXECUTIVE SUMMARY

INTRODUCTION

The National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) has prepared this Draft Programmatic Environmental Impact Statement (PEIS) to analyze the potential environmental impacts associated with NOS's recurring data collection projects (surveying and mapping) to characterize underwater features (e.g., habitat, bathymetry, marine debris) throughout United States (U.S.) waters. Data obtained from these projects are used to produce many products, including charts and maps that are relied upon by mariners, scientists, the shipping and fishing industries, and countless other users in the U.S. and beyond.

The Proposed Action evaluated in this Draft PEIS is to continue NOS's surveying and mapping projects over the next six years. These projects would include surveys performed from crewed, remotely operated, or autonomous vessels operated by NOS field crews, other NOAA personnel on behalf of NOS, contractors, grantees, or permit/authorization holders. These crews and vehicles may use echo sounders and other active acoustic equipment and employ other equipment, including bottom samplers and conductivity, temperature, and depth instruments to collect the needed data. The "action area" for these projects includes rivers; states' offshore waters; the U.S. territorial sea; the contiguous zone; and the U.S. Exclusive Economic Zone (U.S. EEZ). The action area also includes coastal and riparian lands for activities such as the installation, maintenance, and removal of tide gauges. This analysis has been carried out to meet the requirements of the National Environmental Policy Act of 1969 (NEPA). NOS opted to prepare a programmatic NEPA document because the NOS mapping and surveying represents a suite of similar activities over a broad geographic region.

This Draft PEIS evaluates three alternatives: 1) the No Action Alternative (Alternative A), under which NOS would continue to gather accurate and timely data on the nature and condition of the marine and coastal environment, reflecting the technology, equipment, scope, and methods currently in use by NOS at the current level of effort (i.e., the status quo); 2) Alternative B, under which NOS would increase the adoption of new technologies to more efficiently perform surveying, mapping, charting and related data gathering; and 3) Alternative C, which also includes the adoption of new techniques and technologies and includes an overall funding increase of 20 percent. The Draft PEIS has been prepared to: 1) inform NOS and the public on the physical, biological, economic, and social impacts of NOS mapping and surveying projects; and 2) assist NOS in deciding how to execute its mapping and surveying program over the next six years.

This Draft PEIS was prepared in accordance with NEPA (42 United States Code [U.S.C.] § 4321, et seq.); Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR § 1500–1508 (1978)); NOAA Administrative Order 216-6A and other relevant federal and state laws and regulations.

PUBLIC INVOLVEMENT

On December 19, 2016, NOS published a "Notice of Intent to Prepare a Programmatic Environmental Assessment (PEA) and Request for Comments (FR, 2016a)" to advise other federal and state agencies, territories, tribal governments, local governments, private parties, and the public of the Proposed Action and this document and to invite their input. NOS initially planned to address the environmental impacts of the Proposed Action through a PEA; however, during preparation of the PEA NOS determined that due to the geographical and temporal scope of the Proposed Action and the complexities of the analysis, a

PEIS would provide the agency and the public with the appropriate framework to understand the potential impacts to critical resources such as marine mammals and to provide input on the Proposed Action. A copy of the notice is presented in Appendix B. NOS received one comment in response to the Notice of Intent which was not within the scope of the Draft PEIS. The 30-day public comment period on the Notice of Intent closed on January 18, 2017.

NOS developed a public webpage specifically for development of this Draft PEIS, which can be found at https://oceanservice.noaa.gov/about/environmental-compliance/hydroacoustics.html.

Coordination with Other Agencies

NOS is coordinating with several federal and state agencies as part of this NEPA process. NOS is coordinating with the National Marine Fisheries Service (NMFS), which has legal jurisdiction over most marine mammal species (through the Marine Mammal Protection Act [MMPA]), most threatened or endangered marine plant and animal species (through the Endangered Species Act [ESA]), and Essential Fish Habitat (through the Magnuson-Stevens Fishery Conservation and Management Act [MSA]). NOS is also coordinating with the U.S. Fish and Wildlife Service (USFWS), which has legal jurisdiction over certain marine mammal species (including manatees, walruses, polar bears, and sea otters), most threatened or endangered terrestrial plant and animal species (through the ESA), and over 1,000 species of birds (through the Migratory Bird Treaty Act [MBTA]). NOS is also coordinating with the Office of National Marine Sanctuaries, which has legal jurisdiction under the National Marine Sanctuaries Act (NMSA) over activities in national marine sanctuaries, all of which are included in the action area.

NOS intends to coordinate with State Historic Preservation Officers (SHPOs) and Tribal Historic Preservation Officers (THPOs) of each state in which the Proposed Action would occur regarding use of this document to inform compliance with Section 106 of the National Historic Preservation Act. NOS will also coordinate with coastal states and territories regarding use of this document to inform subsequent federal consistency review pursuant to Section 307 of the Coastal Zone Management Act.

Purpose and Need Statement

The purpose of the Proposed Action is to gather accurate and timely data on the marine and coastal environment. The need for the Proposed Action is to ensure safety at sea, economic well-being, and the efficient stewardship of public trust resources.

Proposed Action and Alternatives

Alternative A: No Action – Conduct Surveys and Mapping for Coastal and Marine Data Collection with Current Technology and Methods, at Current Funding Levels

Under Alternative A, NOS would continue to operate a variety of equipment and technologies to gather accurate and timely data on the nature and condition of the marine and coastal environment. This alternative reflects the technology, equipment, scope, and methods currently in use by NOS, at the level of effort reflecting NOS fiscal year 2019 funding levels. NOS operations were widely disrupted during the 2020 field season due to the COVID-19 pandemic. Therefore, the PEIS relies on 2019 as the baseline year for Alternative A as it is the most recent example of typical field operations that would be enacted if NOS chose to continue historical levels of project effort.

Alternative B: NOS Preferred Alternative – Conduct Surveys and Mapping for Coastal and Marine Data Collection with Equipment Upgrades, Improved Hydroacoustic Devices, and New Tide Stations

Alternative B consists of Alternative A plus the more widespread adoption of new techniques and technologies (such as remotely operated vehicles (ROVs), microwave water level (MWWL) radar sensors, etc.) to more efficiently perform surveying, mapping, charting and related data gathering. Specific examples of adaptive methods and equipment that NOS programs are likely to adopt under Alternative B in the next six years include:

- Greater use of ROVs with echo sounder technologies;
- Greater use of autonomous underwater vehicles (AUVs) and autonomous surface vehicles (ASVs) with echo sounder technologies;
- Conversion of one or more existing 10-m (33 feet) crewed survey boats into ASVs;
- Greater use of more efficient, wide-beam sonar systems (i.e., phase-differencing bathymetric systems) for nearshore hydrographic surveys;
- Increased field operations in the National Marine Sanctuary system with associated requirements for hydroacoustic charting, surveying, mapping and associated activities; and
- Installation, operation, and maintenance of additional water level stations, including transitioning to mostly microwave water level (MWWL) radar sensors and upgraded storm strengthening to make stations more climate resilient.

Under Alternative B, all of the activities and equipment operation described in Alternative A would continue, many at a higher level of effort. The nature of these actions would not change, but the overall level of activity would be increased.

Alternative B is NOS's preferred alternative because it takes advantage of newer, more efficient technology, responds to the needs of anticipated new marine sanctuaries, and more effectively addresses the nation's needs for coastal and marine data.

Alternative C: Upgrades and Improvements with Greater Funding Support

Like Alternative B, Alternative C adopts new techniques and technologies to encourage greater program efficiencies regarding surveying, mapping, charting, and related data gathering activities. In addition, Alternative C would consist of NOS program implementation with an overall funding increase of 20 percent relative to Alternative B. Under Alternative C, all of the activities and equipment operation described in Alternative B would continue, many at a higher level of effort. The nature of these actions would not change, but the overall level of activity would be augmented.

Table ES-1 compares the three alternatives.

Table ES-1. Comparison of NOS Annual Planned Surveying and Mapping Activities under Alternatives A, B, and C*

Activity	Described in Section	Alternative A	Alternative B	Alternative C
Crewed vessel operations	2.4.1	518,000 nm (959,000 km)	577,000 nm (1,070,000 km)	637,000 nm (1,180,000 km)
Anchoring**	2.4.2	55 projects	59 projects	64 projects
ROV/AUV/ASV movement	2.4.3	28,600 nm (53,000 km)	86,300 nm (160,000 km)	102,300 nm (189,000 km)
Use of echo sounders	2.4.4	479,000 nm (887,000 km)	534,000 nm (988,000 km)	589,000 nm (1,090,000 km)
Use of sub-bottom profilers	2.4.4	3,210 nm (5,940 km)	5,310 nm (9,830 km)	7,710 nm (14,300 km)
Use of mobile ADCPs	2.4.5	5,890 nm (10,900 km)	11,200 nm (20,700 km)	15,200 nm (28,200 km)
Stationary ADCPs installed/visited for maintenance/removed	2.4.5	37 installed/78 maintenance visits/33 removed	39 installed /79 maintenance visits /33 removed	40 installed /79 maintenance visits /33 removed
Use of acoustic communication systems	2.4.6	24 projects	33 projects	39 projects
Sound speed data collection	2.4.7	56 projects	64 projects	71 projects
Drop/towed cameras/video system operation	2.4.8	31 projects	36 projects	41 projects
Bottom sample collection	2.4.9	54 projects	61 projects	68 projects
Use of passive listening systems***	2.4.10	21 projects	24 projects	29 projects
SCUBA operations	2.4.11	248 projects	254 projects	269 projects
Tide gauges installed/visited for maintenance/removed	2.4.12	32 installed /305 maintenance visits /30 removed	37 installed /305 maintenance visits /35 removed	40 installed /305 maintenance visits /38 removed
GPS reference system installation	2.4.13	12 installed	13 installed	15 installed

*All numbers are approximate and represent an annual level of effort. Projects for each activity were reported by NOS agencies without respect to the combination of activities within projects (e.g., a project involving both crewed vessel operation and echo sounder use would be reported as one crewed vessel project and one echo sounder project).

** NOS estimates that 20 percent of crewed vessel projects include an anchoring component.

***In addition to the projects presented in the table, NOS's Center for Operational Oceanographic Products and Services uses passive listening systems on an as-needed basis. This entails the use of transponder or interrogator sensors during the deployment or retrieval of ADCPs.

ENVIRONMENTAL CONSEQUENCES

Table ES-2 presents a summary of the assessed environmental consequences associated with Alternatives A, B, and C for the resources analyzed in the Draft PEIS. A more complete description of impacts is provided in Chapter 3. All environmental consequences from each of the alternatives are anticipated to be adverse, ranging from negligible to moderate, and insignificant, except for the environmental consequences to socioeconomic resources which are anticipated to be indirect, beneficial, and moderate. The primary difference in impacts among the alternatives is one of scale, with the impacts from Alternative B the same or slightly, but not appreciably, larger than those under Alternative A, and from Alternative C the same or slightly, but not appreciably, larger than those under Alternatives A and B for each impact causing factor.

NOS identified the potential for acoustic disturbance to marine mammals as an area warranting detailed analysis. In this draft, NOS finds that, after conducting quantitative acoustic impacts modeling, impacts on marine mammals under all alternatives are expected to be limited to behavioral disturbances that would be temporary or short-term and would not be considered outside the natural range of variability of species' populations, their habitats, or the natural processes sustaining them. For a few individual high-frequency cetaceans, potential impacts from underwater acoustic sources include injury exposures in the form of hearing loss.

Table ES-2. Summary Comparison of Impacts

Resource	Alternative A: No Action – Conduct Surveys and Mapping for Coastal and Marine Data Collection with Current Technology and Methods, at Current Funding Levels	Alternative B: Conduct Surveys and Mapping with Equipment Upgrades, Improved Hydroacoustic Devices, and New Tide Stations	Alternative C: Upgrades and Improvements with Greater Funding Support
Habitats	Impacts to habitats from water column disruptions under Alternative A would continue to be **adverse** and **negligible.** Impacts to habitats from activities involving physical disturbance to bottom substrate; sedimentation, turbidity and chemical contaminants; increased ambient underwater sound levels; and onshore activities under Alternative A would continue to be **adverse** and **negligible** to **minor.** The impact on habitats from invasive species dispersal facilitated by activities under Alternative A would likely continue to be **adverse** and **minor.** Impacts to habitat areas resulting from Alternative A would not cause long-term changes in the availability of space, shelter, cover, or nutrients necessary for dependent species.	Impacts of Alternative B on habitats throughout the action area would be the same or slightly, but not appreciably, larger than those that would occur under Alternative A for each impact causing factor. Impacts to habitat areas resulting from Alternative A would not cause long-term changes in the availability of space, shelter, cover, or nutrients necessary for dependent species and would not substantially increase in intensity with the increased level of effort of Alternative B. Overall, impacts to habitats under Alternative B would be **adverse**, **minor**, and **insignificant**.	Impacts of Alternative C on habitats throughout the action area would be the same or slightly, but not appreciably, larger than those under Alternatives A and B for each impact causing factor. Impacts to habitat areas resulting from Alternatives A and B would not cause long-term decreases in the availability of space, shelter, cover, or nutrients necessary for dependent species and would not substantially increase in intensity with the increased level of effort of Alternative C. Overall, impacts to habitats under Alternative C would be **adverse**, **minor**, and **insignificant**.

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	Overall, impacts to habitats under Alternative A would continue to be **adverse, minor**, and **insignificant.**		
Marine Mammals	Impacts on marine mammals (cetaceans, pinnipeds, sirenians, and fissipeds) from trash and debris and air emissions under Alternative A would continue to be **adverse** and **negligible.** Impacts from human activity under Alternative A would continue to be **adverse** and **negligible** on cetaceans and sirenians and **adverse** and **minor** on pinnipeds and fissipeds**.** Impacts on marine mammals (cetaceans, pinnipeds, sirenians, and fissipeds) from accidental oil, fuel, or chemical spills under Alternative A would continue to be **adverse** and **negligible** to **minor.** Impacts on marine mammals (cetaceans, pinnipeds, sirenians, and fissipeds) from active underwater acoustic sources, vessel and equipment sound, vessel presence and movement of equipment in the water	Impacts of Alternative B on marine mammals would be the same or slightly, but not appreciably, larger than those that would occur under Alternative A for each impact causing factor. Impacts to marine mammals resulting from Alternative A would be temporary or short-term and would not be considered outside the natural range of variability of species' populations, their habitats, or the natural processes sustaining them. These impacts would not substantially increase in intensity with the increased survey effort of Alternative B. Overall, impacts of Alternative B on marine mammals, including ESA-listed species, and habitat, including designated critical habitat, would be **adverse, minor,** and **insignificant.**	Impacts of Alternative C on marine mammals would be the same or slightly, but not appreciably, larger than those that would occur under Alternatives A and B for each impact causing factor. Impacts to marine mammals resulting from Alternatives A and B would be temporary or short-term and would not be considered outside the natural range of variability of species' populations, their habitats, or the natural processes sustaining them. These impacts would not substantially increase in intensity with the increased survey effort of Alternative C. Overall, impacts of Alternative C on marine mammals, including ESA-listed species, and habitat, including designated critical habitat, would be **adverse, minor,** and **insignificant.**

Resource	Alternative A: No Action – Conduct Surveys and Mapping for Coastal and Marine Data Collection with Current Technology and Methods, at Current Funding Levels	Alternative B: Conduct Surveys and Mapping with Equipment Upgrades, Improved Hydroacoustic Devices, and New Tide Stations	Alternative C: Upgrades and Improvements with Greater Funding Support
	under Alternative A would continue to be **adverse** and **minor.** Although a vessel strike is very unlikely, debilitating injury or mortality of one or a few individuals could occur and impacts would be **adverse** and **moderate,** or greater if an ESA-listed species is affected. If a walrus stampede occurs due to vessel or aircraft disturbance, the impact could be **adverse** and **moderate** or greater. If polar bears are disturbed at denning sites or if polar bear-human interactions occur, the impact could be **adverse** and **moderate**. Potential impacts from underwater acoustic sources include injury exposures in the form of hearing loss (PTS) on cetaceans, but such injury would be rare and confined to a few individual high-frequency cetaceans. It would also include behavioral disruption exposures of cetaceans, pinnipeds, sirenians and fissipeds, but the amount of time individuals may exceed the behavioral exposure		

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	threshold would be on average less than a few minutes. Impacts to marine mammals resulting from Alternative A would be temporary or short-term and would not be considered outside the natural range of variability of species' populations, their habitats, or the natural processes sustaining them. Overall, impacts of Alternative A on marine mammals, including ESA-listed species, and habitat, including designated critical habitat, would continue to be **adverse, minor,** and **insignificant.**		
Sea Turtles	Impacts to sea turtles and their habitats from active underwater acoustic sources, vessel and equipment sound, and onshore activities under Alternative A would continue to be **adverse** and **negligible.** Impacts to sea turtles and their habitats from vessel presence and movement, underwater activities, and air emissions under Alternative A	Impacts of Alternative B on sea turtles and their habitats would be the same or slightly, but not appreciably, larger than those that would occur under Alternative A for each impact causing factor. Impacts to sea turtles resulting from Alternative A would not cause long-term changes in habitat availability and use, sea turtle behavior, or energy expenditures and would not	Impacts of Alternative C on sea turtles and their habitats would be the same or slightly, but not appreciably, larger than those that would occur under Alternatives A and B for each impact causing factor. Impacts to sea turtles resulting from Alternatives A and B would not cause long-term changes in habitat availability and use, sea turtle behavior, or energy expenditures

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	would continue to be **adverse** and **negligible** to **minor.** Impacts to sea turtles and their habitats from accidental oil, fuel, or chemical spills would continue to be **adverse** and **negligible** to **moderate.** Although the effects of impact causing factors on sea turtles and their habitats range from **negligible** to **moderate**, moderate impacts could occur in the very unlikely event of an accidental spill of oil, fuel, or chemicals. Likewise, in the very unlikely event of a vessel strike, injury or death to sea turtles would also constitute a **moderate** or greater impact. Impacts to sea turtles resulting from Alternative A would not cause long-term changes in habitat availability and use, sea turtle behavior, or energy expenditures Overall, impacts under Alternative A on sea turtles and their habitats, including designated critical habitat, would	substantially increase in intensity with the increased survey effort of Alternative B. Overall, impacts on sea turtles and their habitat, including designated critical habitat, would be **adverse, minor,** and **insignificant**.	and would not substantially increase in intensity with the increased survey effort of Alternative C. Overall, impacts on sea turtles and their habitat, including designated critical habitat, would be **adverse, minor,** and **insignificant.**

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	continue to be **adverse, minor,** and **insignificant.**		
Fish	Impacts to fish and their habitats from vessel wake and turbulence; vessel sound; accidental spill of oil, fuel, or chemicals; and disturbance of the ocean/lake/river bottom under Alternative A would continue to be **adverse** and **negligible** to **minor.** Impacts to fish and their habitats from active underwater acoustic sources and air emissions under Alternative A would continue to be **adverse** and **minor.** Impacts to fish resulting from Alternative A may include some stress responses without permanent physiological damage, and may disturb breeding, feeding, or other activities but without any impacts on population levels; additionally, there would not be long-term changes in habitat availability and use or in fish behavior. Overall, impacts of Alternative A on fish, including ESA-listed species, and fish habitat, including designated	Under Alternative B, impacts on fish and fish habitat would be the same or slightly, but not appreciably, larger than those that would occur under Alternative A for each impact causing factor. Impacts to fish resulting from Alternative A may include some stress responses without permanent physiological damage, and may disturb breeding, feeding, or other activities but without any impacts on population levels; additionally, there would not be long-term changes in habitat availability and use or in fish behavior. These impacts would not substantially increase in intensity with the increased survey effort of Alternative B. Overall, impacts of Alternative B on fish, including ESA-listed species, and fish habitat, including designated critical habitat, would be **adverse, minor,** and **insignificant.**	Impacts of Alternative C on fish and fish habitat would be the same or slightly, but not appreciably, larger than those that would occur under Alternatives A and B for each impact causing factor. Impacts to fish resulting from Alternatives A and B may include some stress responses without permanent physiological damage, and may disturb breeding, feeding, or other activities but without any impacts on population levels; additionally, there would not be long-term changes in habitat availability and use or in fish behavior. These impacts would not substantially increase in intensity with the increased survey effort of Alternative C. Overall, impacts of Alternative C on fish, including ESA-listed species, and fish habitat, including designated critical habitat, would be **adverse, minor,** and **insignificant.**

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	critical habitat, would continue to be **adverse, minor,** and **insignificant.**		
Aquatic Macroinvertebrates	Impacts to aquatic macroinvertebrates and their habitats from underwater acoustic sources, vessel sound, and air emissions under Alternative A would continue to be **adverse** and **negligible.** Impacts to aquatic macroinvertebrates and their habitats from vessel wake and underwater turbulence; accidental spill of oil, fuel, or chemicals; and disturbance of the ocean/lake/river bottom under Alternative A would continue to be **adverse** and **negligible** to **minor.** Overall, impacts of Alternative A on aquatic macroinvertebrates, including ESA-listed species, and habitats, including designated critical habitat, would continue to be **adverse, minor,** and **insignificant.**	Under Alternative B, impacts on aquatic macroinvertebrates and their habitats would be the same or slightly, but not appreciably, larger than those that would occur under Alternative A for each impact causing factor. These impacts would not substantially increase in intensity with the increased survey effort of Alternative B. Overall, impacts of Alternative B on aquatic macroinvertebrates, including ESA-listed species, and habitats, including designated critical habitat, would be **adverse, minor,** and **insignificant.**	Under Alternative C, impacts on aquatic macroinvertebrates and their habitats would be the same or slightly, but not appreciably, larger than those that would occur under Alternatives A and B for each impact causing factor. These impacts would not substantially increase in intensity with the increased survey effort of Alternative C. Overall, impacts of Alternative C on aquatic macroinvertebrates, including ESA-listed species, and habitats, including designated critical habitat, would be **adverse, minor,** and **insignificant.**
Essential Fish Habitat (EFH)	Impacts to EFH from disturbance of the water column under Alternative A would continue to be **adverse** and **negligible.**	Under Alternative B, impacts on EFH would be the same or slightly, but not appreciably, larger than those that would occur under Alternative A for each impact causing factor.	Under Alternative C, impacts on EFH would be the same or slightly, but not appreciably, larger than those that would occur under Alternatives

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	Impacts to EFH from physical impacts to bottom habitat; increase in sedimentation, turbidity, or chemical contamination; and increase in underwater sound under Alternative A would continue to be **adverse** and **negligible** to **minor.** Impacts to EFH from dispersal of invasive species under Alternative A would continue to be **adverse** and **minor.** Impacts to EFH resulting from Alternative A would be infrequent, geographically widely distributed, and likely to elicit a minimal or temporary response from prey species or cause short-term changes to physical characteristics (i.e., changes in water quality). Overall, impacts of Alternative A on EFH would continue to be **adverse, minor,** and i**nsignificant.**	Impacts to EFH resulting from Alternative A would be infrequent, geographically widely distributed, and likely to elicit a minimal or temporary response from prey species or cause short-term changes to physical characteristics (i.e., changes in water quality). These impacts would not substantially increase in intensity with the increased survey effort of Alternative B. Overall, impacts of Alternative B on EFH would be **adverse, minor,** and **insignificant**.	A and B for each impact causing factor. Impacts to EFH resulting from Alternatives A and B would be infrequent, geographically widely distributed, and likely to elicit a minimal or temporary response from prey species or cause short-term changes to physical characteristics (i.e., changes in water quality). These impacts would not substantially increase in intensity with the increased survey effort of Alternative C. Overall, impacts of Alternative B on EFH would be **adverse, minor,** and **insignificant**.
Seabirds, Shorebirds and Coastal Birds, and Waterfowl	Impacts to birds and their habitats from active underwater acoustic sources and vessel and equipment	Under Alternative B, impacts on birds and their habitats would be the same or slightly, but not appreciably, larger than those that would occur under	Under Alternative C, impacts on birds and their habitats would be the same or slightly, but not appreciably, larger than those that would occur under

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	sound under Alternative A would continue to be **adverse** and **negligible.** Impacts to birds and their habitats from aircraft sound, vessel presence and movement, underwater activities, onshore activities, and air emissions under Alternative A would continue to be **adverse** and **negligible** to **minor.** Impacts to birds and their habitats from accidental oil, fuel, or chemical spills would continue to be **adverse** and **minor** to **moderate.** Although the effects of impact causing factors on birds and their habitats range from **negligible** to **moderate**, moderate impacts could occur in the very unlikely event of an accidental spill of oil, fuel, or chemicals. Likewise, in the very unlikely event of a vessel strike, injury or death to birds could constitute greater impacts. Impacts to birds resulting from Alternative A would generally persist only for the duration of an activity and would not be expected to cause any	Alternative A for each impact causing factor. Impacts to birds resulting from Alternative A would generally persist only for the duration of an activity and would not be expected to cause any long-term changes in habitat use and availability or energy expenditure outside of the natural range of variation. These impacts would not substantially increase in intensity with the increased survey effort of Alternative B. Overall, impacts on of Alternative B on birds, including ESA-listed species, and habitats, including designated critical habitat, would be **adverse, minor,** and **insignificant.**	Alternatives A and B for each impact causing factor. Impacts to birds resulting from Alternatives A and B would generally persist only for the duration of an activity and would not be expected to cause any long-term changes in habitat use and availability or energy expenditure outside of the natural range of variation. These impacts would not substantially increase in intensity with the increased survey effort of Alternative C. Overall, impacts on of Alternative C on birds, including ESA-listed species, and habitats, including designated critical habitat, would be **adverse, minor,** and **insignificant.**

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	long-term changes in habitat use and availability or energy expenditure outside of the natural range of variation. Overall, impacts on of Alternative A on birds, including ESA-listed species, and habitats, including designated critical habitat, would continue to be **adverse, minor,** and **insignificant.**		
Cultural and Historic Resources	Impacts to cultural and historic resources from installation, maintenance, and removal of tide gauges, buoys, and GPS reference stations under Alternative A would continue to be **adverse** and **negligible** to **minor.** Impacts to cultural and historic resources from bottom sampling under Alternative A would continue to be both **adverse** and **beneficial, permanent,** and **negligible** to **minor.** Beneficial impacts would occur if a resource were discovered that led to the identification of a culturally-significant artifact or a previously undocumented historic site.	Under Alternative B, impacts on cultural and historic resources would be the same or slightly, but not appreciably, larger than those that would occur under Alternative A for each impact causing factor. These impacts would not substantially increase in intensity with the increased survey effort of Alternative B. Overall, impacts of Alternative B to cultural and historic resources would be **adverse, moderate,** and **insignificant.**	Under Alternative C, impacts on cultural and historic resources would be the same or slightly, but not appreciably, larger than those that would occur under Alternatives A and B for each impact causing factor. These impacts would not substantially increase in intensity with the increased survey effort of Alternative C. Overall, impacts of Alternative C to cultural and historic resources would be **adverse, moderate,** and **insignificant.**

Resource	Alternative A: No Action – Conduct Surveys and Mapping for Coastal and Marine Data Collection with Current Technology and Methods, at Current Funding Levels	Alternative B: Conduct Surveys and Mapping with Equipment Upgrades, Improved Hydroacoustic Devices, and New Tide Stations	Alternative C: Upgrades and Improvements with Greater Funding Support
	Impacts to cultural and historic resources from anchoring under Alternative A would continue to be **adverse, permanent,** and **negligible** to **moderate.** Impacts on subsistence hunting and fishing, including Traditional Cultural Places, under Alternative A would continue to be **adverse** and **negligible** to **moderate.** Although the effects of impact causing factors on cultural and historic resources range from **negligible** to **moderate**, moderate impacts that could occur if the integrity of a resource is diminished would be very unlikely. Overall, impacts of Alternative A to cultural and historic resources would continue to be **adverse, moderate,** and **insignificant.**		
Socioeconomic Resources	The economic impacts of ocean data procured under Alternative A on health and safety, recreational economic activity, transportation, and energy-	The economic benefits of impacts of Alternative B would be the same or slightly, but not appreciably, larger than those discussed above under Alternative A. These impacts would	The economic benefits of impacts of Alternative C would be the same or slightly, but not appreciably, larger than those under Alternatives A and B. These impacts would not

Resource	Alternative A: No Action – Conduct Surveys and Mapping for Coastal and Marine Data Collection with Current Technology and Methods, at Current Funding Levels	Alternative B: Conduct Surveys and Mapping with Equipment Upgrades, Improved Hydroacoustic Devices, and New Tide Stations	Alternative C: Upgrades and Improvements with Greater Funding Support
	related activities would continue to be **indirect, beneficial,** and **moderate**. Data collected under Alternative A would continue to improve the quality and quantity of ocean data and data products. Overall, Alternative A would continue to have **indirect, beneficial**, and **moderate** impacts on the ocean economy.	not substantially increase in intensity with the increased survey effort of Alternative B. Overall, Alternative B would have **indirect, beneficial**, and **moderate** impacts on the ocean economy.	substantially increase in intensity with the increased survey effort of Alternative C. Overall, Alternative C would have **indirect, beneficial**, and **moderate** impacts on the ocean economy.
Environmental Justice	Impacts of underwater acoustic sources on subsistence hunting of marine mammals under Alternative A would continue to be **adverse** and **moderate**, and the impacts to subsistence fishing communities would continue to be **adverse** and **minor**. Impacts of vessel and equipment noise on subsistence hunting of marine mammals under Alternative A would continue to be **adverse** and **minor**, and the impacts to subsistence fishing communities would continue to be **adverse** and **negligible**.	Under Alternative B, impacts on environmental justice would be the same or slightly, but not appreciably, larger than those that would occur under Alternative A for each impact causing factor. These impacts would not substantially increase in intensity with the increased survey effort of Alternative B. Overall, impacts of Alternative B on environmental justice would continue to be **adverse, minor** to **moderate,** and **insignificant.**	Under Alternative C, impacts on environmental justice would be the same or slightly, but not appreciably, larger than those that would occur under Alternatives A and B for each impact causing factor. These impacts would not substantially increase in intensity with the increased survey effort of Alternative C. Overall, impacts of Alternative C on environmental justice would continue to be **adverse, minor** to **moderate,** and **insignificant.**

Resource	Alternative A: No Action – Conduct Surveys and Mapping for Coastal and Marine Data Collection with Current Technology and Methods, at Current Funding Levels	Alternative B: Conduct Surveys and Mapping with Equipment Upgrades, Improved Hydroacoustic Devices, and New Tide Stations	Alternative C: Upgrades and Improvements with Greater Funding Support
	Impacts of vessel and equipment presence and movement on subsistence hunting of marine mammals under Alternative A would continue to be **adverse** and **moderate**, and the impacts to subsistence fishing communities would continue to be **adverse** and **negligible**. Impacts of human activities and accidental leakage or spillage of oil, fuel, and chemicals on subsistence hunting and fishing under Alternative A would continue to be **adverse** and **minor**. Impacts of marine trash and debris and air emissions on subsistence hunting and fishing activities under Alternative A would continue to be **adverse** and **negligible**. The availability of new mapping and charting information under Alternative A would have **beneficial** effects on EJ communities.		

Resource	Alternative A: No Action – Conduct Surveys and Mapping for Coastal and Marine Data Collection with Current Technology and Methods, at Current Funding Levels	Alternative B: Conduct Surveys and Mapping with Equipment Upgrades, Improved Hydroacoustic Devices, and New Tide Stations	Alternative C: Upgrades and Improvements with Greater Funding Support
	Overall, impacts of Alternative A on environmental justice would continue to be **adverse, minor** to **moderate,** and **insignificant.**		