Draft Regulatory Impact Review
and
Initial Regulatory Flexibility Analysis

Amendments to the North Atlantic Right Whale Vessel Strike Reduction Rule

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Office of Protected Resources
National Marine Fisheries Service (NMFS)
National Oceanic and Atmospheric Administration
Department of Commerce

Executive Summary

The National Marine Fisheries Service (NMFS) is proposing modifications to the North Atlantic right whale (*Eubalaena glacialis*) vessel speed rule (50 CFR 224.105), to further reduce the likelihood of mortalities and serious injuries to endangered North Atlantic right whales from vessel collisions, which are a leading cause of the species' decline and part of an ongoing Unusual Mortality Event. The proposed speed rule modifications include the following: 1) spatial and temporal expansion of existing mandatory 10-knot Seasonal Management Areas (SMAs), renamed Seasonal Speed Zones (SSZs), 2) inclusion of most vessels ≥ 35 ft and < 65 ft in length into the vessel size class subject to 10 knot speed restrictions in active SSZs, 3) a new mandatory Dynamic Speed Zone (DSZ) program requiring regulated vessels to slow to 10 knots or less for a limited period within discrete zones when North Atlantic right whale aggregations are detected outside active SSZ boundaries, and 4) modifications to the current safety deviation provision to enhance enforcement, mariner safety, and monitoring of implementation. These proposed modifications are analyzed in five alternatives.

This proposed regulatory action has been deemed significant under Presidential Executive Order (E.O.) 12866 (58 FR 51735, October 4, 1993). As such, it requires a Regulatory Impact Review (RIR). This RIR evaluates the costs and benefits of the amendments NMFS is proposing to its current speed regulation to further protect North Atlantic right whales from lethal collisions with vessels in U.S. waters. This RIR includes justification for the proposed rule, a benefit-cost evaluation of the alternatives, and the potential socioeconomic impacts of implementing the proposed rule.

The benefits of North Atlantic right whale and other endangered whale protection include non-consumer use benefits and non-use benefits. However, sufficient data to convert these benefits into monetary terms for quantitative comparison are unavailable. Therefore, we provide a qualitative discussion of benefits.

The compliance costs of Alternatives 2, 3, 4 and 5 (Preferred Alternative) relative to Alternative 1 (No Action Alternative) are provided in Section 2.6.2 and focus on the cost of delayed vessel transit hours as the primary metric of impact. Under Alternative 5 (Preferred Alternative), we estimate 15,899 vessels would potentially be affected along the U.S. Atlantic coast from Maine to Florida, resulting in an expected 121,061 additional transit hours annually across all vessel types, size classes, and regions. The total estimated annual costs associated with this Preferred Alternative are $46,216,122, with the largest portion (35%) borne by the shipping industry.

This action is not expected to have an annual effect on the economy of $100 million or more, or have an adverse effect in a material way on the economy. Furthermore, this action would not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; or materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof. However, it may raise novel or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866.

(Photo Credit: Florida Fish and Wildlife Conservation Commission, NOAA permit 20556-01)

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1.0 Basis For and Purpose of the Proposed Rule

1.1 Objectives and Legal Basis of the Proposed Rule

National Marine Fisheries Service (NMFS) is proposing changes to the North Atlantic right whale (*Eubalaena glacialis*) vessel speed regulations to further reduce the likelihood of mortalities and serious injuries to endangered right whales from vessel collisions, which are a leading cause of the species' decline and a primary factor in an ongoing Unusual Mortality Event (UME). Despite NMFS' best efforts, the existing speed rule and associated vessel strike mitigation efforts are insufficient to reduce the level of lethal right whale vessel strikes to sustainable levels in U.S. waters. Additional action is needed to address gaps in current management programs and better tailor mitigation efforts.

The Endangered Species Act (ESA) of 1973 provides a framework to conserve and protect endangered and threatened species throughout all or a significant portion of their range, in addition to the conservation of the ecosystems on which these species depend. All right whale species (*Eubalaena sp.*) were listed as endangered worldwide under the ESA since the ESA's passage in 1973 (35 FR 8495, June 2, 1970). Following a status review, NMFS concluded in 2008 that the North Atlantic right whale (*Eubalaena glacialis*) should be listed separately as an endangered species (73 FR 12024, March 6, 2008) under the ESA. As required by ESA section 4(f)(1), NMFS developed a recovery plan for the North Atlantic right whale in 1991, most recently revised and updated in 2005. The 2005 recovery plan states: ''Ship collisions and entanglements in fishing gear are the most common anthropogenic causes of mortality in North Atlantic right whales. Action is urgently needed to reduce these significant threats, and thus improve the survival of right whales." (NMFS 2005).

The Marine Mammal Protection Act (MMPA) provides protection for species or stocks that are, or may be, in danger of extinction or depletion as a result of human activity. The MMPA states that measures should be taken to replenish the population of any marine mammal species or stock that has diminished below its optimum sustainable level. Under the MMPA, the Secretary of Commerce is responsible for the conservation and management of pinnipeds (other than walruses) and cetaceans (including right whales). The Secretary of Commerce has delegated MMPA authority to NMFS.

In 2008 (73 FR 60173, October 10, 2008), NMFS implemented a 10-knot (5.1 meter/second) vessel speed restriction (50 CFR 224.105) for a five-year period for most vessels ≥ 65 ft (19.8 m) in overall length within designated areas (referred to as Seasonal Management Areas (SMAs)) along the U.S. East Coast to reduce the risk of mortality and serious injury from vessel strike. NMFS removed the five-year "sunset" provision from the speed rule in 2013 (78 FR 73726, December 9, 2013; 79 FR 34245, June 16, 2014).

In 2017, NMFS declared a UME for the species pursuant to section 404 of the MMPA after elevated strandings occurred in U.S. and Canadian waters. Vessel strikes and entanglements are the two leading causes of the UME, which is ongoing and includes an unprecedented 51 known mortalities and serious injuries to date (NMFS 2021b).

Because of the critical status of endangered North Atlantic right whales, the ongoing UME, recent vessel strike events in U.S. waters, the vulnerability of mothers with calves, and the

adverse impact that additional human-caused mortality would have on the species' ability to recover, NMFS has determined that modifications to the speed rule are necessary. NMFS is proposing modifications to the speed regulations pursuant to its rulemaking authority under MMPA section 112(a) (16 U.S.C. 1382(a)), and ESA section 11(f) (16 U.S.C. 1540(f)).

The preferred alternative analyzed in this Regulatory Impact Review (RIR) is a proposed action to: 1) modify the spatial and temporal boundaries of current SMAs (to be renamed as Seasonal Speed Zones (SSZs)), 2) include most vessels ≥ 35 ft (10.7 m) and < 65 ft (19.8 m) in length in the size class subject to speed restriction, and 3) create a Dynamic Speed Zone (DSZ) framework to implement mandatory speed restrictions when whales are known to be present outside active SSZs.

In addition to the modifications discussed above, NMFS proposes to update the speed rule safety deviation provision to: 1) expand the definition to include emergencies that present a threat to the health, safety, or life of a person, 2) require mariners to file an electronic report to the agency within 48 hours of employing a safety deviation and 3) allow vessels ≥ 35 ft to < 65 ft in length to exceed the 10 knot limit when transiting areas where a National Weather Service Gale Warning or other warning for wind speeds exceeding those that trigger a Gale Warning is in effect. These proposed updates are administrative in nature and not considered under the alternatives analyzed here.

1.2 Problem Addressed by the Proposed Rule

The North Atlantic right whale is one of the rarest of all large cetaceans and among the most endangered species in the world. The species was severely depleted by commercial whaling and, despite protection from commercial harvest since 1935, has not recovered.

Following two decades of growth between 1990 and 2010, North Atlantic right whales have been in decline over the past decade, with a preliminary population estimate of fewer than 350 individuals as of 2020 (Pace 2021). Right whale abundance began to decline in 2010 due to a combination of increased human-caused mortality and decreased reproductive output (Pace et al. 2017). The decline coincided with changes in whale habitat use patterns, characterized by the whales' increasing use of areas with few protections from anthropogenic harm (Davis et al. 2017; Meyer-Gutbrod and Greene 2018; Record et al. 2019). The species' decline has been exacerbated by the ongoing UME that began in 2017, and now includes 51 known right whale mortalities and serious injuries to date. Vessel strikes and entanglements are the primary cause of the UME declaration (NMFS 2021b). NMFS has determined that the Potential Biological Removal (PBR) for the species— defined by the MMPA as "the maximum number of individuals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population"— is 0.7 whales (NMFS 2021a). This means the population cannot sustain, on average over the course of a year, the death or serious injury of a single individual due to human causes for the species to recover.

Entanglement in fishing gear and vessel strikes are the two primary causes of North Atlantic right whale mortality and serious injury, and human-caused mortality to adult females, in particular, is limiting recovery of the species (Moore et al. 2005, 2021; Pace et al. 2017; Corkeron et al. 2018; Hayes et al. 2019; Sharp et al. 2019). Anthropogenic trauma was the sole

source of mortality of North Atlantic right whale adults and juveniles for which a cause of death could be determined between 2003-2018 (Sharp et al. 2019). Furthermore, calving rates dropped from 2017-2020, with zero births recorded during the 2017-2018 season, though calving increased with 20 calves documented during the 2020-2021 calving season, and 15 during the 2021-2022 season (NMFS internal data). While 15 to 20 calves in a season is encouraging, mortalities continue to outpace births, and with fewer than 70 reproductively active females remaining in the population, both a reduction in human caused mortality and sustained calving rates are needed to swiftly stabilize the ongoing population decline.

North Atlantic right whales are vulnerable to vessel strike due to their coastal distribution and frequent occurrence at near-surface depths, and this is particularly true for females with calves. The proportion of known vessel strike events involving females, calves, and juveniles is higher than their representation in the population (NMFS 2020). Mother/calf pairs are at high risk of vessel strike because they frequently rest and nurse in nearshore habitats at or near the water surface, particularly in the Southeast calving area (Cusano et al. 2018; Dombroski et al. 2021). Calving females have the longest residence time of any demographic group on the Southeast calving ground, staying on average for about three months in the region before traveling to northern foraging areas (Krzystan et al. 2018). North Atlantic right whales nurse their calves for up to a year. This promotes rapid calf growth (Fortune et al. 2012) but also places mother/calf pairs at increased risk of vessel interactions, not only within the Southeast calving ground but also along the Mid-Atlantic and off New England, which are important foraging areas and migratory routes for North Atlantic right whales.

Vessel strikes are an ongoing threat to all large whale species and are contributing to two ongoing UMEs involving minke (*Balaenoptera acutorostrata*) and humpback whales (*Megaptera novaeangliae*). Researchers have found that the majority of large whale vessel strike mortalities involve vessels transiting at speeds greater than approximately 10 knots (Laist et al. 2001; Jensen and Silber 2004; Vanderlaan and Taggart 2007; Conn and Silber 2013). While the proposed changes to the speed rule are designed to address lethal right whale vessel strike risk, the agency anticipates ancillary benefits will accrue to other large whales species which inhabit the regions/seasons covered by the proposed action.

In January 2021, NMFS released an assessment evaluating the effectiveness of the North Atlantic right whale speed rule and associated voluntary Dynamic Management Area (DMA) program (NMFS 2020). The review found that the speed rule had made progress in reducing vessel strike risk to right whales but that additional action is warranted to further reduce the threat of vessel collisions. While it is not possible to establish a direct causal link between speed reduction efforts and the relative decline in observed right whale serious injury and mortality events following implementation of the speed rule, the preponderance of evidence suggests speed reductions, as implemented, have helped. NMFS' data on documented vessel strike events continues to affirm the role of high vessel speeds (greater than 10 knots) in lethal collision events and supports existing studies implicating speed as a factor in lethal strike events (Vanderlaan and Taggart 2007; Conn and Silber 2013; Van der Hoop et al. 2014; Martin et al. 2015; Crum et al. 2019). NMFS has documented five right whale vessel strike cases in U.S. waters that resulted in non-serious injuries for which vessel speed is known. Only one of the five vessels involved was transiting in excess of 10 knots at the time of the collision. In contrast, of the nine documented

lethal right whale vessel collisions in U.S. waters since 1990 for which vessel speed is known, eight involved vessels transiting in excess of 10 knots.

Since the speed rule first went into effect, NMFS has documented 12 right whale serious injury and mortality events involving vessel collisions in U.S. waters, along with an additional five lethal events involving unknown whale species, possibly right whales. These figures likely underestimate the total number of lethal right whale vessel strikes in U.S. waters. Strikes occurring farther offshore and/or involving large ocean-going vessels are likely underreported in the data because most large ships are not able to detect interactions with large whales, and whales that die well offshore are less likely to be detected overall. Based on estimates of total right whale deaths, documented mortalities from all sources represent approximately one-third of actual annual right whale mortality range-wide (Pace et al. 2021). Thus, in addition to the observed events, NMFS recognizes that additional lethal vessel strike events likely went undetected in U.S. waters.

A detailed examination of documented right whale vessel strike events in the U.S. reveals the following:

1) Vessels < 65 ft (19.8 m) in length accounted for five of the 12 documented lethal strike events in U.S. waters since 2008, demonstrating the significant risk this unregulated vessel size class can present to right whales.
2) Vessel strikes continue to occur all along the U.S. coast from the Gulf of Maine to the Florida coast. There is no indication that strike events only occur in "hot spots" or limited spatial/seasonal areas.
3) Strikes occur both inside and outside active SMAs, but in many cases the location of the strike event remains unknown. Four of the five collision events involving vessels < 65 ft (19.8 m) in length occurred inside active SMAs, although the vessels involved were not subject to mandatory speed restrictions due to their size.
4) Of the six lethal vessel strike cases documented in U.S. waters involving right whales since 1999 where vessel speed is known, only one involved a vessel transiting under 10 knots (5.1 m/s) (~9 knots (4.6 m/s)), although in most cases we lack vessel speed data associated with collision events.
5) Females, calves, and juveniles are disproportionately represented in the vessel strike data. This is concerning given the paucity of reproductively active females remaining in the population and their critical role in stabilizing the population decline.
6) Non-lethal vessel collisions with right whales continue to occur. NMFS' best estimates indicate that vessel strikes (in U.S. waters or first seen in U.S. waters) have resulted in at least 26 non-serious right whale injuries since 2008, although these data do not account for the possibility of blunt force trauma injuries, which are not usually visibly detectable and make accurate assessments of strike injuries challenging.

No changes to SMAs have been made since the speed rule was implemented in 2008; however, beginning in 2010, there has been a documented change in right whale prey distribution that has shifted right whales into new areas outside their regulatory protections, increasing documented anthropogenic mortality (Record et al. 2019; Plourde et al. 2019). This shift in right whale habitat use patterns in 2010 was highlighted in an analysis of right whale acoustic presence along the U.S. Eastern seaboard from 2004 to 2014 (Davis et al. 2017). It was also reflected in visual

survey data in the greater Gulf of Maine region. Between 2012 and 2016, visual surveys detected fewer individuals in the Great South Channel (NMFS unpublished data) and the Bay of Fundy (Davies et al. 2019), while the number of individuals using Cape Cod Bay in spring months increased (Mayo et al. 2018). In addition, right whales apparently abandoned the Jordan Basin in the central Gulf of Maine in winter (Cole et al. 2013), but have since been seen in large numbers in a region south of Martha's Vineyard and Nantucket Islands (Leiter et al. 2017), an area outside of the 2016 Northeastern U.S. Foraging Area Critical Habitat and not currently covered by a SMA. Additionally, more recent data demonstrate nearly year round use of the Mid-Atlantic region (Davis et al. 2017), an area that was less well understood as right whale habitat when the 2008 SMA boundaries were implemented.

The existing North Atlantic right whale vessel speed rule (50 CFR 224.105) does not address the threat of mortalities and serious injuries from strike events involving vessels < 65 ft in length. Many vessels < 65 ft in length are designed to transit at high speeds shown to contribute to the severity and/or likelihood of vessel strike injuries (Laist et al. 2001; Jensen and Silber 2004; Vanderlaan and Taggart 2007; Neilson et al. 2012; Conn and Silber 2013; Kelley et al. 2021). Based on available Automatic Identification System (AIS) data from vessels < 65 ft in length transiting active SMAs during 2018-2019, 43%of transit distance was in excess of 10 knots with 36%in excess of 15 knots (NMFS 2020). There are no federal regulations mandating reduced speeds for this vessel size class, adding urgency to the need to address this threat given the recent vessel collisions involving vessels < 65 ft in length transiting at speeds greater than 10 knots.

In examining the totality of information available to inform changes to the location and timing of new SSZ boundaries, it became clear that for some areas and seasons, static speed management may not be sufficient as a sole strategy to reduce vessel strike risk. This is primarily the case in areas where right whale presence is less predictable or more ephemeral and/or where elevated strike risk is more moderate. Additionally, having built-in adaptivity to climate change and other ecological shifts would ensure the vessel strike regulations remain resilient and provide effective protection long-term. To address elevated vessel strike risk in areas outside SSZs, NMFS is proposing to implement a mandatory DSZ framework to replace the current voluntary DMA/Slow Zone program. The NMFS 2008 speed rule stated the agency would "monitor voluntary compliance" with DMAs and if cooperation was not satisfactory would "consider making them mandatory, through a subsequent rulemaking" (73 FR 60173, October 10, 2008). Despite NMFS' best efforts to reach out to vessel operators about dynamic speed reduction areas and educate the maritime community about the need for right whale vessel strike mitigation, NMFS' speed rule assessment determined that vessel cooperation levels are low, and therefore, the reduction in risk currently provided by the voluntary DMAs is minimal (NMFS, 2020).

1.3 Affected Vessels

Proposed changes to the speed rule would continue to regulate vessels already subject to mandatory speed restrictions under the current rule and newly regulate most vessels ≥ 35 ft and < 65 ft in length, not currently subject to mandatory speed restrictions at 50 CFR 224.105 (Table 1). Certain vessels (of all sizes) would remain exempt from proposed requirements including military vessels, vessels owned, operated or contracted by the Federal government, and vessels engaged in enforcement or search and rescue activities (50 CFR § 224.105(a)). Under the proposed rule, regulated vessels (of all sizes) would be exempt from speed restrictions in the

event of an emergency that presents a threat to the health, safety, or life of a person. Additionally, vessels greater than or equal to 35 ft and less than 65 ft in length would be exempt from speed restrictions and allowed to exceed the 10 knot limit when transiting areas where a National Weather Service Gale Warning or other warning for wind speeds exceeding those that trigger a Gale Warning is in effect.

Vessels may be impacted by speed limitations to varying degrees depending upon a vessel's transit distance through proposed static and dynamic speed zones during active periods and the vessel's usual transit speed. Certain vessels may be minimally impacted by the proposed changes if they operate at moderate speeds and rarely, or only occasionally, exceed 10 knots. Other vessel types are designed for high-speed transit and may be more substantially impacted. Additionally, some vessel types, particularly commercial and industrial work vessels, are active year-round, while others (e.g. recreational vessels) can exhibit strong seasonality in transit patterns. For example, off the coast of New England, SMAs are mostly active in the winter and spring, when general boating activity is lower due to colder weather and rougher sea conditions.

Table 1. Commercial and recreational vessel types subject to mandatory speed restriction and used in this analysis.

Use Category	Use Sub-Category	Vessels Types Included
Commercial	Commercial fishing	Commercial Fishing
		Fish Processing
		Fishing Tender
	Commercial shipping	Container Ships
		Cargo Ships
		Tanker Ships
		Bulk Carriers
		Roll-On/Roll-Off (Ro-Ro/Vehicle Carriers)
	Industrial work	Dredging
		Tenders/Offshore Work
		Offshore Supply
	Passenger	Tour and Wildlife Viewing
		Charter Fishing
		Ferries
	Passenger (Cruise)	Cruise Ships
	Pilot	Pilot
	Towing/Pushing	Towing
		Pushing
	Other	Research
		Public
		School Ships
		Unknown
Recreational	Recreation/Pleasure	Motorized (Pleasure)
		Sailing
		Unknown Mode of Propulsion

1.4 Regulatory Alternatives

NMFS identified five regulatory alternatives for consideration. The first of these (Alternative 1) is the No Action Alternative, also called the baseline, which would make no changes to the status quo. Alternative 2 would restrict the speed of most vessels ≥ 35 ft and < 65 ft in length to 10 knots or less within current SMAs. Alternative 3 would modify the spatial and temporal boundaries of the existing SMAs (Figure 2), (to be re-named to SSZs) (Figure 1). Alternative 4 is a combination of Alternative 2 and a new mandatory DSZ framework. Alternative 5 is the Preferred Alternative and is a combination of Alternatives 2, 3, and a mandatory DSZ program. Action alternatives 2, 4, and 5 propose reducing vessel speed for

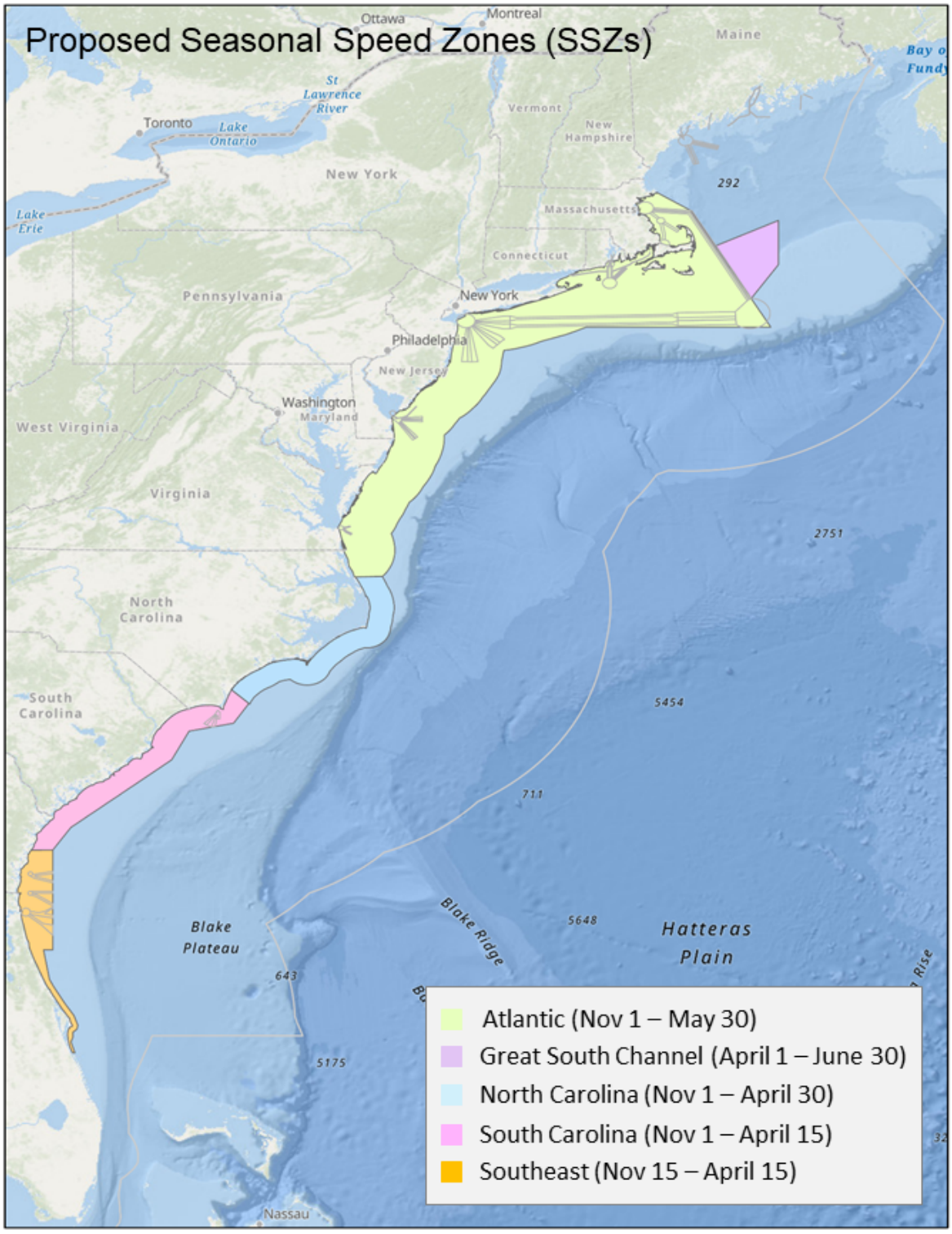

Figure 1. Proposed Seasonal Speed Zone (SSZ) boundaries and timing (Alternatives 3 and 5).

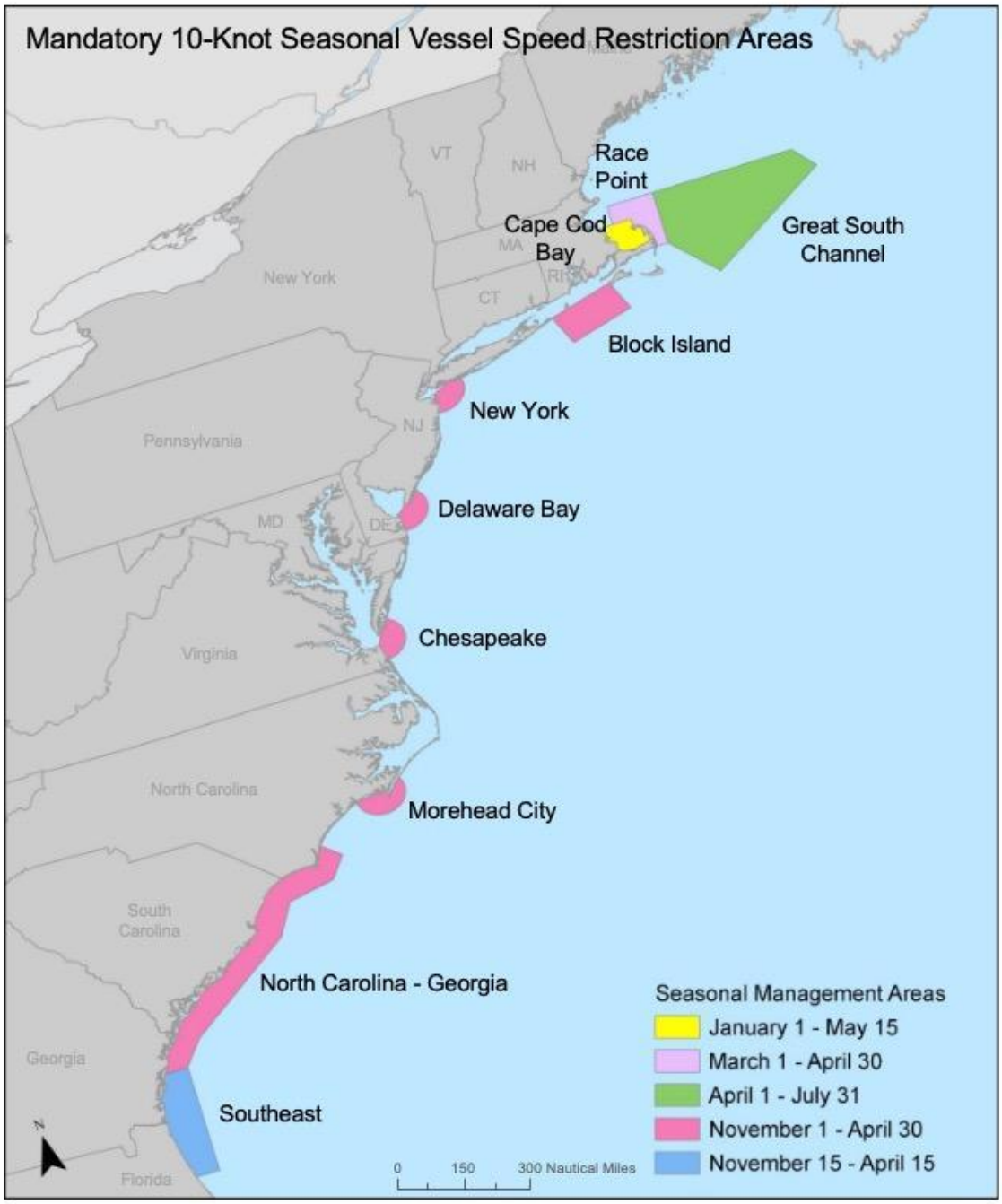

Figure 2. Existing mandatory 10-knot Seasonal Management Areas (SMAs) as defined in North Atlantic right whale vessel speed regulations at 50 CFR 224.105 (Alternatives 1, 2 and 4).

vessels ≥ 35 ft and < 65 ft in length to 10 knots or less based on numerous studies indicating that slowing the speed of vessels reduces the risk of lethal vessel collisions, particularly in areas where North Atlantic right whales are abundant and vessel traffic is common and otherwise traveling at high speeds (Vanderlaan and Taggart 2007; Conn and Silber 2013; Van der Hoop et al. 2014; Laist et al. 2014; Martin et al. 2015; Crum et al. 2019).

Alternatives 3 and 5 propose expanding the spatial and temporal SMA boundaries to the proposed SSZ boundaries to maximize the reduction of vessel strike risk to North Atlantic right whales. NMFS developed proposed modifications to the SMAs using a coast-wide vessel strike mortality risk model (Garrison et al. 2022). North Atlantic right whale visual sighting (NARWC 2021) and acoustic detection (NEFSC 2022) data, recent vessel traffic AIS data, and information on relevant planned ocean activities to develop these boundaries. NMFS sought to provide robust protections for right whales over a 10-15 year time period, and account for possible changes in whale distribution and habitat use. The agency further aimed to identify the smallest spatial and temporal footprint possible for speed restricted zones to minimize the extent of regulatory action while still achieving necessary conservation goals. Changes to these seasonal speed boundaries focused on reducing vessel traffic operating at speeds in excess of 10 knots, as elevated transit speeds are implicated in lethal strike events.

Alternatives 4 and 5 include a proposed framework to implement dynamic, mandatory speed restrictions (DSZs) to address right whale vessel strike risk outside of active SSZs. Recent evaluation of the existing voluntary DMA/Slow Zone program determined that vessel cooperation levels are low, and therefore the reduction of risk provided by the existing DMA program is minimal (NMFS 2020). To address elevated vessel strike risk in areas outside of existing SMAs (Alternative 4), or proposed SSZs (Alternative 5), NMFS is proposing to implement this mandatory DSZ framework to replace the current voluntary DMA/Slow Zone program.

The current speed rule includes a safety deviation provision allowing vessels to exceed 10 knots within SMAs if warranted to maintain vessel maneuverability. In addition to the modifications discussed above, NMFS proposes to update the safety deviation provision to: 1) expand the definition to include emergencies that present a threat to the health, safety, or life of a person, 2) require mariners to file an electronic report to the agency within 48 hours of employing a safety deviation and 3) allow vessels ≥ 35 ft to < 65 ft in length to exceed the 10 knot limit when transiting areas where a National Weather Service Gale Warning or other warning for wind speeds exceeding those that trigger a Gale Warning is in effect. These proposed changes are not considered under the alternatives analyzed here as NMFS anticipates the updated safety deviation provision would be used infrequently and not as a part of day to day vessel operations.

1.4.1 Alternative 1: No-Action Alternative

Alternative 1 (No Action Alternative) would not change the status quo. No action would be taken and vessel speed regulations along the U.S. East Coast would continue as is under 50 CFR 224.105.

1.4.2 Alternative 2: Include most vessels ≥ 35 ft in length and < 65 ft in length in the vessels size class subject to speed regulation in Seasonal Management Areas (SMAs)

Alternative 2 would restrict the speed of most vessels ≥ 35 ft in length and < 65 ft in length to 10 knots or less within existing SMAs, as defined in North Atlantic right whale vessel speed regulations at 50 CFR 224.105. This action alternative would not apply to U.S. vessels owned or operated by, or under contract to the Federal Government or law enforcement vessels of a State, or political subdivision thereof, when engaged in law enforcement or search and rescue duties, as defined at 50 CFR 224.105 for vessels ≥ 65 ft in length.

1.4.3 Alternative 3: Spatial and temporal expansion of existing Seasonal Management Areas (SMAs) (renamed to Seasonal Speed Zones (SSZs))

Alternative 3 would modify the spatial and temporal boundaries of the existing SMAs (Figure 2) to create newly proposed SSZs (Figure 1). Most vessels > 65 ft in length would be required to restrict their speed to 10 knots or less within these new boundaries when the SSZs are active, as defined in North Atlantic right whale vessel speed regulations at 50 CFR 224.105(a).

1.4.4 Alternative 4: Combination of Alternative 2 and implementation of a new mandatory Dynamic Speed Zone (DSZ) program

Alternative 4 would restrict the speed of most vessels ≥ 35 ft in length and < 65 ft in length to 10 knots or less within existing SMAs, as detailed in Alternative 2, in addition to establishing a new mandatory DSZ program. Under the new DSZ framework, mandatory speed reduction zones would be triggered when certain levels of right whale detections occur outside of active SMAs and there is a greater than 50% likelihood the whales will remain within the designated DSZ while effective. Speed restrictions within designated DSZs would apply to the same vessels subject to speed restriction within SMAs.

1.4.5 Alternative 5 (Preferred Alternative): Combination of Alternatives 2, 3, and implementation of a mandatory Dynamic Speed Zone (DSZ) program

Alternative 5 (Preferred Alternative) would modify the spatial and temporal boundaries of the existing SMAs to the proposed SSZs, add vessels ≥ 35 ft in length and < 65 ft in length to the vessels size class subject to speed regulation (50 CFR 224.105(a)), and establish a mandatory DSZ program. Speed restrictions within designated DSZs would apply to the same vessels subject to speed restriction within SSZs.

2.0 Regulatory Impact Review

2.1 Introduction

The preparation of a RIR is required under Presidential Executive Order (E.O.) 12866 (58 FR 51735, October 4, 1993). The purpose of E.O. 12866 is to enhance planning and coordination with respect to new and existing regulations. The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following statement from the E.O.:

> *In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that*

are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

NMFS requires a RIR for all regulatory actions that are of public interest. The RIR does three things: (1) it provides a comprehensive review of the level and incidence of impacts associated with a regulatory action; (2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives which could be used to solve the problem; and (3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in E.O. 12866. E.O. 12866 requires that the Office of Management and Budget (OMB) review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

- Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866.

In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider.

This RIR evaluates the costs and benefits of modifications to the North Atlantic right whale vessel speed regulations at 50 CFR 224.105 to modify the areas currently referred to as SMAs (newly labeled SSZs), include most vessels ≥ 35 ft and < 65 ft in length in the speed regulation requirements, and establishing a new mandatory DSZ program.

2.2 Methodology and Framework for Analysis

This RIR assesses management measures from the standpoint of determining the resulting changes in costs and benefits to society. To the extent practicable, the net effects of regulatory measures should be stated in terms of producer and consumer surplus, changes in profits, employment in the direct and support industries where practicable. However, much of this

information is unavailable for most vessels and areas subject to the proposed rule modifications. Therefore, the impact analysis of the proposed rule focuses on direct impacts to affected vessel owners and operators transiting within active speed restriction zones along the U.S. East Coast, and benefits of reducing vessel strike risk and severity for North Atlantic right whales.

2.3 Economic Baseline for Comparison

The baseline for the economic analysis is Alternative 1 (No Action Alternative), which would maintain the status quo, using data from 2020-2021 to evaluate. For Alternative 5 (Preferred Alternative), it is estimated that up to 15,899 vessels would be affected with a total annual cost of $46,216,122. For Alternative 2, it is estimated that up to 2,725 vessels would be affected with a total cost of $9,437,888. For Alternative 3, it is estimated that up to 4,980 vessels would be affected with a total cost of $26,067,727. For Alternative 4, it is estimated that up to 7,316 vessels would be affected with a total cost of $16,578,970.

2.4 Time Horizon

The proposed rule is planned for publication in July 2022. A final rule would follow, with a target publication date of late 2022 to provide protections for right whales as soon as possible during the 2022-2023 calving season.

2.5 Benefit-Cost Framework

Benefit-cost analysis (BCA) is the preferred method for analyzing the consequences of a regulatory action such as the proposed rule. BCA is a well-established procedure for assessing the "best" course or scale of action, where "best" is that course which maximizes net benefits (i.e., benefits minus costs). Because BCA assesses the value of an activity in net benefit terms, it requires that a single metric, most commonly dollars, be used to gauge both benefits and costs. The data and economic models necessary to estimate costs may be difficult or costly to gather and develop, and a comprehensive analysis of the costs associated with a regulatory action is not always feasible. This is the case for costs stemming from implementation of the proposed rule, which would impose speed restrictions on a previously unregulated vessel size class.

Assessing the benefits of the proposed rule in a BCA framework is also straightforward in principle, but much more difficult in practice. To the extent that new regulations would reduce the risk that North Atlantic right whales will suffer serious injury or mortality as a result of vessel strikes, they would produce real benefits. Ideally, these benefits would be measured first by a biological metric, and then by a dollar metric. A biological metric could take the form of a reduction in known serious injury and mortality events from vessel collisions, the associated expected decrease in extinction risk, increase in the annual growth of the population, or similar measures. Quantification of the benefits of protection of nonhuman animals raises serious challenges given the lack of data. A BCA might begin by valuing these quantified biological benefits in terms of "willingness to pay," the standard economic measure of economic value recommended by OMB (OMB 2003). This would produce a dollar estimate of the benefits of the proposed rule, which could then be compared directly to the costs.

This approach raises legitimate questions. The value of North Atlantic right whales and other endangered large whales might not be adequately or fully captured by people's willingness to pay to protect these whales. Their own welfare loss might be deemed relevant, regardless of that figure. The data required to complete such a quantitative analysis are not available for this proposed action. Estimation of the economic benefits attributable to implementing the proposed rule would require a more detailed understanding of the biological impacts of restricting vessel speed than current models can provide. It also would require more extensive research than economists have conducted to date on the relationship between conservation and restoration of these species and associated economic values.

In the absence of the information required to conduct a complete BCA, the discussion that follows presents qualitative information on the benefits that may stem from improved protection of North Atlantic right whales and other endangered whales, coupled with a quantitative indicator of the potential impact of each alternative. Because the alternatives vary substantially with respect to the benefits they would provide, it is possible to identify a superior option based primarily on expected benefits while considering overall cost differentials.

2.6 Economic Analysis of the Alternatives

2.6.1 Benefits of the Alternatives

Since the suspension of commercial whaling in the U.S., there has been no conventional market for the consumptive use of products derived from whales. While it is difficult to establish the full value of reducing risks to large whales, whale protection and associated increases in whale populations can be described in terms of two types of benefits: (1) non-consumptive use benefits; and (2) non-use benefits.

2.6.1.1 Non-consumptive Use Benefits

A variety of recreational activities involve the non-consumptive use of natural resources, either in a market or non-market context. The opportunity to enjoy one such activity, whale watching, has fostered the development of the commercial whale watching industry. A study by (Cisneros-Montemayor et al. 2010) suggests that the global whale watching industry would generate over $2.5 billion (in 2009 dollars) in yearly revenue and about 19,000 jobs around the world. The U.S. and Canadian whale watching industry could create 3,657 jobs yearly from six marine mammal species within their Exclusive Economic Zones.

Although current data on the industry are lacking, a study by Hoyt (2001) suggests that roughly half of all commercial whale watching worldwide occurs in the U.S., and that much of this activity is centered in New England. As shown in Table 2, the Hoyt study identified 36 whale watching businesses in New England, with most operating multiple vessels. Hoyt estimated that over one million individuals take whale watching tours in the region each year, generating over $30 million in annual revenue for the industry. Because these figures only apply to permitted and registered operations, the full scale and economic impact of whale watching activity is likely to be greater.

Table 2. New England whale watching industry

State	Number of Operations	Number of Vessels	Annual Ridership	Annual Revenue (millions $)
Maine	14	18-24	137,500	$4.40
New Hampshire	4	6-10	80,000	$1.90
Massachusetts	17	30-35	1,000,000	$24.00
Rhode Island	1	1	12,500	$0.30
Total	36	55-70	1,230,000	$30.60

Source: Hoyt 2001

A special report from the International Fund for Animal Welfare (O'Connor et al. 2009) pointed out that whale watchers in the New England area decreased by 3% per year from 1998 to 2008. Although the number of whale watch operators and passengers decreased from 1998 to 2008 (likely due to poor whale sightings during part of this period), average passenger fees increased from $25 to $38, resulting in an increase of 14% in direct sales to whale watch operators and an increase of 17% in sales in the economy. The Stellwagen Bank National Marine Sanctuary Final Management Plan quotes various reports suggesting a decline in one of the main food sources for fin and humpback whales was causing the decline in whale sightings. Several studies have linked whale sightings to concentrations of a small, semi‑pelagic fish called sand lance (NOAA 2010). A more recent study (Schwarzmann 2020) on whale watching in Stellwagen Bank National Marine Sanctuary provides a comprehensive analysis on the economic effects of the whale watching industry to the local economies (Table 3).

Table 3. Economic contribution to the local economy related to wildlife viewing at the Stellwagen Bank National Marine Sanctuary (Schwarzmann 2020).

Contribution	Employment	Labor Income	Value Added	Output
Direct	858.5	$41,235,976	$53,746,886	$95,145,968
Indirect	238	$15,928,585	$22,950,838	$37,204,253
Total	1096.5	$57,164,561	$76,697,724	$132,350,221

This study included information from six whale watching operations that are known to visit Stellwagen Bank National Marine Sanctuary, which is located in the Gulf of Maine and represents approximately 80% of whale watching efforts in the New England region. Overall, the direct and indirect spending in the study area that was associated with whale watching contributed $132 million in output, $57 million in income, and 1096.5 full and part-time jobs to the local economy. This indicated that the contributions have the potential to be greatly affected by changes, such as increases in whale populations within the sanctuary.

It is not feasible at present to estimate the impact of potential modifications to the proposed rule on the values in the whale watching market. Estimation of these impacts would require the ability to forecast the impact of various management measures on the population of whales, coupled with a far more detailed understanding of the relationship between an increase in this population and demand for viewing opportunities. However, with Stellwagen Bank as an example, given the economic contributions associated with opportunities to see, photograph, and

otherwise experience whales in their natural environment, it is reasonable to assume that an increase in these opportunities could have a positive impact on communities.

2.6.1.2 Non-use Benefits

The protection and restoration of populations of endangered whales may also generate non-use benefits. Economic research has demonstrated that society places economic value on environmental assets, whether or not those assets are ever directly exploited. For example, society places real (and potentially measurable) economic value on simply knowing that large whale populations are flourishing in their natural environment (often referred to as "existence value") and will be preserved for the enjoyment of future generations. Using survey research methods, economists have developed several studies of non-use values associated with protection of whales or other marine mammals. Table 4 summarizes these studies.

In each, researchers surveyed individuals on their willingness to pay (WTP) for programs that would maintain or increase marine mammal populations. One of the studies (Wallmo and Lew 2012) employed a stated preference method to estimate the value of recovering or down-listing eight ESA-listed marine species, including the North Atlantic right whale. Through a survey of 8,476 households, the authors estimated an average WTP (per household per year, for a 10-year period) of $71.62 for recovery of the species which, if extrapolated nationwide, suggests Americans are willing to pay approximately $4.38 billion for right whale recovery. While the other studies noted do not focus specifically on the North Atlantic right whale, they do demonstrate that individuals derive significant economic value from the protection of marine mammals.

As noted, the value of whales might not be adequately captured by non-use values of this kind. Death or suffering of whales might be believed to be intrinsically bad, because it is a welfare loss in itself.

Table 4. Studies of non-use value associated with marine mammals

Author	Title	Findings
Schwarzmann et al. (2021)	Whale Watching in Channel Islands National Marine Sanctuary: A Stated Preference Study of Passengers' Willingness to Pay for Marine Life Improvements	Respondents' WTP values for large baleen whales ranged from $181 to $121 per household, depending on the amount of marine life improvements.
Lew (2015)	Willingness to Pay for Threatened and Endangered Marine Species: A Review of the Literature and Prospects for Policy Use	Comprehensive literature review on the methods and case studies on WTP for threatened and endangered marine species.
Wallmo and Lew (2012)	Public Willingness to Pay for Recovering and Downlisting Threatened and Endangered Marine Species	Per-household mean WTP annually over 10 years for increase in North Atlantic right whale populations estimated to be $71.62 (for recovery) and $38.79 (for down-listing to threatened status) (2010 dollars).
Giraud et al. (2002)	Economic Benefit of the Protection of the Steller Sea Lion	Estimated WTP for an expanded Steller sea lion protection program. The average WTP for the entire nation amounted to roughly $61 per person.

Loomis and Larson (1994)	Total Economic Values of Increasing Gray Whale Populations: Results from a Contingent Valuation Survey of Visitors and Households	Mean WTP of U.S. households for an increase in gray whale populations estimated to be $16.18 for a 50% increase and $18.14 for a 100% increase.
Samples and Hollyer (1990)	Contingent Valuation of Wildlife Resources in the Presence of Substitutes and Complements	Respondents' average WTP (lump sum payment) to protect humpback whales in Hawaii ranged from $125 to $142 (1986 dollars).
Samples et al. (1986)	Information Disclosure and Endangered Species Valuation	Estimated individual WTP for protection of humpback whales of $39.62 per year.
Day (1985), cited in Rumage (1990)	The Economic Value of Whalewatching at Stellwagen Bank. The Resources and Uses of Stellwagen Bank	Non-use value of the presence of whales in the Massachusetts Bays system estimated to be $24 million.
Hageman (1985)	Valuing Marine Mammal Populations: Benefit Valuations in a Multi-Species Ecosystem	Per-household WTP for gray and blue whales, bottlenose dolphins, California sea otters, and northern elephant seals estimated to be $23.95, $17.73, $20.75, and $18.29 per year, respectively (1984 dollars).

A study published last year by The Pew Charitable Trusts specifically addressed the public's desire to increase federal protections for the North Atlantic right whale (The Pew Charitable Trusts 2021). The survey was conducted by SSRS, an independent research company, and the results are based on responses from 1,847 participants. Survey respondents were representative across geography, gender, political party, and education level; there was at least one respondent from every U.S. East Coast state and each age category was well represented from 18 to 65 years or older. The majority of respondents, 78%, stated that most government environmental regulations are necessary and protect the environment. When asked about North Atlantic right whales specifically, 88% of respondents felt it was important for the federal government to create policies to protect this species, with 53% believing it is very important. These survey results indicate substantial support from U.S. East Coast residents for federal protections for North Atlantic right whales.

Large whales provide ecosystem services, which are benefits that people receive from the environment. The services whales provide include contributing to sense of place, education, research, and they play an important role in carbon cycling in the oceans. They accumulate carbon in their bodies over a lifetime and following death, can sequester tons of carbon in the deep sea (Pershing et al. 2010; Roman et al. 2014). Large whales are also considered ecosystem engineers, given their potential for trophic influence on their ecosystems. As large consumers, whales heavily impact food-web interactions and can promote primary productivity. Their presence can reduce the risk of trophic cascades, which have previously affected smaller species when whale populations suffered historic declines. Additionally, large whales may contribute to enhanced ocean productivity via a concept commonly known as the "whale-pump,". The "whale-pump" refers to whales' contribution to vertical mixing, horizontal transfer, and the recycling of limiting nutrients in the ocean as they dive, migrate, and release fecal plumes and urine (Roman et al. 2014).

2.6.1.3 Potential Safety Benefits

In addition to the direct benefits accruing from enhanced North Atlantic right whale protections, slowing vessels may also provide an ancillary benefit for mariner safety. Recent assessments indicate that reducing the speed of large vessels is associated with a reduction in marine casualty events (Chang and Park 2019) and the NMFS North Atlantic Right Whale Vessel Speed Rule Assessment (NMFS 2020) noted a decline in vessel grounding events within active, existing SMAs following implementation of the vessel speed rule. The U.S. Coast Guard (USCG) Recreational Boating Statistics report (USCG 2021) states that excessive speed was one of "the top five primary contributing factors in accidents" and played a role in 418 reported accidents in 2020. Slowing the speed of vessels in the busy coastal corridor may provide a secondary, albeit unintentional, benefit of enhancing mariner safety.

Collisions with vessels < 65 ft in length pose a danger to both the whale and vessel occupants. There are numerous cases from around the world of vessels sustaining significant damage, and even sinking, following collisions with whales. For example, two vessel-whale collisions that occurred in March 2009 and February 2021 resulted in vessel damage significant enough to require passenger rescue by the USCG (NMFS internal data). Sailing vessels can be at particular risk of substantial damage due to their deliberately light construction (Ritter 2012). Moreover, collisions with vessels < 65 ft in length with whales in U.S. waters have resulted in injuries to vessel occupants.

2.6.2 Costs of the Alternatives

2.6.2.1 Methodology

To estimate the potential costs to regulated vessels under all alternatives, we assembled vessel data from two primary sources: AIS data and United States Coast Guard (USCG) vessel registration data (USCG 2021). We characterized vessel traffic using data collected via satellite and terrestrial based AIS that transmits information on vessel movements, speed, and characteristics for those vessels that carry AIS units. We used AIS data transmitted between November 1, 2020 to October 31 2021 to evaluate vessel transits through existing SMAs and proposed SSZs and AIS data from January 1 2021 to December 31 2021to evaluate DSZs. These are the most recent and comprehensive vessel traffic data available. Where possible, we linked AIS vessel identification records to the Information Handling Services (IHS) Markit database of vessels to confirm or correct vessel information entered into the AIS system.

For vessels ≥ 65 ft in length, AIS was the primary source of data used to calculate potentially delayed transit hours for different vessels by service type since we have nearly 100% AIS coverage for vessels in this size class. To estimate the potential costs to vessels > 65 ft in length operating in new SSZ boundaries (Alternatives 3 and 5), we first calculated the number of vessels impacted by the proposed action. We used AIS data from the same season (October 2020 - June 2021) to determine how many vessels > 65 ft transit at speeds greater than 10 knots within areas of the newly proposed SSZ boundaries.

We used a combination of existing (but limited) AIS-equipped vessel data and USCG vessel registration data to identify the potential number of vessels ≥ 35 ft to < 65 ft in length affected and their transit characteristics. USCG AIS carriage requirements do not apply to most vessels < 65 ft in length (80 FR 5281, January 30, 2015; 80 FR 2050, April 7, 2016). Because of this,

available AIS data for this vessel size class are biased and not a representative sample of vessels < 65 ft operating in active SMAs. To supplement the available AIS data, we used USCG vessel registration data for vessels ≥ 35 ft and < 65 ft in length (USCG 2021) to approximate the full universe of vessels transiting within active SMAs, SSZs, or DSZs. We estimated the number of affected vessels (i.e those transiting in excess of 10 knots) to evaluate the cost burden on these vessels under alternatives that would regulate this new vessel size class (Alternatives 2, 4 and 5).

Using the USCG data, we identified vessels within this size class with a valid registration and a designated hailing port within 50 nm (vessel transit distance) of the existing SMA boundaries. For Alternative 5 (Preferred Alternative), we enlarged the dataset to include vessels with a registered hailing port within 50 nm transit distance of the extended Southeast SSZ boundary. To estimate the number of affected vessels ≥ 35 ft and < 65 ft in length, we calculated the proportion of AIS-equipped vessels transiting in active SMAs, or proposed SSZs/DSZs (depending on the alternative) on an annual basis, relative to the total number of vessels from the USCG registration data. For example, if we documented 40 unique vessels of "type X" transiting within an SMA from AIS data but identified 200 registered "type X" vessels from the USCG data, we would assume that the AIS-equipped vessels represent 20% of the total "type X" vessel activity in that SMA. We would then apply this proportion to calculate estimated delayed hours and costs for this vessel type.

For all vessel size classes, once the total number of affected vessels was determined for all alternatives, we calculated the "transit delay" by vessel service type and region. This applies to both current and proposed boundaries and vessel size classes dependent upon each alternative, and is described in further details below (Sections 2.6.2.2.1-5). For each vessel transit through an active SMA or SSZ with at least a portion of the transit distance in excess of 10 knots, the actual transit time and estimated transit time if a 10-knot speed restriction were put in place, were calculated. The difference between these two times is the "transit delay". The transit delay time was then aggregated and averaged over all potentially affected vessels to determine the average total delayed hours per season, if all vessels are required to travel at 10 knots in active SMAs or SSZs (assuming perfect vessel compliance) to determine the total delayed transit hours resulting from a 10-knot speed limit. Using this, we calculated the delayed hours per vessel per season. Using the delayed transit hours, total number of impacted vessels, the total number of expected delay hours due to a 10-knot speed limit per vessel, by vessel type and region was calculated.

We employed similar methods to estimate the potential impacts and costs accruing to vessels transiting in (possible) mandatory DSZs (Alternatives 4 and 5). Since we do not know when and where a DSZ may be declared in future, we relied on data from our existing voluntary DMA/Slow Zone program to estimate these impacts. During 2021, NMFS declared 67 DMAs/Slow Zones along the U.S. eastern seaboard. We identified vessels transiting in excess of 10 knots within these 2021 DMAs/Slow Zones and then calculated potential delayed transit hours based on if these vessels had been required to slow to 10 knots or less. For vessels ≥ 65 ft in length, these hours were transferred to costs directly and for vessels ≥ 35 and < 65 ft, the results were adjusted based on percentage of AIS-equipped vessels in the USCG vessel data, similar to the SMA and SSZ analysis. For Alternative 4, the existing voluntary DMA program was used with the existing SMA boundaries. For Alternative 5, only 13 DSZs were located out of

the proposed SSZ boundaries, and only the impacts of those 13 zones were used in the analysis and estimating the final costs for Alternative 5 (Preferred Alternative). Additional details and calculations for the economic analysis and methods are described in Appendix A. See Appendix Section 1.1.1 for USCG vessel registration data and Section 1.1.2 for AIS data presented in Tables 5-7, 9-11, and 15-18. See Appendix Section 1.1.3 for cost data sources and Section 2 for estimation method for data presented in Tables 8, 12-14 and 19-21.

For all SMA and SSZ analyses, the Northeast/Mid-Atlantic region includes vessels with a hailing port in Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina. The Southeast region includes vessels hailing from South Carolina, Georgia, and Florida. For DSZs, the results are presented for all regions combined, although it is expected that dynamic zones will mostly be triggered in the Northeast/Mid-Atlantic region, given that 93% of DMAs/Slow Zones occurred within the NMFS Greater Atlantic Region during 2021.

2.6.2.2 Alternative 1 (No-Action Alternative)

Alternative 1 is the No Action Alternative (status quo) and used as the baseline for the economic analysis.

2.6.2.3 Alternative 2

Alternative 2 would add most vessels ≥ 35 ft and < 65 ft in length to the size class of vessel subject to current speed regulations as described in Section 2.6.2.1. The focus of this assessment was to estimate delayed (or additional) transit hours that would likely accrue to each vessel type, in each region, as a result of a 10-knot speed restriction within active, existing SMAs. We estimated the number of vessels potentially affected, their associated delayed transit hours, and the costs of the delay using the methodology described in Section 2.6.2.1. Table 5 displays the estimated number of potentially affected vessels, using USCG vessel registration information and AIS-equipped vessel data under Alternative 2. For this size class, recreational vessels and commercial fishing vessels are the most common vessel types operating within active existing SMAs, with an estimated 6,525 recreational vessels (including sailing and motorized vessels), 499 commercial fishing vessels, and 7,542 vessels in total across all regions.

Table 5. Estimated number of unique vessels (≥ 35 ft and < 65 ft in length) expected to transit in active SMAs by service type and region under Alternative 2.

	Northeast/Mid-Atlantic	Southeast	Total
Commercial fishing	401	98	499
Industrial work	179	9	187
Other	25	15	40
Passenger	136	95	231
Pilot	3	3	6
Recreational	1,560	4,965	6,525
Towing/Pushing	25	28	53
Total	2,329	5,213	7,542

The vessel totals in Table 5 show estimated vessels that would operate within active, existing SMAs. Based on AIS-equipped vessel data, it is estimated that on average, 36.3% of the vessels in this size class, transit at speeds in excess of 10 knots in active SMAs and would be impacted by the proposed rule under Alternative 2. Within the Northeast and Mid-Atlantic, recreational, industrial work, and passenger vessels account for the majority of the vessels transiting in excess of 10 knots (Table 6) while in the Southeast region, recreational vessels account for the majority. Alternative 2 is expected to impact more recreational vessels in the Southeast compared to the Northeast and Mid-Atlantic regions, likely due to the more seasonal weather conditions in the Southeast region during the SMA season. Most or all SMAs are inactive June - October, which is when recreational and other tourism-based vessels (passenger vessels), are most active in the Northeast and Mid-Atlantic.

Table 6. Estimated number of vessels (≥ 35 ft and < 65 ft in length) expected to transit in excess of 10 knots in active SMAs by service type and region under Alternative 2.

	Northeast/Mid-Atlantic	Southeast	Total
Commercial fishing	87	57	144
Industrial work	149	9	157
Other	12	3	15
Passenger	136	48	184
Pilot	3	3	6
Recreational	712	1,508	2,220
Towing/Pushing	0	0	0
Total	1,098	1,628	2,725

The potentially delayed hours, if all vessels are traveling at 10 knots or less (assuming full compliance), was calculated to determine the overall impact and costs associated with Alternative 2 (Tables 7 and 8). This analysis likely, and deliberately, overestimates the number of vessels affected by the action and the extent of the delayed hours affected mariners may experience. This approach was taken to ensure that the analysis did not fail to capture potential impacts from the action given the limits of the available data.

Table 7. Potentially delayed hours if all vessels (≥ 35 ft and < 65 ft in length) are required to travel at 10 knots within active SMAs under Alternative 2.

	Northeast/Mid-Atlantic	Southeast	Total
Commercial fishing	496	858	1,354
Industrial work	2,246	135	2,381
Other	467	110	577
Passenger	5,934	150	6,083
Pilot	671	1,339	2,010
Recreational	4,212	17,601	21,814
Towing/Pushing	51	2	53
Total	14,077	20,196	34,273

Table 8. The potential compliance costs for vessels ≥ 35 ft and < 65 ft in length under Alternative 2.

	Northeast/ Mid-Atlantic	Southeast	Total
Commercial fishing	$9,191	$42,805	$51,996
Industrial work	$2,744,128	$241,873	$2,986,001
Other	$329,253	$77,647	$406,900
Passenger	$3,055,798	$77,193	$3,132,991
Pilot	$728,921	$1,453,867	$2,182,788
Towing/Pushing	$59,463	$2,598	$62,062
Total Commercial	$6,926,754	$1,895,984	$8,822,737
Recreational	$118,791	$496,360	$615,151
All Vessels Total	$7,045,545	$2,392,344	$9,437,888

For commercial vessels, operating in the Northeast and Mid-Atlantic, industrial work vessels and passenger vessels incur the greatest economical impact from Alternative 2. Recreational vessels are substantially less impacted in the Northeast ($118,791) compared to the Southeast ($496,360), due to the seasonal implications of the active timing of the SMAs.

2.6.2.4 Alternative 3

Alternative 3 would modify the spatial and temporal boundaries of SMAs (into proposed SSZs), for vessels ≥ 65 ft in length, as currently regulated under 50 CFR 224.105. It would require these vessels to restrict their speed to 10 knots or less within the new proposed boundaries, when the SSZs are active (Figure 1). This analysis used the most recent year of AIS data available to identify the number of unique vessels ≥ 65 ft in length that transit in the proposed SSZ boundaries. The number of vessels presented in this analysis are the number of actual AIS-equipped vessels recorded.

The most common vessels transiting within the proposed SSZ boundaries, across all regions, are commercial ships, with 3,616 vessels (Table 9). Other vessel classes with high numbers of vessels include recreational boats, with 1,094 vessels (Table 9). AIS data were used to determine the number of unique vessels that transit in excess of 10 knots in active SSZs (Table 10), and thus would be affected by Alternative 3.

Table 9. Number of unique AIS-equipped vessels ≥ 65 ft in length by service type and region that transited in proposed active SSZs under Alternative 3.

	Northeast/Mid-Atlantic	Southeast	Total
Commercial fishing	577	90	667
Commercial shipping	2,405	1,211	3,616
Industrial work	66	39	105
Other	448	180	628
Passenger	91	14	105
Passenger (Cruise)	4	8	12
Pilot	6	1	7
Recreational	627	467	1,094
Towing/Pushing	241	181	422
Total	4,465	2,191	6,656

Table 10. Number of unique AIS-equipped vessels ≥ 65 ft in length by service type and region that transited faster than 10 knots in proposed active SSZs by region and service type under Alternative 3.

	Northeast/Mid-Atlantic	Southeast	Total
Commercial fishing	199	13	212
Commercial shipping	2,281	1,049	3,330
Industrial work	34	15	49
Other	205	92	297
Passenger	77	12	89
Passenger (Cruise)	4	8	12
Pilot	5	1	6
Recreational	486	349	835
Towing/Pushing	94	56	150
Total	3,385	1,595	4,980

For vessels ≥ 65 ft in length, approximately 74.82% (4,980 of 6,656) of the vessels transited in excess of 10 knots (Table 10). Across all regions, a total of 3,330 commercial ships traveled at 10 knots or greater and would experience a total of 32,730 hours of delayed transit time (Table 11) under Alternative 3. The majority of these vessels and delays occur in the Northeast and Mid-Atlantic, likely due to the large spatial coverage of the combined SSZs and extensive transit activity of vessels in this region.

We documented 89 passenger vessels transiting in excess of 10 knots, with a total estimated 8,067 delayed transit hours in the active proposed SSZs (Tables 10 and 11). The majority of this delay is seen in the Northeast and Mid-Atlantic (7,999 hours) due to the extensive spatial and temporal coverage of these SSZs. In addition, we documented 835 recreational vessels traveling in excess of 10 knots that would be expected to experience a total of 5,559 delayed transit hours

(Table 10 and 11). Commercial fishing, industrial work, passenger cruise ships, and pilot vessels contributed to the total transit delay hours in the Mid-Atlantic and Southeast, but to a lesser degree. We identified very few cruise ships during the 2020-2021 season, likely due, in part, to the impact of the COVID-19 (Coronavirus Disease) pandemic.

Table 11. Potentially delayed hours if all unique AIS-equipped vessels ≥ 65 ft in length are required to travel at 10 knots within proposed active SSZs by service type and region under Alternative 3.

	Northeast/ Mid-Atlantic	Southeast	Total
Commercial fishing	813	35	848
Commercial shipping	31,435	1,295	32,730
Industrial work	492	65	557
Other	1,911	1,465	3,376
Passenger	7,999	68	8,067
Passenger (Cruise)	34	6	39
Pilot	739	5	744
Recreational	3,643	1,916	5,559
Towing/Pushing	875	62	937
Total	47,939	4,918	52,857

Table 12. Potential compliance costs if all unique AIS-equipped vessels ≥ 65 ft in length are required to travel at 10 knots within proposed active SSZs by service type and region under Alternative 3.

	Northeast/Mid-Atlantic	Southeast	Total
Commercial fishing	$199,466	$4,086	$203,552
Commercial shipping	$15,702,695	$344,346	$16,047,041
Industrial work	$742,773	$84,510	$827,283
Other	$1,318,533	$1,031,936	$2,350,469
Passenger	$4,300,823	$34,845	$4,335,668
Passenger (Cruise)	$213,203	$36,834	$250,037
Pilot	$802,050	$5,921	$807,971
Recreational	$102,720	$54,043	$156,763
Towing/Pushing	$1,016,849	$72,094	$1,088,943
Total	$24,399,112	$1,668,615	$26,067,727

For commercial vessels across all regions, commercial ships incur the greatest economic effects from Alternative 3 with an estimated cost of $16,047,041. Passenger vessels (excluding cruise ships) would be highly impacted at an estimated cost of $4,335,668. Then, in order, all "other vessels," towing and pushing vessels, industrial work vessels, pilot vessels, passenger (cruise ships), and commercial fishing vessels are impacted under Alternative 3. Recreational vessels have the lowest economic impact with an estimated cost of $156,763 under Alternative 3, due to the seasonality of the SSZs, which exclude the months of July, August, and September when

recreational vessels are expected to be the most active. Commercial vessels also have higher operating costs compared to recreational vessels, which varies greatly by vessel type, and is described further in Appendix A.

2.6.2.5 Alternative 4

Alternative 4 combines Alternative 2 with the creation of a mandatory DSZ program. This alternative would regulate most vessels ≥ 35 ft in length and < 65 ft in length in existing SMAs (as described in Alternative 2) and regulate vessels of all sizes (≥ 35 ft in length) within mandatory DSZs. We calculated the number of affected vessels, total delayed hours, and final estimated costs for vessels by size category (≥ 35 and < 65 ft, and ≥ 65 ft) in active DSZs (Tables 13 and 14). For this alternative, the impacts presented are coastwide, as the DSZs are not categorized by region.

Alternative 4 identifies the cumulative impacts for vessels ≥ 35 ft and < 65 ft in length, ≥ 65 ft in length, and total vessels combined in active DSZs by calculating the total number of vessels, delayed hours, and associated costs of transit in these zones. For vessels ≥ 35 and < 65 ft in length, recreational vessels had the highest number of vessels transiting in active DSZs, totaling 1,974 vessels, 6,758 delayed transit hours, and associated cost of $190,576 (Table 13). Although a high number of recreational vessels are impacted, the associated cost is low in comparison to commercial vessels, due to the higher operating cost of commercial vessels. For example, passenger vessels have the highest estimated costs at a total of $1.226 million, with 636 vessels experiencing 2,382 delayed transit hours. Industrial work vessels are estimated to impact 151 total vessels, resulting in 352 delayed hours, and $473,826 total costs. Commercial fishing, industrial work, pilot, and towing and pushing vessels also have an increase in delayed hours and cost, but to a lesser degree than others in this size class.

Table 13. Estimated number of vessels, total delayed hours, and total cost impacts for all vessels, by size class, in active DSZs under Alternative 4.

	Vessels ≥ 35 ft and < 65 ft			Vessels ≥ 65 ft			Total Vessels		
	Vessels	Total delayed hours	Total costs	Vessels	Total delayed hours	Total costs	Vessels	Total delayed hours	Total costs
Commercial fishing	231	989	$26,440	122	149	$45,412	353	1,137	$71,852
Commercial shipping	0	0	$0	974	4,068	$2,167,646	974	4,068	$2,167,646
Industrial work	151	352	$473,826	13	71	$108,433	164	423	$582,259
Other	16	107	$75,548	117	434	$305,681	133	541	$381,229
Passenger	636	2,382	$1,226,784	53	4,212	$2,169,217	689	6,594	$3,396,001
Pilot	7	65	$70,251	3	7	$7,650	10	72	$77,902
Recreational	1,974	6,758	$190,576	246	769	$21,695	2,220	7,527	$212,271
Towing/Pushing	9	101	$116,871	40	116	$135,050	49	217	$251,921
Total	3,023	10,753	$2,180,297	1,568	9,826	$4,960,785	4,591	20,579	$7,141,082

Similarly, for vessels > 65 ft in length, 246 recreational vessels are impacted, with an associated 769 delayed hours of transit time and costs of $21,695. For commercial vessels > 65 ft in length, commercial shipping and passenger vessels (including cruise ships) are expected to have the highest impacts by number of vessels, delayed transit time, and overall costs as a result of slowing to under 10 knots in DSZs. Of these, 974 commercial shipping vessels are expected to be impacted, resulting from 4,068 delayed transit hours and $2,167,646. Passenger vessels are also greatly impacted under this rule with an estimated 53 affected vessels, 4,212 hours, and $2,168,217 cost due to the high operating costs that are associated with delayed transit time. Overall, for all vessel size classes combined, passenger vessels see the greatest economic cost, due to the variety of sizes in this vessel class, and an estimated $3,396,001 in active DSZs.

The estimated cost for all vessel categories combined in active DSZs (Table 14), were added to the total estimated cost of vessels ≥ 35 and < 65 ft in active SMAs (determined in Alternative 2, Table 6) were combined to show a total estimated cost for all vessels under Alternative 4. Because vessels ≥ 65 ft in length are already regulated in SMAs, the SMA estimated costs are only included for vessels ≥ 35 ft and < 65 ft in length.

Table 14. Total estimated costs for vessels (≥ 35 ft and < 65 ft in length) in active SMAs (Table 8) and combined DSZ costs (Table 13) for all vessel sizes under Alternative 4.

	SMA	DSZ	Total
Commercial fishing	$51,996	$71,852	$123,849
Commercial shipping	0	$2,167,646	$2,167,646
Industrial work	$2,986,001	$582,259	$3,568,260
Other	$406,900	$381,229	$788,129
Passenger	$3,132,991	$3,396,001	$6,528,992
Pilot	$2,182,788	$77,902	$2,260,689
Towing/Pushing	$62,062	$212,271	$274,333
Recreational	$615,151	$251,921	$867,072
Total	$9,437,888	$7,141,082	$16,578,970

Cumulatively, for all vessel size classes and regions combined in active existing SMAs and DSZs will impact a total of 7,316 vessels, 54,852 estimated delayed transit hours, and overall cost of of $16,578,970 (Tables 6, 13, and 14). The majority of these costs are expected to primarily impact commercial, passenger, industrial work, pilot, and commercial fishing vessels when combined. The total expected costs of $6,528,992 for passenger vessels is highest, due to the combined DSZ estimates for all vessel size classes, costs associated with vessels ≥ 35 and < 65 ft in length in active SMAs, and high operating costs. Industrial work vessels have an estimated cost of $3,568,260 due to combined impacts of regulating vessels ≥ 35 and < 65 ft in existing SMAs and DSZs for both size classes. Similarly for pilot vessels, the expected overall cost of $2,260,689 is primarily a reflection of the inclusion of vessels ≥ 35 and < 65 ft in length in SMAs. In comparison, commercial shipping vessels, whose total estimated cost of $2,167,646, is entirely due to speed restrictions imposed by DSZs and vessels > 65 ft in length that are already regulated in the current SMA boundaries. Other commercial vessel categories such as commercial fishing, other vessels, and towing/pushing vessels have an associated cost as a combined result of SMA and DMA regulations, but at a lesser degree than the shipping, industrial work, passenger, and pilot vessels under (Table 14). Recreational vessels across both size classes are expected to experience an estimated $867,072 additional cost under Alternative 4 (Table 14).

2.6.2.6 Alternative 5 (Preferred Alternative)

Alternative 5 (Preferred Alternative) would: 1) change the boundaries and timing of the current SMAs (to become new SSZs), 2) include vessels ≥ 35 ft to < 65 ft in length into the vessel size class subject to mandatory speed restrictions, and 3) introduce a mandatory DSZ framework to implement dynamic speed restrictions.

To estimate the number of vessels ≥ 35 and < 65 ft in length impacted by both SSZs and DSZs, the same methods from Alternative 2 were used, with the addition of vessels registered in Florida that would be impacted by the expansion of the Southeast proposed SSZs (Figure 1). Existing SMAs cover the major coastal ports in each state, and vessels registered outside of those areas are not expected to spend significant time in the proposed SSZ boundaries under Alternative 5,

with the exception of Florida. For Alternative 5, additional hailing ports in Florida were included to represent vessels that would be impacted by the southern expansion of the Southeast SSZ (Figure 1). This analysis also presents an estimated number of vessels > 65 ft in length impacted by the proposed rule due to the newly proposed SSZ boundaries, which follows the methods and analysis described in Alternative 3.

The total number of estimated vessels that transit faster than 10 knots in active, proposed SSZ boundaries under Alternative 5 was determined by service type, vessel size, and region (Table 15). For vessels ≥ 35 and < 65 ft in length, for all regions combined, there are 696 commercial fishing and 671 passenger vessels impacted, the majority of which are in the Northeast and Mid-Atlantic SSZs. Recreational vessels account for the majority of vessels in this size class expected to transit in excess of 10 knots in the proposed SSZ boundaries across all regions, with 6,488 total impacted vessels (Table 15). In comparison to the existing SMA boundaries and impacts presented in Alternative 2, an additional 7,342 vessels ≥ 35 and < 65 ft in length are expected to be impacted under Alternative 5. This increase is due to the proposed spatial expansion of the SSZ boundaries.

Table 15. Estimated number of vessels that transit at speeds in excess of 10 knots in active, proposed SSZs by service type, vessel size, and region under Alternative 5.

	Vessels ≥ 35 ft and < 65 ft in length)			Vessels (≥ 65 ft in length)			All Vessels
	Northeast/ Mid-Atlantic	Southeast	Total	Northeast/ Mid-Atlantic	Southeast	Total	Total
Commercial fishing	547	150	696	199	13	212	908
Commercial shipping	0	0	0	2,281	1,049	3,330	3,330
Industrial work	381	34	415	34	15	49	464
Other	53	37	90	205	92	297	387
Passenger	561	110	671	77	12	89	760
Passenger (Cruise)	0	0	0	4	8	12	12
Pilot	13	13	26	5	1	6	32
Recreational	4,342	2,146	6,488	486	349	835	7,323
Towing/Pushing	54	0	54	94	56	150	204
Total	5,951	2,489	8,440	3,385	1,595	4,980	13,420

As presented in Alternative 3, the majority of vessels ≥ 65 ft in length expected to transit in excess of 10 knots are 3,330 commercial shipping and 835 recreational vessels (Table 15). For all regions, vessel types, and vessels > 35 ft in length combined, a total of 13,420 vessels are expected to transit in excess of 10 knots in the proposed SSZ boundaries under Alternative 5.

Alternative 5 also identifies the cumulative impacts for vessels ≥ 35 ft and < 65 ft in length and ≥ 65 ft in length, and total vessels combined under a mandatory DSZ program by calculating the total number of vessels, delayed hours, and associated costs of transit in these zones. The total

number of vessels expected to travel in excess of 10 knots or more in proposed SSZs and mandatory DSZs was combined to show the cumulative number of vessels impacted (Table 16). An estimated total of 15,899 vessels are likely to be impacted under Alternative 5. However, it is possible that is an overestimate as some vessels may have been added to the analysis twice, if they tranisited in both proposed SSZ and DSZ boundaries. The majority of vessels that will be impacted are the 9,200 recreational vessels, followed by 3,575 commercial shipping vessels (Table 16).

Table 16. Estimated number of vessels that transit at speeds in excess of 10 knots in active proposed SSZs and DSZs by service type, vessel size, and total, under Alternative 5.

	≥ 35 ft and < 65 ft		≥ 65 ft		
	DSZ	SSZ	DSZ	SSZ	Total
Commercial fishing	89	696	82	212	1079
Commercial shipping	0	0	245	3330	3575
Industrial work	30	415	6	49	500
Other	6	90	53	297	446
Passenger	71	671	16	89	847
Passenger Cruise	0	0		12	12
Pilot	0	26	0	6	32
Recreational	1640	6488	237	835	9200
Towing/Pushing	0	54	4	150	208
Total	1836	8440	643	4980	15899

The estimated delayed transit hours were calculated for vessels in active SSZs by region, vessel size class, and service type (Table 17). In active SSZs vessels ≥ 35 ft and < 65 ft in length are expected to be delayed a total of 59,346 hours, with 47,908 of those hours occuring in the Northeast/Mid-Atlantic and 11,438 hours occuring in the Southeast (Table 17). Recreational vessels would be the most impacted vessel type of this size class in active SSZs, with 22,718 delayed hours in the Northeast/Mid-Atlantic and 8,088 delayed hours in the Southeast (Table 17). Vessels ≥ 65 ft in length would experience 52,857 total delayed hours within active SSZs, with 47,939 delayed hours occurring in the Northeast/Mid-Atlantic and 4,918 delayed hours occuring in the Southeast (Table 17). Commercial shipping vessels would be the most impacted vessel type of this size class in active SSZs, with 31,435 delayed hours in the Northeast/Mid-Atlantic and 1,295 delayed hours in the Southeast (Table 17).

Table 17. Total estimated delayed hours by affected vessels in active SSZs only, by region, size, and service type under Alternative 5.

	Vessels (≥ 35 ft and < 65 ft in length)			Vessels (≥ 65 ft in length)		
	Northeast/ Mid-Atlantic	Southeast	Total	Northeast/ Mid-Atlantic	Southeast	Total
Commercial fishing	5,503	850	6,354	813	35	848
Commercial shipping	0	0	0	31,435	1,295	32,730
Industrial work	5,015	532	5,547	492	65	557
Other	841	314	1,155	1,911	1,465	3,376
Passenger	12,675	272	12,948	7,999	68	8,067
Passenger (Cruise)	0	0	0	34	6	39
Pilot	804	1,378	2,183	739	5	744
Recreational	22,718	8,088	30,806	3,643	1,916	5,559
Towing/Pushing	351	4	355	875	62	937
Total	47,908	11,438	59,346	47,939	4,918	52,857

The total estimated delayed hours in active DSZs for all vessels by size category and service type is shown in Table 18. Overall, vessels ≥ 35 ft and < 65 ft will experience a total of 5,991 delayed transit hours in active DSZs, while vessels ≥ 65 ft will experience 623 delayed transit hours (Table 18). The most affected vessels of the smaller size class in active DSZs are recreational vessels at 5,164 delayed hours. The most affected vessels of the larger size class are passenger vessels at 1,516 delayed hours (Table 18). The DSZ impacts under Alternative 5 are less than those in Alternative 4, due to the additional spatial and temporal coverage of the proposed SSZ boundaries that now cover areas that previously relied on existing DMAs. Based on an evaluation of recent voluntary DMAs and acoustically triggered slow zones, under the current regulations and existing SMA boundaries, only 13 of the 2021 DMA/Slow Zones would have been triggered if the proposed SSZ boundaries were in effect. The proposed SSZ boundaries under Alternative 5 cover areas of elevated vessel strike risk (NMFS 2020).

To determine the overall impact, the delayed transit hours for vessels in active DSZs and SSZs were calculated (Table 18). The combined total of delayed transit hours estimated under Alternative 5 is 121,061 hours. Vessels ≥ 35 ft and < 65 ft will experience 65,339 of these delayed hours in both active SSZs and DSZs annually. Vessels ≥ 65 ft will experience 55,722 of these delayed hours in both active SSZs and DSZs (Table 18).

Table 18. Total estimated delayed hours by affected vessels in active DSZs and SSZs combined by vessel size and service type under Alternative 5.

	Vessels ≥ 35 ft and < 65 ft		Vessels ≥ 65 ft		All Vessels
	DSZ	SSZ	DSZ	SSZ	Total
Commercial fishing	660	6,354	51	848	7,913
Commercial shipping	0	0	556	32,730	33,286
Industrial work	2	5,547	18	557	6,124
Other	39	1,155	92	3,376	4,662
Passenger	126	12,948	1,516	8,067	22,657
Passenger Cruise	0	0	0	39	39
Pilot	0	2,183	0	744	2,927
Recreational	5,164	30,806	623	5,559	42,152
Towing/Pushing	0	355	9	937	1,301
Total	5,991	59,348	2,865	52,857	121,061

The delayed transit hours were used to estimate the total costs imposed on affected vessels for active SSZs by region and vessel type and for DSZs. The total estimated costs for vessels in active SSZs ≥ 35 ft and < 65 ft is $18,700,754, with a cost of $15,625,200 for the Northeast/Mid-Atlantic and a cost of $3,075,554 for the Southeast. For the vessels ≥ 65 ft in SSZs the total cost is $26,067,727, with a cost of $24,399,112 for the Northeast/Mid-Atlantic and a cost of $1,668,615 for the Southeast (Table 19). Most of the costs will be placed on industrial work and passenger vessels for those vessels ≥ 35 ft and < 65 ft. For vessels ≥ 65 ft, most of the costs will impact commercial shipping vessels (Table 19).

Table 19. The total estimated costs by affected vessels in active SSZs by service type under Alternative 5

	SSZ vessels (≥ 35 ft and < 65 ft in length)			SSZ vessels (≥ 65 ft in length)		
	Northeast/ Mid-Atlantic	Southeast	Total	Northeast/ Mid-Atlantic	Southeast	Total
Commercial fishing	$229,695	$34,008	$263,703	$199,466	$4,086	$203,552
Commercial shipping	0	0	0	$15,702,695	$344,346	$16,047,041
Industrial work	$6,352,815	$950,072	$7,302,887	$742,773	$84,510	$827,283
Other	$593,083	$221,083	$814,166	$1,318,533	$1,031,936	$2,350,469
Passenger	$6,527,643	$140,300	$6,667,943	$4,300,823	$34,845	$4,335,668
Passenger (Cruise)	0	0	0	$213,203	$36,834	$250,037
Pilot	$873,391	$1,496,896	$2,370,288	$802,050	$5,921	$807,971
Recreational	$640,649	$228,073	$868,722	$102,720	$54,043	$156,763
Towing/Pushing	$407,924	$5,122	$413,046	$1,016,849	$72,094	$1,088,943
Total	$15,625,200	$3,075,554	$18,700,754	$24,399,112	$1,668,615	$26,067,727

The total estimated costs calculated for vessels in active DSZs are in Table 20. Vessels ≥ 35 ft and < 65 ft have a total cost of $257,810, with recreational and passenger vessels being the most impacted vessel types with costs of $145,617 and $64,781, respectively (Table 20). For vessels ≥ 65 ft in active DSZs, the total estimated cost is $1,189,831. In this larger size class, vessels that are the most impacted are passenger, including cruise ships, at $780,732 and commercial shipping at $276,072. Due to the spatial and temporal expansion of the SSZs, the impact of DSZs on vessels of all size classes is lower in comparison to impacts to all vessel size classes proposed in Alternative 4 (Table 13).

Table 20. The total estimated costs by affected vessels in active SSZs and DSZs by service type under Alternative 5.

	Vessels ≥ 35 ft and < 65 ft		Vessels ≥ 65 ft		All Vessels
	DSZ	SSZ	DSZ	SSZ	Total
Commercial fishing	$16,548	$263,703	$18,365	$203,552	$502,168
Commercial shipping	$0	$0	$276,072	$16,047,041	$16,323,113
Industrial work	$3,177	$7,302,887	$22,316	$827,283	$8,155,663
Other	$27,687	$814,166	$64,816	$2,350,469	$3,257,138
Passenger	$64,781	$6,667,943	$780,732	$4,335,668	$11,849,124
Passenger (Cruise)	$0	$0	$0	$250,037	$250,037
Pilot	$0	$2,370,288	$0	$807,971	$3,178,259
Recreational	$145,617	$868,722	$17,566	$156,763	$1,188,668
Towing/Pushing	$0	$413,046	$9,965	$1,088,943	$1,511,954
Total	$257,810	$18,700,754	$1,189,831	$26,067,727	$46,216,122

The cumulative impacts for all vessel size classes and regions combined have an overall estimated impact of $46,216,122 under Alternative 5 (Table 20). The majority of these costs are expected to impact commercial shipping and passenger vessels, as their estimated costs are $16,323,113 and $11,849,124, respectively (Table 20). In addition to cost burdens associated with the different alternatives, mariners affected by the proposed changes will need to become familiar with the new regulations and understand where and when they may need to modify their vessel speed to comply. As is the case for the current regulation, NMFS will provide outreach and educational materials to affected mariners and update NOAA electronic chart products to ensure seasonal speed restricted areas are included in chart products already widely used by mariners. NMFS plans to post any DSZ announcements on its website and include that information in relevant notices to mariners and other platforms such as social media, smartphone apps, text alerts and/or other formats as requested by mariners.

2.6.3 Integration of Results

It is not feasible, at present, to fully estimate the economic costs and benefits attributable to each of the regulatory alternatives that NMFS is considering with available data. It is possible, however, to develop a qualitative ranking of the alternatives with respect to potential costs and benefits associated with implementing Alternative 5 (Preferred Alternative). Table 21

summarizes the estimated costs under each action Alternative relative to the no action alternative (Alternative 1). We estimate that Alternative 5 (Preferred Alternative), would result in the highest estimated costs relative to other individual alternatives; however, NMFS expects this alternative would most effectively address lethal vessel strike risk needed to achieve conservation goals and, along with other regulatory actions, stabilize the right whale population decline.

Table 21. The total estimated annual costs of each proposed alternative by vessel size and cumulative costs for both vessel size categories combined.

	Vessels ≥ 35 ft and < 65 ft	Vessels ≥ 65 ft	Total Vessel Costs
Alternative 1 (No Action)	$0	$0	$0
Alternative 2	$9,437,888	$0	$9,437,888
Alternative 3	$0	$26,067,727	$26,067,727
Alternative 4	$11,618,185	$4,960,785	$16,578,970
Alternative 5 (Preferred)	18,958,564	27,257,558	$46,216,122

As previously noted, the inability to quantify and value the benefits of implementing speed restrictions for this vessel size class prohibits the use of BCA to identify the regulatory alternative that would provide the greatest net benefit. Instead, this RIR summarizes the estimated costs of complying with each alternative. Based on best available information, and coast-wide vessel strike risk modeling, NMFS recognizes that to achieve substantial reductions (> 90%) in lethal right whale vessel strike risk, proposed modifications need to address two insufficiencies in the current speed rule: 1) misalignment between areas/times of elevated vessel strike risk and SMA spatial and temporal bounds, and 2) a lack of mandatory speed restriction on vessels ≥ 35 ft and < 65 ft in length that present a lethal threat to right whales.

NMFS determined that Alternative 1 (status quo) would not result in any anticipated reduction in strike risk, given that increases in vessel traffic and possible shifts in whale distribution may result in increased risk of lethal strikes to right whales over time. Alternative 2 would address vessel strike risk from most vessels ≥ 35 ft and < 65 ft in length, but fails to remedy the spatial and temporal misalignment of current SMAs, leaving right whales vulnerable to vessel collision in areas where they are known to aggregate in large numbers (e.g. south of Martha's Vineyard and Nantucket, MA). Alternative 4 partially addresses this issue by further extending mandatory protections through the DSZ framework, but given the broad spatial/temporal extent of the areas NMFS has identified as high risk outside the current SMAs, the use of a dynamic framework would be inadequate to mitigate the constant vessel strike risk in certain areas/seasons, and would create a cumbersome and less predictable regulatory environment. Alternative 3 successfully addresses much of the spatial and temporal misalignment of current SMAs but fails to address the risk from vessels < 65 ft in length, which account for at least 42% of documented lethal strike events in U.S. waters since the current speed rule was implemented in 2008. Only Alternative 5 (Preferred Alternative and Proposed Action) provides a high likelihood (> 90%) of substantial reduction in lethal vessel strike events involving most vessels ≥ 35 ft transiting at speeds greater than 10 knots. NMFS has considered the benefits and cost information available

and believes that Alternative 5 provides the best option to achieve the significant reduction in lethal right whale vessel collisions.

2.6.4 Uncertainties

AIS data used in this analysis accurately capture vessel movements and transit speeds within SMAs and proposed SSZs/DSZs from AIS-equipped vessels. USCG AIS carriage requirements do not apply to most vessels < 65 ft in length (80 FR 5281, January 30, 2015; 80 FR 2050, April 7, 2016). Due to a lack of AIS data for vessels < 65 ft in length, this analysis likely overestimates the number of vessels < 65 ft affected by the action and the extent of delayed hours affected mariners may experience. This conservative approach was employed to ensure that the analysis did not fail to capture potential impacts from the action given the limits of the data available. Furthermore, the analysis approach assumes vessels do not modify their transit behavior in response to speed restrictions, but rather must experience additional delayed transit hours. For commercial and industrial vessels this may be an appropriate assumption, but recreational boaters may have more flexibility to modify their total transit distance or length of their trip to accommodate speed restrictions within active SSZs.

It is likely that the available AIS data more accurately reflect the activity of the largest vessels < 65 ft in length, as well as vessels engaged in industry and commerce. Because only a limited portion of targeted vessels carry AIS, the analysis uses AIS-based vessel speed data as a sample to estimate total impact of potential speed limits to potentially affected vessels within the study area. By comparing the distribution of different types of vessels within these two datasets, we find some commercial vessels are likely well represented in the AIS data because they are more likely to be AIS-equipped, while most recreational vessels do not carry AIS. This means the sample size of commercial vessels is likely relatively larger than that available for recreational vessels. However, the absolute number of recreational vessels carrying AIS is much larger. As a result, the recreational vessel AIS data are representative enough for inference of population parameters.

NMFS anticipates that speed restrictions on vessels less than 65 ft in length may impact recreational anglers, depending on the spatial and temporal overlap of their fishing activity, and associated transit distance, relative to the proposed speed restrictions. To better understand potential impacts to recreational anglers in particular, NMFS invites public comment on the degree to which seasonal speed limits overlap with the area/timing of recreational angling activity and how vessel speed restrictions may impact the cost of a fishing trip.

The analysis likely overestimates the number of vessels that transit at speeds in excess of 10 knots in active proposed SSZs and DSZs. Due to the uncertainty of where and when DSZs might be designated in the future, our analysis used data from voluntary dynamic areas declared in 2021 that would have occurred outside the proposed SSZ boundaries to estimate the potential impact of the DSZs. It is likely that some of the same vessels tranisited in both the proposed SSZs and DSZs, resulting in a double counting of the total number of potentially affected vessels.

To most accurately portray vessel transit characteristics, we relied on recent years' (2020-2021)

AIS data to evaluate the economic impacts of the proposed rule. This time period overlaps with the ongoing global COVID-19 pandemic which may have impacted vessel operations along the U.S. East Coast. We lack sufficient information to quantify any COVID-19 specific impacts to vessel operations but suspect that at a minimum cruise ship operations and some tourist related vessel activities were likely constrained during certain periods. Overall, relatively few cruise ships operate in regulated speed areas, consistent with the major cruise ship ports occurring to the south (Miami/Ft Lauderdale) of these areas. The delayed distance and hours that accrue to cruise ships likely comprise only a small fraction of their entire journey unless they travel along coastal waters for their entire trip. Based on pre-pandemic data from the 2017-2018 SMAs, 38 cruise ships were detected in the data compared to 12 during the 2020-2021 year examined in this RIR. Thus costs accruing to the industry during "normal" operating years may be more than triple the estimated $250,037 per year. Alternatively, anecdotal reports indicate that recreational vessel activity may have increased in some areas.

It is challenging to predict how different mariner groups might respond, adjust, or otherwise modify operations to accommodate measures in the proposed rule. Further, it is unclear how these measures may impact vessel passengers or clients. The proposed changes to the speed rule will impact a wide variety of vessel types and operators, and we anticipate decisions regarding changes to vessel operations will vary depending on the unique nature of a vessel's operations, needs, schedule, flexibility and cost.

2.7 Results of the Regulatory Impact Review

NMFS has considered this action under E.O. 12866. As described in this analysis, from an economic perspective, this action is not expected to have an annual effect on the economy of $100 million or more, or have an adverse effect in a material way on the economy. Furthermore, this action would not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; or materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof. However, it may raise novel or policy issues arising out of legal mandates, the President’s priorities, or the principles set forth in E.O. 12866.

NMFS has considered the information presented above and believes that Alternative 5 (Preferred Alternative) offers the best option for achieving compliance with ESA and MMPA requirements while minimizing adverse economic impacts. Based on these considerations and as detailed in Section 2.6.3, NMFS has identified Alternative 5 (Preferred Alternative) as its proposed approach to meet North Atlantic right whale recovery goals.

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Appendix A: Detailed Methodology for the Economic Impact Analysis

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1.0 Research Method

Annual economic impacts were evaluated as the total cost difference, including both extra costs and cost savings, of potential affected vessels with or without the proposed changes to the speed rule. Impacts from both commercial vessels and recreational vessels were considered. For commercial vessels, we evaluated the change in operating costs and fuel costs; and for recreational vessels, instead of operating costs, we evaluated the opportunity costs of boaters by using average local labor rate as proxy. Fuel cost impacts were also applied to recreational vessels. Detailed data and methods are described in the following section.

1.1 Data Sources

Data from both public and private service providers were used to evaluate the economic impacts. However, some assumptions were required when sensitive/confidential data were not available, especially for industrial operating costs for commercial vessels.

1.1.1 United States Coast Guard (USCG) Vessel Registration Data

United States Coast Guard (USCG) vessel registration data (January 2020 version) were used to identify the universe of potentially regulated vessels ≥ 35 and < 65 ft (USCG 2021). Applicable vessels (≥ 35 and < 65 ft in length) with a valid registration and hailing port within 50 nm transit distance from an existing Seasonal Management Area (SMA) or proposed Seasonal Speed Zone (SSZ) (depending on the alternative examined) were considered in the analysis with the exception of vessels expected to transit in inshore areas only (e.g., Long Island Sound, Chesapeake Bay, Albemarle Sound, and Pamlico Sound). For Alternatives 2 and 4, we included only vessels within range of existing SMAs. For Alternative 5, we included only vessels within range of proposed SSZs. For all action alternatives, vessels were sorted into service categories to further determine impacts and operating costs.

1.1.2 Automatic Identification System (AIS) Data

Automatic Identification System (AIS) data provided by the Volpe National Transportation Systems Center were used to calculate (or estimate) delayed transit hours for different vessels by service type and size in each speed restriction area (SMAs, SSZs, and Dynamic Speed Zones (DSZs)). AIS is a maritime navigation safety communications system adopted by the International Maritime Organization (IMO), and required by the USCG on most vessels > 65 ft in length, that provides vessel information automatically to appropriately equipped shore stations and satellite receivers. AIS uses transmitters installed on a vessel to relay the vessel's precise location, as well as other information such as its size, speed, and heading. Vessel traffic operators use AIS in ports to coordinate docking and ensure safety. For navigation at sea, AIS supplements radar as the primary means of detecting other vessels and avoiding collisions. Where possible, we linked AIS vessel identification records to the Information Handling Services (IHS) Markit database of vessels to confirm or correct vessel information entered into the AIS system.

1.1.3 Primary Cost Data Sources

1.1.3.1 Drewry Operating Cost Data

We used the Drewry Maritime Research 2021-2022 Operating Cost Report (Drewry 2021) cost estimates to evaluate the economic impacts on commercial shipping vessels. The Drewry report provides data, information, and analysis of the main components of ship operating costs, in addition to an assessment of indicative daily and annual operating costs for a range of 47 different vessel types and sizes. We converted Drewry's estimates of daily operating costs to hourly costs based on the assumption of a 24-hour working day. For the purposes of this analysis, we relied on Drewry's 2021/22 daily operating cost estimates as the most recent estimates that reflect both the global impacts of the COVID-19 pandemic and rising fuel price.

Drewy's estimates of operating costs include the following cost elements:

- Manning – all crew-related costs, including wages, subsistence, training and any crew travel and other costs. Manning costs are based on a series of surveys conducted on an annual basis covering each of the Dry, Offshore and Wet sectors individually. For the 2021/22 report, data is based on over 40,000 officers employed by 60+ companies serving on approximately 3,000 internationally trading vessels.
- Insurance – premiums and insurance coverage for the vessel itself as well as all cargo and any additional risks (war risk, kidnap risk etc.). The assessments of insurance costs are based on typical premiums for hull and machinery (H&M), and protection and indemnity (P&I) as well as a range of other related insurance costs
- Stores, spares and lubes – lubricating oils, materials, supplies and tools required for the efficient operation of the vessel. The data has been assessed by a Drewry expert who has over 30 years of experience in the management of ships of all types.
- Repairs & maintenance and intermediate surveys & dry-docking– contracts and parts for vessel engines and system repairs as well as maintenance to equipment such as navigation or communication technology. The basic approach is similar to that applied to 'Stores, spares and lubes', with itemization of individual cost components and assessments of these costs provided by our internal expert, while cross-checking with external resources and ship repair yards.
- Management and administration – business operations costs for the registration and management of the vessel, as well as compliance costs, such as costs related to vessel inspections or waste disposal.

1.1.3.2 U.S. Bureau of Labor Statistics (BLS) Occupational Data

When estimating the potential economic impacts for recreational vessels, it is not appropriate to apply operating costs to them as for commercial vessels. Instead we used the average wage rate of each coastal state as a proxy to estimate opportunity costs (BLS 2020).

1.1.3.3 Ship and Bunker Fuel Price Data

Ship and Bunker (shipandbunker.com) provides public access to marine fuel daily prices for major ports around the globe. For our analysis, we picked the daily average marine gas oil (MGO) prices for New York and Rotterdam from Oct 30 2020 to June 30 2021, which cover the

active SMA/SSZ season. The final price we used for the cost estimation is $531.75 per metric ton.

2.0 Cost Estimation

2.1 Overarching Methods

This analysis evaluated the economic impacts of 10-knot mandatory speed limits for vessels that normally would transit at speeds greater than 10 knots in active speed restriction zones, either a SMA, or newly proposed SSZ/mandatory DSZ (depending on the alternative examined). The impacts to vessel operators consisted of operation costs and fuel costs changes. Operation costs change is reflected as the delayed hours caused by speed restriction, and fuel costs change is derived from the change of fuel efficiency under different speeds, especially for large ocean going vessels. In this analysis, we evaluated the operating cost change for all types of vessels, but we could only calculate the fuel cost change for commercial shipping vessels due to their large fuel consumption and data availability.

Using AIS data, we first identified all vessels that transited at least one segment in the relevant active speed restricted area during the 2020-2021 season at a speed of greater than 10 knots. Then we regrouped all vessels by size into two categories: vessels ≥ 65 ft in length, and vessels ≥ 35 and < 65 ft in length. For vessels ≥ 65 ft in length, there is nearly 100% coverage, so we could rely on AIS data to accurately characterize their transit information and evaluate their potentially delayed hours. For vessels ≥ 35 and < 65 ft in length, AIS data coverage varies by service type. Some industrial work vessels, like pilot vessels, have higher coverage and most small recreational vessels have low coverage.

To make up for the shortage in AIS coverage for vessels ≥ 35 and < 65 ft in length, we used USCG vessel registration data to develop best estimates of potential overall vessel activity in speed restriction areas (USCG 2021). We first divided the total number of vessels from this size class transiting within the relevant speed restricted area on an annual basis by the number of applicable vessels (≥ 35 and < 65 ft in length) in the USCG registered vessels data that identified a hailing port within 50 nm of the relevant zone. Then we applied this percentage to calculate delayed hours and final costs. For example, if AIS data provided information for 10 commercial fishing vessels within the Southeast SMA during a 12-month period, while USCG data indicate that 100 commercial fishing vessels have a homeport within 50 miles of the Southeast SMA, then we assumed the AIS data represented 10% of applicable fishing vessel activity in the region. This adjustment was only applied to vessels ≥ 35 and < 65 ft in length given the lack of comprehensive AIS data for this vessel size class.

Estimating costs for the proposed Dynamic Seasonal Areas (DSZs) presented a challenge because the location and timing of these potential zones is uncertain. During 2021, NMFS declared 67 Dynamic Management Areas (DMAs) and Slow Zones along the U.S. Atlantic coast under the current voluntary program. We used these voluntary DMAs/Slow Zones as a proxy for future mandatory DSZs to evaluate potential economic impacts - given that we cannot fully predict where future DSZs may be designated. We identified high speed transits in active

DMAs/Slow Zones, and calculated delayed hours based on their actual transiting speed. For vessels ≥ 65 ft the delayed hours were transferred to costs directly, for vessels ≥ 35 and < 65 ft the results were further adjusted based on the percentage of AIS vessels in the USCG vessel data. Detailed cost estimation results are found in the section 2 of the RIR.

For Alternative 4, the impact of the proposed DSZ program utilized all 67 DMAs/Slow Zones as proxies since this alternative employs the current SMA measures, and DSZs would be expected to occur in similar locations and times as existing DMAs/Slow Zones. For Alternative 5 (Preferred Alternative), only 13 of the 67 DMA/Slow Zones would have occurred outside of the proposed SSZ boundaries/times, therefore, we used those 13 zones as proxies for this alternative analysis.

2.2 Transit Time Impacts

The focus of this assessment was to estimate delayed (or additional) transit hours that would likely accrue to each vessel type in each region, as a result of a 10-knot speed restriction within relevant speed restriction areas (depending on the alternative evaluated). The analysis followed these steps using available AIS data:

1. We calculated the number of unique AIS-equipped applicable vessels transiting active speed restricted areas with any distance transited at a speed greater than 10 knots (impacted vessels) by service type, region, and season. Then we calculated the average proportion of AIS-equipped vessels with any distance transited at a speed greater than 10 knots for each season.
2. For each vessel transit through an active speed restricted area with at least a portion of transit distance in excess of 10 knots, we calculated both actual transit time and transit time if a 10-knot speed restriction were in place. The difference between these two times is the transit delay. The transit delay time was then aggregated and averaged over all impacted vessel types in the sample.
3. For vessels ≥ 35 and < 65 ft in length, we further adjust the delayed hours by AIS vessel percentage as described earlier; for vessels ≥ 65 ft, we used the calculated results directly.

This analysis likely, and deliberately, overestimates the number of vessels affected by the action and the extent of delayed hours affected mariners may experience. This approach was employed to ensure that the analysis did not fail to capture potential impacts from the action given the limits of the data available.

3.0 Commercial Vessel Annual Cost Impacts

3.1 Commercial Shipping Vessels

Commercial shipping vessels are one of the most impacted vessel types of vessels > 65 ft in length. We analyzed five types of vessels that could be identified in AIS data: bulk carrier, container, general cargo, tanker, and roll-on/roll off cargo (“Ro-Ro”).

We relied on the 2021/22 Operating Cost Report from Drewry ($2021) to estimate the hourly operating costs for each type of shipping vessel. Due to data confidentiality we could only report the mean hourly operating costs by using a similar category from the Drewry report (Table A-1). The hourly fuel consumption data were adopted from the previous Industrial Economics Inc (IEc) report (IEc 2020) prepared for the North Atlantic Right Whale Speed Rule Assessment (NMFS 2020). To be consistent with the previous IEc economic analysis, we followed their assumption that shipping vessels would use MGO when approaching ports, and we adopted the same fuel pricing method by averaging New York and Rotterdam daily MGO price from Oct 30, 2020 to June 30, 2021, which ends up with $531.75 per metric ton. The mean hourly operating costs, fuel consumption and hourly fuel costs are reported in Table A-1.

Table A-1. Mean hourly operating and fuel costs by vessel service type*

AIS vessel Category	Drewery vessel category	Mean hourly operating cost in FY2021	Hourly fuel consumption (metric tons)*	Hourly fuel cost in FY2021
Bulk carrier	Bulk carrier	$274	1.47	$782
Container	Container	$315	6.82	$3,627
General Cargo	General Cargo; Refrigerated Cargo ("Reefer")	$330	1.22	$649
Tanker	Chemical Tanker; Liquid Natural Gas (LNG) Tanker; Liquid Petroleum Gas (LPG) Tanker; Oil Tanker	$387	1.56	$830
Ro-Ro	Roll-On/Roll-Off Cargo ("Ro-Ro")	$213	2.19	$1,165

* Hourly fuel consumption rate in this table is based on vessel maximum designed service speed, which is not the most efficient rate.

The total economic impacts of the alternatives on shipping vessels consist of two parts: Operating costs difference and fuel costs difference where

$$C_o = R_o(T_B - T_A)$$

$$C_f = P_f(Q_B T_B - Q_A T_A)$$

C_o and C_f are the operating costs and fuel costs difference with or without the alternative. R_o is the hourly operating costs, and P_f is the fuel price. T_A is the actual transiting time for high speed (greater than 10 knots) segments in active speed restricted areas, while T_B is the counterfactual transiting time if vessels comply with the 10 knots speed restriction. Q_A and Q_B are hourly fuel consumption rates at different speeds.

The hourly fuel consumption rate (Q_{max}) estimated in the 2020 IEc report was based on a vessel's maximum designed service speed (usually around 20 knots), which consumes the most fuel. Vessels usually cruise with a speed that could best accommodate fuel efficiency and travel time, and we assume it is Q_A. According to a study by Bialystocki and Konovessis (2016), the fuel consumption rate for commercial ships at its regular cruising speed (about 15 knots) is about 67% of its highest speed; while at its lowest cruising speed (about 10 knots) the fuel consumption could be lowered by 50% compared to its highest speed. Therefore, we could modify the fuel costs equation to:

$$C_f = P_f\left(0.5Q_{max} * T_B - 0.67Q_{max} * T_A\right) = P_f\left(0.5Q_{max} * (T_B - T_A) - 0.17T_A\right)$$

P_f equals to \$531.75, R_o and Q_{max} could be found in Table X; T_A and T_B could be calculated in the AIS data as described in the previous section.

The final cost estimation for shipping vessels is presented in Table A-2. The proposed SSZs presented below are defined as Atlantic (ATL), Great South Channel (GSC), North Carolina (NC), South Carolina (SC), and Southeast (SE) (Figure 1).

Table A-2. Cost impacts for commercial shipping vessels by service type in proposed SSZs (in \$2021).

	ATL	GSC	NC	SC	SE	Total
Operating Cost Change						
Bulk Carrier	\$459,122	\$520	\$12,135	\$14,306	\$2,504	\$488,587
Cargo	\$366,876	N/A	\$37,061	\$15,189	\$4,671	\$423,796
Container	\$4,365,818	\$689	\$294,559	\$264,537	\$10,445	\$4,936,048
Ro-Ro	\$1,580,658	N/A	\$95,878	\$21,237	\$23,705	\$1,721,478
Tanker	\$2,223,529	\$848	\$28,419	\$31,731	\$2,794	\$2,287,321
Total	\$8,996,003	\$2,057	\$468,051	\$347,000	\$44,119	\$9,857,230
Fuel Cost Change*						
Bulk Carrier	-\$475,970	-\$1,454	-\$6,085	-\$22,172	-\$5,637	-\$511,317
Cargo	-\$53,275	N/A	-\$475	-\$13,389	-\$5,740	-\$72,879
Container	\$6,833,885	-\$2,407	\$511,379	\$116,737	-\$39,120	\$7,420,474
Ro-Ro	\$387,126	N/A	\$90,702	\$1,237	-\$41,606	\$437,460
Tanker	-\$1,046,303	-\$2,536	\$1,996	-\$29,893	-\$7,192	-\$1,083,926
Total	\$5,645,463	-\$6,397	\$597,517	\$52,521	-\$99,294	\$6,189,811
Total Cost Change*						
Bulk Carrier	-\$16,848	-\$934	\$6,049	-\$7,865	-\$3,132	-\$22,731
Cargo	\$313,601	N/A	\$36,586	\$1,800	-\$1,070	\$350,917
Container	\$11,199,703	-\$1,718	\$805,938	\$381,273	-\$28,674	\$12,356,523
Ro-Ro	\$1,967,784	N/A	\$186,580	\$22,475	-\$17,901	\$2,158,938
Tanker	\$1,177,226	-\$1,688	\$30,415	\$1,839	-\$4,398	\$1,203,394
Total	\$14,641,467	-\$4,340	\$1,065,568	\$399,521	-\$55,175	\$16,047,041

*Note: negative numbers indicate cost savings. It is assumed that vessels are 100% compliant with the rule, and they recover to their regular speed once they are out of the SSZs. In reality vessels could increase their speed to compensate for their lost hours once they transit out of the SSZs, which could cause extra fuel and save some operating costs. But we do not consider that situation here.

3.2 Commercial Fishing Vessels

Commercial fishing vessels transit at relatively slower speeds compared to shipping vessels. For all commercial fishing vessels (≥ 35 ft) that are equipped with AIS and transited within proposed active SSZs, about 33% transited in excess of 10 knots (Table A-3).

Table A-3. The percentage of commercial fishing vessels (carrying AIS) that traveled more than 10 knots in proposed active SSZs.

SSZ	No. of Commercial Fishing Vessels ≤ 10 knots	No. of Commercial Fishing Vessels >10 knots	Total	Percentage > 10 knots
ATL	457	287	744	39%
GSC	208	53	261	20%
NC	86	63	149	42%
SC	55	21	76	28%
SE	74	16	90	18%
Total	880	440	1,320	33%

Among all the commercial fishing vessels with high speed transit segments in active SSZs, vessels ≥ 35 and < 65 ft in length tend to have higher average speeds, especially in the Southeast, while large fishing vessels traveled under 10 knots for most of their transit in active SSZs (Table A-4). On average, commercial fishing vessels generally transit at lower speeds, meaning that compliance with speed restrictions is less likely to result in a substantial fuel efficiency change. Therefore, our economic analysis will only consider the impacts on their operating costs.

Table A-4. Average speed for high-speed* (transiting in excess of 10 knots) commercial fishing vessels in active SSZs by size and region.

SSZ	Average Speed for Commercial Fishing Vessels ≥ 35 and <65 ft	Average Speed for Commercial Fishing Vessels > 65 ft	Average Speed (kts)
ATL	10.7	8.9	9.2
GSC	7.3	9.4	9.4
NC	15.6	9.0	12.6
SC	13.4	9.3	11.5
SE	26.9	7.0	11.1
Average	12.7	8.9	9.7

*Note: high-speed vessels are not necessarily transiting in excess of 10 knots for the entirety of a transit segment.

For the operating costs estimation, we used the cost models developed by IEc report (2020), which simply rely on vessel length (in meters).

For Northeast vessels (ATL and GSC SSZ):

$$Hourly\ Cost = -\ 901.3431 + 349.0782 * ln(length)$$

For Mid-Atlantic and Southeast vessels (NC, SC, and SE SSZ)

$$Hourly\ Cost = -\ 605.8238 + 244.2857 * ln(length)$$

Table A-5 summarizes the regional economic impacts for commercial fishing vessels from the expanded SSZs based on this cost estimation method.

Table A-5. The economic impacts on fishing vessels by size class in the northeast/mid-Atlantic (NE/MD) and southeast (SE) SSZs.

Impacted Commercial Fishing Vessels in SSZs	SSZ Region	Cost
Vessels ≥ 35 and <65 ft	NE/MD	$229,695
	SE	$34,008
	Total	$263,703
Vessels ≥ 65 ft	NE/MD	$199,466
	SE	$4,086
	Total	$203,552

3.3 Passenger Vessels

Due to the impact of the COVID-19 pandemic, very few cruise vessels were operating during the 2020-2021 season. AIS data indicate that only 12 cruise vessels traveled in active SMAs, and all of them had some high speed transition segments. When those segments slowed to 10 knots, a total of 39 hours could be delayed. With a high operating costs of $6,362 per hour (IEc 2020, in $2021), the total costs could be in excess of $250,000 per year. However, we could not evaluate impacts on passengers.

Most other passenger vessels in our analysis are not cruise ships, rather they could be ferries, tour boats, whale watching boats, for-hire fishing boats or other primarily passenger carrying vessels. Neither AIS nor USCG registration data identify the details of these passenger boats, thus, given available data, we have to combine them together and apply a general hourly operating cost rate for the estimation. Fuel cost efficiency change is not considered here; it is incorporated into the operating costs.

We adopted the hourly operating costs from IEc's economic analysis report (2020), which was based on a U.S. Department of Transportation (DOT) model. The DOT model allows users to specify values for certain variables that affect operating costs. In most cases we used the default assumptions DOT suggests, varying from these assumptions only when necessary to improve the applicability of the resulting cost estimates to our analysis. This calculation yields a weighted-average operating cost of approximately $515 per hour (in $2021) which is applied to passenger vessels transiting in proposed SSZs by region (Table A-6).

Table A-6. The economic impacts on passenger vessels by region operating within the proposed SSZs in $2021.

Vessel Type	NE/MID	SE	Total
	Impacted high speed vessel number		
Non-cruise Passenger (≥ 35 and <65)	561	110	671
Non-cruise Passenger (≥ 65)	77	12	89
Passenger (Cruise)	4	8	12
	Total delayed hours		
Non-cruise Passenger (≥ 35 and <65)	12,675	272	12,948
Non-cruise Passenger (≥ 65)	7,999	68	8,067
Passenger (Cruise)	34	6	39
	Total economic cost impacts		
Non-cruise Passenger (≥ 35 and <65)	$6,527,643	$140,300	$6,667,943
Non-cruise Passenger (≥ 65)	$4,300,823	$34,845	$4,335,668
Passenger (Cruise)	$213,203	$36,834	$250,037

3.4 Industrial Work Vessels

A number of industrial work vessels would be heavily impacted by this proposed rule, which include towing/pushing vessels, pilot vessels, dredging vessels, port tenders/offshore work vessels etc. We used a similar estimation method for all these vessels which is based on the delayed hours and their hourly operating costs. Table A-7 describes the detailed rate and Table A-8 displays the economic impacts for each type of these vessels.

Table A-7. The hourly operating costs in 2021 for industrial work vessels.

Vessel Type	Hourly operating cost (in $2021)*
Towing/pushing vessel	$1,161
Dredging vessel	$1,789
Other industrial work vessel**	$1,085

*Data from IEc 2020. **Other industrial work vessels include pilot vessels and port tenders and offshore work vessels. Their cost data are not available, therefore we created a weighted average rate for towing/pushing, dredging, and passenger vessels based on the distribution of transits in the AIS dataset.

Table A-8. The economic impacts for each type of industrial work vessel in the northeast/mid-Atlantic (NE/MD) and southeast (SE) from proposed SSZs.

	Vessels ≥ 35 and <65 ft			Vessels ≥ 65 ft		
	NE/MD	**SE**	**Total**	**NE/MD**	**SE**	**Total**
	Impacted high speed vessels			**Impacted high speed vessels**		
Towing/pushing	54	0	54	94	56	150
Pilot*	13	13	26	5	1	6
Industrial other)	381	34	415	34	15	49
	Total delayed hours			**Total delayed hours**		
Towing/pushing	351	4	355	875	62	937
Pilot*	804	1,378	2,183	739	5	744
Industrial (other)**	5,015	532	5,547	492	65	557
	Total economic cost impacts			**Total economic cost impacts**		
Towing/pushing	$407,924	$5,122	$413,046	$407,924	$5,122	$413,046
Pilot*	$873,391	$1,496,896	$2,370,288	$802,050	$5,921	$807,971
Industrial (other)**	$6,352,815	$950,072	$7,302,887	$1,016,849	$72,094	$1,088,943

*Note: We list pilot and tow/push vessels separately because they are identified separately in both the AIS and USCG data. **Other industrial vessel types, such as dredging vessels, are not identified separately in USCG data, so we combine them into the other industrial vessels category for reporting convenience.

3.5 Other Vessels Types

For all other unidentified vessels in AIS data, we applied a similar method to calculate the hourly operating cost by using weighted average costs of commercial fishing, non-cruise passenger, and industrial work vessels. The average hourly cost is about $705, and 300 vessels could be delayed for 3,376 hours, which results in an estimated annual cost of $2.35 million for vessels > 65 ft in length operating within the proposed SSZs (Alternative 3).

4.0 Recreational Vessel Annual Cost Impacts

Recreational vessels do not operate for revenue or profit, rather they operate for the pleasure of boat owners and guests. Therefore, we did not use operating costs to evaluate potential lost benefits from the delayed hours. Instead we applied the most recent national average wage rate from the Bureau of Labor Statistics as the opportunity cost for slowing down in active SMAs/SSZs. Based on this approach, a total of 835 vessels would be slowed down by 5,559 hours. There is at least one boat operator for each recreational vessel, so the minimum costs could be $156,763 at a wage rate of $28.2/hour.

5.0 Impacts from Management Alternatives

5.1 Economic Impacts of Alternative 2

Alternative 2 would add vessels ≥ 35 and < 65 ft in length to the existing class of vessels regulated under the current speed rule. Thus only vessels ≥ 35 and < 65 ft in length transiting

within existing active SMAs would be impacted by this change. The estimating method is the same as the preferred alternative, and the results are displayed in Table A-9.

Table A-9. Estimated compliance costs by region for vessels ≥ 35 and < 65 ft under Alternative 2.

Vessel Type	NE/MID	SE	Total
Commercial fishing	$9,191	$42,805	$51,996
Industrial work	$2,744,128	$241,873	$2,986,001
Other	$329,253	$77,647	$406,900
Passenger	$3,055,798	$77,193	$3,132,991
Pilot	$728,921	$1,453,867	$2,182,788
Towing/Pushing	$59,463	$2,598	$62,062
Sum-Commercial	$6,926,754	$1,895,984	$8,822,737
Sum-Recreational	$118,791	$496,360	$615,151
Total	$7,045,545	$2,392,344	$9,437,888

Note: Northeast/Mid-Atlantic region ranges from the Cape Cod Bay SMA to the Morehead City SMA; The Southeast region includes the North Carolina-Georgia SMA and Southeast SMA.

5.2 Economic impacts of Alternative 3

Alternative 3 would expand the existing SMAs into new SSZs. Under this alternative only vessels ≥ 65 ft in length would be affected within newly regulated areas/times. Table A-10 presents the cost estimates of Alternative 3 for these vessels broken down by region.

Table A-10. Estimated compliance costs for all affected vessels ≥ 65 ft in length under Alternative 3 by region.

Vessel Type	NE/MID	SE	Total
Commercial fishing	$199,466	$4,086	$203,552
Commercial shipping	$15,702,695	$344,346	$16,047,041
Industrial work	$742,773	$84,510	$827,283
Other	$1,318,533	$1,031,936	$2,350,469
Passenger	$4,300,823	$34,845	$4,335,668
Passenger (Cruise)	$213,203	$36,834	$250,037
Pilot	$802,050	$5,921	$807,971
Towing/Pushing	$1,016,849	$72,094	$1,088,943
Recreational	$102,720	$54,043	$156,763
Total	$24,399,112	$1,668,615	$26,067,727

5.3 Economic impacts of Alternative 4

Alternative 4 would combine the provisions of Alternative 2 (within existing SMAs) with a new mandatory DSZ program. The alternative would impact vessels from both size classes and the total costs are presented in Table A-11.

Table A-11. The total estimated costs for all affected vessels ≥ 35 ft in length under Alternative 4 by region.

Vessel Type	SMA	DSZ	Total
Commercial fishing	$51,996	$71,852	$123,849
Commercial shipping	0	$2,167,646	$2,167,646
Industrial work	$2,986,001	$582,259	$3,568,260
Other	$406,900	$381,229	$788,129
Passenger	$3,132,991	$3,396,001	$6,528,992
Pilot	$2,182,788	$77,902	$2,260,689
Towing/Pushing	$62,062	$212,271	$274,333
Recreational	$615,151	$251,921	$867,072
Total	$9,437,888	$7,141,082	$16,578,970

5.4 Economic impacts of Alternative 5

Alternative 5, the preferred alternative, would combine the provisions of Alternatives 2 and 4 to: 1) include vessels ≥ 35 and < 65 ft in length, 2) expand the current SMAs into newly proposed SSZs and create a new mandatory DSZ program. The combined costs of these proposed changes is presented in Table A-12 following the methods outlined above.

Table A-12. The total estimated costs by affected vessels in active SSZs and DSZs by service type under Alternative 5.

	Vessels ≥ 35 ft and < 65 ft		Vessels ≥ 65 ft		All Vessels
	DSZ	SSZ	DSZ	SSZ	Total
Commercial fishing	$16,548	$263,703	$18,365	$203,552	$502,168
Commercial shipping	$0	$0	$276,072	$16,047,041	$16,323,113
Industrial work	$3,177	$7,302,887	$22,316	$827,283	$8,155,663
Other	$27,687	$814,166	$64,816	$2,350,469	$3,257,138
Passenger	$64,781	$6,667,943	$780,732	$4,335,668	$11,849,124
Passenger (Cruise)	$0	$0	$0	$250,037	$250,037
Pilot	$0	$2,370,288	$0	$807,971	$3,178,259
Recreational	$145,617	$868,722	$17,566	$156,763	$1,188,668
Towing/Pushing	$0	$413,046	$9,965	$1,088,943	$1,511,954
Total	$257,810	$18,700,754	$1,189,831	$26,067,727	$46,216,122

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Appendix B: Initial Regulatory Flexibility Act Analysis (IRFA)

Overview

The Regulatory Flexibility Act (RFA) requires federal agencies to consider disproportionate and/or significant adverse economic impacts of their proposed regulations on U.S. small entities. To meet this obligation the National Marine Fisheries Service (NMFS) has developed this Initial Regulatory Flexibility Analysis (IRFA) to evaluate the impact that the proposed North Atlantic right whale speed rule would have on small entities and evaluate methods to minimize these impacts. A description of the proposed speed rule action, why it is being considered, and the legal basis for this action are contained in the Regulatory Impact Review (RIR) for the proposed rule. This appendix provides an assessment and discussion of the potential economic impacts of the proposed action on U.S. small entities, as required under the RFA.

Description and Estimate of the Number of Small Entities Affected by the Proposed Rule

This proposed rule does not duplicate, overlap, or conflict with other Federal rules. This analysis includes an estimate of the number of small entities affected using entity size standards issued by the U.S. Small Business Administration (SBA). Three types of small entities are defined in the IRFA: small business, small governmental jurisdiction, and small organization. This analysis presents the estimated number of small entities potentially affected by the operational measures of the proposed rule by vessel "service category" and U.S. entity type.

According to the SBA, a small business must meet the following criteria: the business must be for profit of any legal structure, independently owned and operated, not nationally dominant in its field, and physically located in the U.S. or territories (13 CFR 121). The SBA notes that businesses outside the U.S. may be counted as small if they have an operation in the U.S. that makes a significant contribution to the U.S. Economy. Finally, the entity must meet the numerical small business size standard for its industry, which is established by the SBA for most industries in the U.S. economy.

Vessel types associated with industries potentially affected by the proposed rule are presented in Table B-1. This analysis focuses on small entities that may be affected by the proposed rule and includes vessels identified as: commercial fishing, pushing or towing, pilot, passenger, industrial work and other. Vessels identified as recreational/recreational sailing, were not considered in the analysis as they are pleasure vessels that do not meet the standard for small entities. Lacking information on vessel ownership for most vessel types, all industrial work vessels, pushing/towing vessels, pilot vessels, passenger vessels and "other" vessels are considered small entities for the purposes of this analysis. This likely provides an overestimate of the number of vessels/small entities that would be affected by the proposed rule.

Table B-1. Vessel types and their North American Industry Classification System (NAICS) U.S. Industry Title and Codes affected by the proposed rule (From U.S. Census Bureau 2018).

Vessel Category	NAICS U.S. Industry Title	NAICS Code
Commercial Fishing	Finfish Fishing	114111
	Shellfish Fishing	114112
	Other Marine Fishing	114119
Pushing/Towing/Pilot	Navigational Services to Shipping	488330
Passenger	Scenic and Sightseeing Transportation (water)	487210
	Coastal and Great Lakes Passenger Transportation	483114
	Environment, Conservation and Wildlife Organizations	813312
	Tour Operators	561520
Commercial Shipping	Deep Sea Freight Transportation	483111
	Coastal and Great Lakes Freight Transportation	483113
Industrial Work	Support Activities for Oil and Gas Operations	213112
	Other Support Activities for Water Transportation	488390
International cruise operator	Deep Sea Passenger Transportation	483112
Other Vessels	Unknown	Unknown

Many entities operating within the international shipping and cruise industry have foreign ownership and/or have their primary place of business outside of the United States, and would not qualify as a U.S. small entity. We identified commercial ships/cruise ships owned by U.S. entities based on Automatic Identification System (AIS) and maritime ownership data and calculated the percentage of U.S. vessels expected to be active in proposed Seasonal Speed Zones (SSZs) that traveled in excess of 10-knots in the 2020-2021 season. Only 2% of affected commercial ships (and no cruise ships) were U.S entities, but for other vessel types, the majority were U.S. entities (Table B-2).

Table B-2: The proportion of U.S.-flagged vessels in proposed SSZs that transited at speeds greater than 10 knots by vessel type and country of ownership.

Vessel type	U.S.	International	Total	US%
Commercial fishing	301	2	303	99%
Commercial shipping	35	1,534	1,569	2%
Industrial work	42	5	47	89%
Other	260	39	299	87%
Passenger (cruise)	0	4	4	0%
Passenger (non-cruise)	39	1	40	98%
Pilot	5		5	100%
Towing/Pushing	141	3	144	98%

Commercial Ships

We identified 35 potentially affected US-flagged commercial ships (Table B-3). To estimate annual revenue, we used total operating costs as a proxy. We assumed these ships operate 365 days a year with 330 days-at-sea, and 35 days at port.[1] When in port, we assumed the ship's operating costs are 60% of sailing day costs, in part due to the lack of fuel costs while docked. We estimated that the total annual revenue for these 35 ships is $595 million. Compliance costs for commercial ships are about $16 million. Only about 2% of commercial ships (and no cruise ships) are US-based vessels, resulting in estimated costs for U.S. entities of about $364,000, which is approximately 0.06% of total revenue. Finally, we assumed that 60% of these U.S. vessels belong to large entities not subject to this analysis, leaving 21 vessels likely to be small entities.

Table B-3: Estimate of total revenue for affected shipping vessels by type (both large and small entities) (IEc 2020 andDrewry 2021).

	Affected vessels	Mean hourly operating cost ($2021)	Hourly fuel cost ($2021)	Annual sailing costs	Annual port cost	Total costs (revenue)
Bulk Carrier	1	$274	$782	$8,362,246	$138,180	$8,500,426
Container Ships	11	$315	$3,627	$31,220,257	$158,970	$345,171,499
Tanker Ships	10	$387	$830	$9,638,053	$195,248	$98,333,001
Roll-On/Roll-Off (Ro-Ro)	13	$213	$1,165	$10,912,697	$107,520	$143,262,826
Total	35					**$595,267,753**

Commercial Fishing Vessels

We estimate that 908 commercial fishing vessels would be affected by the proposed rule. NMFS Northeast Fisheries Science Center commercial fishing affiliation data identifies 9 large entities that owned 130 fishing vessels in 2020. We assume that the remaining 778 vessels are individual small entities. The annual revenue for each vessel in the large entity category is about $1.45 million, while the annual per vessel revenue for small entities is $159,000. Additionally, per vessel annual compliance costs for large entities is $1,047, and for small entities is $403. Table B-4 shows total compliance costs and annual revenue for commercial fishing entities. Compliance costs comprise about 0.07% of annual revenue for large entities, and 0.25% for small entities.

[1] This assumption is based on Table 2.12 of the United Nations Conference on Trade and Development Review of Maritime Transport 2019. The average round trip days for deep-sea maritime services offered by all operators in 2019 is 65. Port turnaround time is about one to two days depending on vessel type and port. Therefore, we assume for a round trip, the sailing days and port days are 10 to 1, which is about 330 days and 35 days, respectively, over a year.

Table B-4: Estimate of compliance costs and revenues for affected commercial fishing vessels.

	Entity	Vessel	Total Costs	Revenue	Costs/Revenue
Large	9	130	$136,081	$188,767,237	0.07%
Small	778	778	$313,269	$124,083,246	0.25%

Other Industries

We assumed all other vessel types are analogous to small entities with each vessel representing a single small entity. Table B-5 shows the economic impacts for each type of vessel/entity. As above, we used total operating costs as a proxy to estimate annual revenue.[2] Passenger vessels (non-cruise ships) and pilot vessels are the small entities most impacted by the proposed rule. We estimate that passenger vessels would need to spend 1.5% of their annual revenue, and pilot vessels more than 2%, to be fully compliant with the proposed rule.

Table B-5: Estimate of compliance costs and revenues by vessel type (other than commercial fishing or commercial ships).

	All affected vessels	Affected USA vessels	Total compliance cost	Total annual revenue	Cost/Revenue
Industrial work	464	415	$7,288,039	$936,618,158	0.78%
Passenger (non-cruise)	760	741	$11,552,896	$787,594,080	1.47%
Pilot	32	32	$3,178,259	$152,213,760	2.09%
Towing/Pushing	204	200	$1,480,455	$677,759,740	0.22%
Other	387	337	$2,832,294	$493,475,478	0.57%

In summary, we anticipate a total of 2,524 small entities (individual vessels) would be affected by the proposed rule with an estimated annual cost, as a percentage of revenue, ranging from 0.06% to 2.09%, depending on the vessel type, with passenger and pilot vessels most impacted. Commercial fishing and passenger vessel entities make up a combined 60% of the total entities affected by the rule, although as a proportion of revenue, the cost of this impact is substantially lower for commercial fishing vessels. It is possible that total vessel operating costs are an unreliable proxy for estimating annual entity revenue. Given data constraints this was the most prudent analysis approach and consistent with methods used in earlier economic analyses of the vessel speed rule (Nathan Associates 2008).

Reporting and Record Keeping Requirements

The proposed speed rule includes no day to day reporting requirements for compliance. The only time a vessel would have a reporting requirement is if they use the safety deviation provision due to limited maneuverability affecting vessel safety or an emergency. In these cases, a vessel operator must submit a brief electronic report to NMFS within 48 hours of employing the

[2] Industrial work vessels, passenger vessels and other vessels are assumed to work 40 hours per week for 52 weeks a year. Pilot vessels are assumed to work 12 hours a day for 365 days a year. Towing/pushing vessels are assumed to work 8 hours a day for 365 days a year.

deviation to explain why the vessel needed to exceed the 10-knot speed limit. Since these safety/emergency situations are expected to be rare, the impact on most small entities should be minimal.

Measures to Reduce Impacts on Small Entities

We anticipate certain components of the proposed changes to the speed rule will potentially lessen impacts on small entities. First, when examining the totality of information available to inform changes to the location and timing of SSZ boundaries, it became clear that for some areas and seasons, mandatory Dynamic Speed Zones (DSZs) may be an efficient and effective strategy to reduce vessel strike risk. This is primarily the case in areas where right whale presence is less predictable or more ephemeral and/or where elevated strike risk is more moderate. With adequate seasonal monitoring for right whale presence, DSZs can effectively achieve targeted protection for right whales (in areas not protected by SSZ) from elevated vessel strike risk while avoiding unnecessary regulation of vessel speed. We anticipate that the use of mandatory DSZs, as opposed to the alternative of larger or longer SSZs, would moderate the impacts of speed restrictions on small entities.

Second, the proposed rule contains safety deviation provisions for all vessels if needed to maintain save maneuvering speed in the event of a personal emergency, and an exemption for vessels ≥ 35 ft and < 65 ft in length where a National Weather Service Gale Warning, or other National Weather Service Warning (*e.g.*, Storm Warning, Hurricane Warning) for wind speeds exceeding those that trigger a Gale Warning is in effect. NMFS anticipates that vessels < 65 ft most likely to be transiting in SSZs or DSZs in severe weather are industrial work boats, pilot boats and towing/pushing vessels performing essential maritime work. Although these provisions are proposed solely to maximize the safety of vessels and passengers they also may have the effect of reducing impacts on small entities.

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