FINAL REPORT

Economic Analysis of North Atlantic Right Whale Ship Strike Reduction Rule

Update of Economic Impact and Scoping Assessment for Study of Potential Modifications

SUBMITTED TO
National Oceanic & Atmospheric Administration (NOAA)
National Marine Fisheries (NMFS)
Office of Protected Resources

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1. Introduction

Background

On December 9, 2008, the Right Whale Ship Strike Reduction Rule (Rule) issued by the U.S. National Marine Fisheries Service (NMFS) went into effect. The rule requires certain vessels to travel at 10 knots or less in certain areas of right whale aggregation and near several key port entrances along the U.S. eastern seaboard.

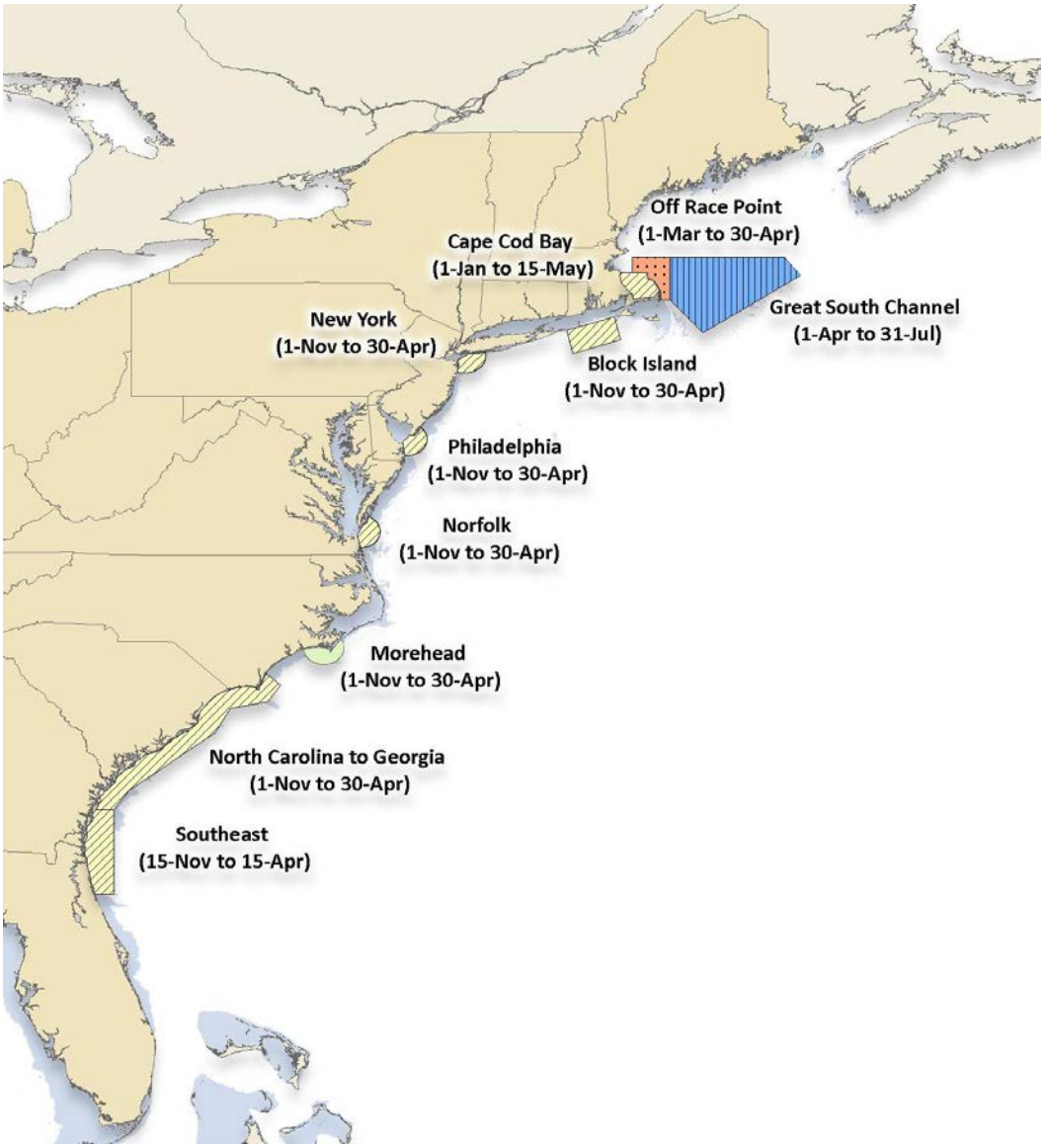
The U.S. National Marine Fisheries Service's (NMFS) Final Rule to reduce the severity and likelihood of vessel strikes to North Atlantic right whales went into effect on 9 December 2008 (73 FR 60173; 10 October 2008). The stated goal of the rule was "*to reduce or eliminate the threat of ship strikes [of North Atlantic right whales] - the primary source of mortality in the endangered population*." It requires that vessels 65 feet and greater in length travel at speeds of 10 knots or less near several key port entrances and in certain areas of right whale aggregation and along the U.S. eastern seaboard, known as "Seasonal Management Areas" (SMA) (Figure 1- 1).

As indicated in the preamble to the rule, a program of "Dynamic Management Areas" (DMA) was also established whereby temporary zones (15 days in duration, generally) are created around aggregations of right whales occurring outside of SMAs. Mariners are asked, but not required, to either avoid established DMAs altogether or travel through them at speeds of 10 knots or less.

The rule is set to expire five years from the date of its publication. NMFS indicated that it would develop ways to monitor the effectiveness of the rule. This report presents an updated assessment of the estimated economic impact of the Rule. In large measure, the economic impact assessment is based on the approach and analysis presented in the FEIS Report, Economic Analysis for the Final Environmental Impact Statement of the North Atlantic Right Whale Ship Strike Reduction Strategy prepared by Nathan Associates Inc. for NMFS in August 2008.

Whereas the economic analysis included in the FEIS report were based on assumptions regarding the impact on vessel operations, this updated assessment is based on actual vessel operations recorded during periods when the rule was in effect and not in effect. There are also several important data and analytical improvements that are incorporated in the present assessment that are further described herein.

Figure 1-1. Locations of Vessel Speed Restriction Seasonal Management Areas



General Approach

Our approach for the estimation of the potential economic impact of the proposed operational measures of the Rule has been designed so that results can be identified and analyzed at a summary level or disaggregated by port area, vessel type, vessel size, and vessel flag. An ancillary benefit of this approach is that it also enhances the accuracy and rigor of the analysis. Key factors such as vessel operating speed vary significantly by vessel type and size; vessel operating costs vary by those vessel characteristics as well as flag of registry. For this study, we have used 10 knots as the base case.

As depicted in Figure 1-2, our general approach is organized into the following four principal tasks:

Task A. Identify and analyze vessels affected by the final rule. Detailed information regarding vessels transiting SMAs during 2009 was obtained from the U.S. Coast Guard's Automatic Identification System (AIS) database. Vessel transits were analyzed for 10 SMAs on the U.S. East Coast, 12 vessel types, 18 vessel DWT size ranges and U.S. and foreign flag registration.

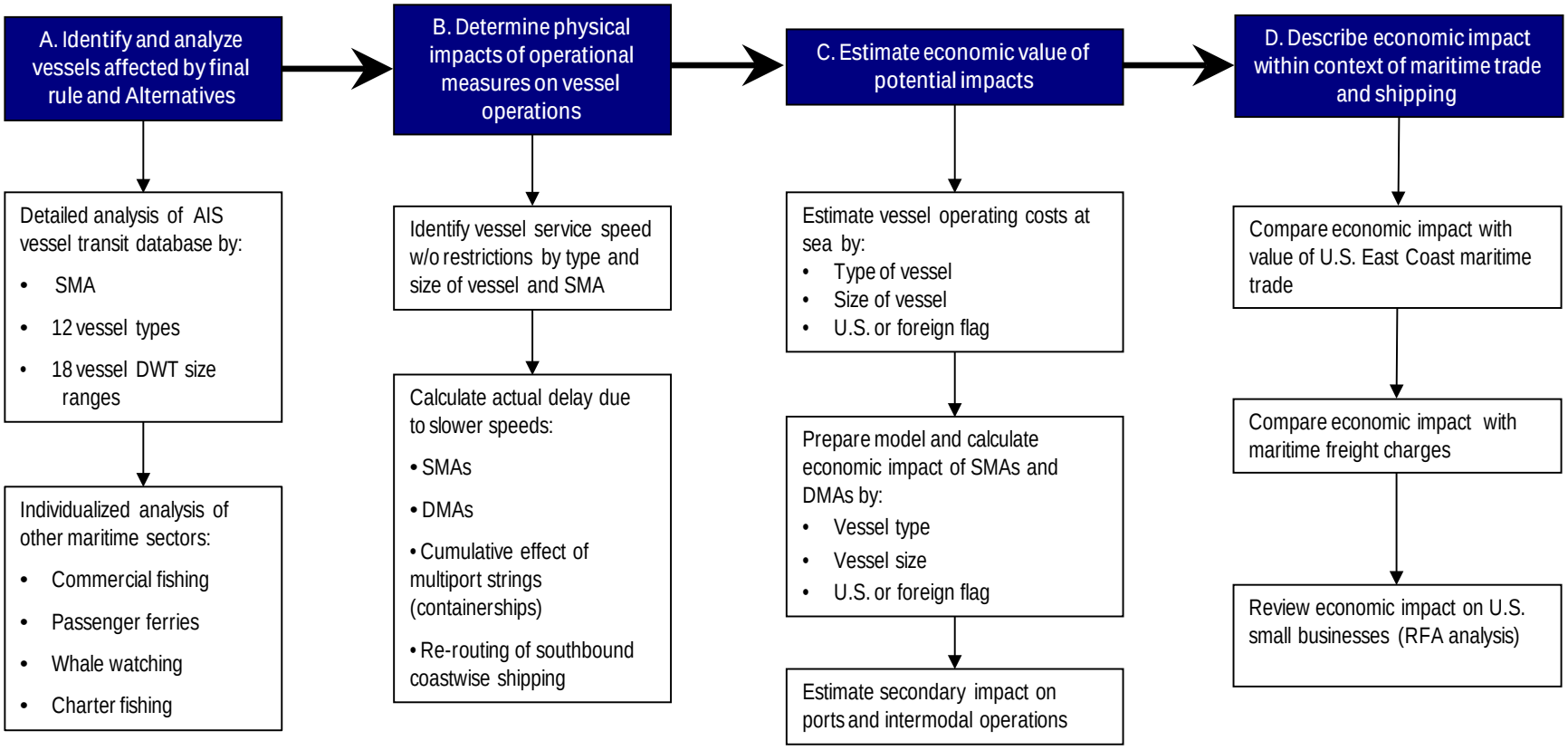
Task B. Determine physical impacts of operational measures on vessel operations. Key information include vessel service speed by type and size of vessel for periods when the SMAs were not in effect as compared to when they were in effect. Similar information was analyzed for DMAs. Results of this task include estimate of minutes of delay per vessel transit for SMAs and DMAs.

Task C. Estimate economic value of potential impacts. Key data include vessel operating costs at sea by type and size of vessel and whether U.S. or foreign flag registry. Results include detailed estimates of economic impact of speed restrictions by SMA, vessel type, vessel DWT size range, and flag of registration.

Task D. Describe economic impact within context of U.S. East Coast maritime trade and shipping. The estimated economic impact is assessed relative to the value of maritime trade and relative to maritime freight charges. We also conducted separate economic impact analyses for sectors not sufficiently included in the AIS database such as whale watching vessels, passenger ferries, commercial fishing and charter fishing.

Chapter 2 provides a detailed assessment of the impact of the rule on the shipping industry, while Chapter 3 presents the assessment on other maritime sectors. Chapter 4 presents a summary of the total direct and indirect economic impact. Chapter 5 presents the updated analysis of the impact of the rule on small business entities, consistent with a Regulatory Flexibility Act (RFA) threshold assessment. Chapter 6 provides a scoping analysis of the approach, data requirements and issues for the conduct of an economic analysis of potential modifications of the current rule.

Figure 1-2. General Approach



2. Economic Impact on Shipping Industry

Direct Economic Impact

AIS Data and Approach

A key data improvement is the availability of Automatic Identification System (AIS) that uses a Global Positioning System-linked, very high frequency radio signal that provides for ship-to-ship and ship-to-shore information transfer. It transmits the ship's name, call sign, position, dimensions, speed, heading and other information multiple times each minute. The AIS signal provides a suite of information, both dynamic (that is unique to a particular voyage) and static (that is consistent for a given vessel). Dynamic information includes the vessel's position, speed over ground, course over ground, heading, rate of turn, and position accuracy (< or > 10 m) which are determined by continuous GPS linked updates. Static information includes the vessel name, call sign, type, cargo, and its Maritime Mobile Service Identity (MMSI) number. Given the rate at which it provides this information, AIS is a precise means to remotely track vessel speeds and other vessel operations.

AIS transponders are required on certain vessel types that transit U.S. waters. These include: 1) all commercial tugs, barges, tow and similar vessels that are 26 feet in length or greater; 2) all passenger vessels (such as ferries and cruise ships) 150 gross tonnage or more; and 3) any commercial self-propelled vessel that is 65 feet in length or greater, which consists of commercial fishing vessels, tankers, cargo ships, etc.

The goal of the economic impact analysis is to estimate the impact on the shipping industry and overall economy from the actual implementation of the Rule. For these reasons, the economic impact analysis uses actual speeds of vessel transiting areas when the rule is not in effect by vessel type, size and flag compares those speeds with those from transits when the rule is in effect

We obtained access to the AIS for the areas relevant to the Rule for the full year of 2009 from the NOAA Office of Protected Resources. We then spent a significant effort to review the data and fill-in critical missing information for the economic analysis on vessel type and size. This was accomplished by matching various vessel identifiers such as the Maritime Mobile Service Identity (MMSI) number, call sign, and IMO number. In some instances, information on the type and size of vessel were confirmed based on the name of the vessel, length and cargo type. For vessels that the vessel type was known as well as the gross registered tonnage, the deadweight tonnage was estimated using the regression analysis described in the 2008 FEIS Report, Appendix A, Attachment 5.

As a result of the AIS data review and analysis, we were able to obtain for 2009, operating information for 62,765 vessel transits through areas affected by the Rule[1]. Table 2-1 presents the distribution of the total vessel transits through SMA areas by type and size of vessel. Containerships accounted for 18,540 transits followed by towing vessels with 14,425 transits and tank ships with 10,002 transits.

Table 2-1. Total Vessel Transits through SMAs by Type and Size of Vessel, 2009 (includes periods when Rule is in effect and not in effect)

	DWT Size Range																		
Vessel Type	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-60	60-70	70-80	80-90	0-100	00-120	0-150	150+	Total
Bulk Carrier	1	276	257	206	134	312	239	565	258	297	380	251	767	177	3		22	20	4,165
Combination Carrier (e.g. OBO)		6						44					6	13		2			71
Container Ship	139	610	964	352	712	506	1,221	888	1,450	1,078	3,704	6,616	79	221					18,540
General Dry Cargo Ship	371	559	510	322	347	311	116	123	258	100	8	1							3,026
Industrial Vessel	1,270	125	13				6												1,414
Passenger Ship a/	3,143	933	159																4,235
Refrigerated Cargo Ship	4	225	265	54	1	2	96		5		26								678
Ro-Ro Cargo Ship	138	201	962	1,627	988	804	176	79	211	24	317	22							5,549
Tank Barge										2									2
Tank Ship	13	389	403	501	116	193	317	891	786	2,284	695	567	774	282	525	531	448	287	10,002
Towing Vessel	14,425																		14,425
Other b/	1,900	148	18	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	2,072
Total	20,134	3,347	3,538	3,062	2,298	2,128	2,171	2,590	2,968	3,785	5,130	7,457	1,626	693	528	533	470	307	62,765
a/ Includes recreational vessels.																			
b/ Includes freight barges, fishing vessels, industrial vessels, research vessels, and school ships.																			
Source: Nathan Associates Inc.																			

Of total 62,765 transits, 28,543 vessel transits (45.5%) occurred during periods when the Rule was in effect and 34,222 vessel transits (54.5%) occurred during periods when the Rule was not in effect (Table 2-2).

[1] The data file received from NOA had a total of 78,757 transit records. However, we excluded 15,992 records due to vessels less than 65 feet LOA, non-commercial shipping vessels and where the vessel type or size could not be determined.

Table 2-2. Percent of Vessel Transits through SMAs during Effected Periods by Type of Vessel, 2009

Vessel Type	Rule in Effect	Rule Not in Effect	Total	% Rule in Effect
Bulk Carrier	2,193	1,972	4,165	52.7
Combination Carrier (e.g. OBO)	46	25	71	64.8
Container Ship	8,634	9,906	18,540	46.6
General Dry Cargo Ship	1,310	1,716	3,026	43.3
Passenger Ship	1,244	2,991	4,235	29.4
Refrigerated Cargo Ship	390	288	678	57.5
Ro-Ro Cargo Ship	2,648	2,901	5,549	47.7
Tank Barge	2		2	100.0
Tank Ship	4,494	5,508	10,002	44.9
Towing Vessel	6,751	7,674	14,425	46.8
Other b/	831	1,241	2,072	40.1
Grand Total	28,543	34,222	62,765	45.5
a/ Includes recreational vessels.				
b/ Includes freight barges, fishing vessels, industrial vessels, research vessels, and school ships.				
Source: Nathan Associates Inc.				

Table 2-3 presents the number of transits through SMA areas in 2009 by SMA and type of vessel. The New York SMA had the largest number of transits at 15,180 transits followed by the SMA from North Carolina to Georgia with 13,437 transits and Norfolk with 9,549 transits. Each of these areas had a large number of containership transits.

Table 2-3. Total Vessel Transits through SMAs by Type of Vessel, 2009 (includes periods when Rule is in effect and not in effect)

SMA	Bulk Carrier	Combination Carrier (e.g. OBO)	Container Ship	General Dry Cargo Ship	Passenger Ship a/	Refrigerated Cargo Ship	Ro-Ro Cargo Ship	Tank Barge	Tank Ship	Towing Vessel	Other b/	Total
Off Race Point	177		341	51	192	2	92		672	446	53	2,026
Cape Cod Bay	44		17	27	69		21		166	1,633	107	2,084
Great South Channel	246		353	78	173	2	89		618	24	32	1,615
Block Island	326	4	55	138	109	25	237		605	826	141	2,466
New York	592	27	4,850	266	478	20	1,056	2	3,173	4,294	422	15,180
Philadelphia	430	5	870	532	1,308	567	333		1,779	2,687	189	8,700
Norfolk	1,424	27	3,988	632	235	10	1,198		622	1,130	283	9,549
Morehead City	50		15	49	40		8		72	429	54	717
North Carolina to Georgi	533	6	6,668	735	981	14	843		1,707	1,338	612	13,437
Southeast	343	2	1,383	518	650	38	1,672		588	1,618	179	6,991
Grand Total	4,165	71	18,540	3,026	4,235	678	5,549	2	10,002	14,425	2,072	62,765
a/ Includes recreational vessels.												
b/ Includes freight barges, fishing vessels, industrial vessels, research vessels, and school ships.												
Source: Nathan Associates Inc.												

In terms of transits during periods when the SMAs were in effect, the Mid-Atlantic region registered the highest percentage of transits, generally between 45-50 percent of total transits (Table2-4). This is consistent with the 181-day period that the SMAs were in effect in these areas from November 1 through April 30. Other areas also generally had the percentage of transits through active SMAs matching the percent of the days of the year that they were in effect.

Table 2-4. Percent of Vessel Transits through SMAs by Type of Vessel during Effected Periods, 2009

SMA	Rule in Effect	Rule Not in Effect	Total	% Rule in Effect
Off Race Point	316	1,710	2,026	15.6
Cape Cod Bay	882	1,202	2,084	42.3
Great South Channel	477	1,138	1,615	29.5
Block Island	1,121	1,345	2,466	45.5
New York	7,520	7,660	15,180	49.5
Philadelphia	3,979	4,721	8,700	45.7
Norfolk	4,652	4,897	9,549	48.7
Morehead City	182	535	717	25.4
North Carolina to Georgia	6,499	6,938	13,437	48.4
Southeast	2,915	4,076	6,991	41.7
Grand Total	28,543	34,222	62,765	45.5
Source: Nathan Associates Inc.				

AVERAGE OPERATING SPEEDS BY VESSEL TYPE AND SIZE

Accurate information on current vessel operating speeds is clearly an important element for the determination of the economic impact of the speed restriction required by the Rule. The AIS information provides the most detailed and accurate information of vessels operating speeds for the areas subject to the Rule. For each area subject to the Rule, we have computed the average operating speeds by type and size of vessel for periods in 2009 when the Rule was not in effect. This provides the most robust estimate for actual vessel operations and average operating speeds without the influence of the Rule. In Table 2-5 below, we present the data by vessel type and size but summarized across all of the areas affected by the Rule. The fastest average vessel operating speed in these areas observed in 2009 was 14.0 knots for containerships and 13.9 knots for refrigerated cargo ships. The overall weighted average speed was 11.9 knots.

Table 2-5. Average Vessel Operating Speed through SMAs by Type and Size of Vessel for Areas Subject to Rule During Periods When Rule Is Not in Effect, 2009 (knots)

	DWT Size Range																		
Vessel Type	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-60	60-70	70-80	80-90	90-100	100-120	120-150	150+	Total
Bulk Carrier	4.6	11.1	11.2	11.9	9.6	11.4	11.1	10.7	11.2	11.9	12.3	11.3	11.4	10.8			12.6	10.6	11.3
Combination Carrier (e.g. OBO)		13.9						10.1					9.8			12.7			10.6
Container Ship	12.4	12.9	14.1	13.7	13.2	14.9	14.5	13.9	14.0	13.9	14.4	13.9	13.6	14.1					14.0
General Dry Cargo Ship	11.4	11.6	13.5	12.3	12.4	11.5	12.3	11.2	11.8	12.9	12.8								12.1
Passenger Ship	10.7	15.7	14.8																12.4
Refrigerated Cargo Ship	11.0	14.4	14.6	15.0			11.3		13.4		13.7								13.9
Ro-Ro Cargo Ship	8.4	13.3	13.6	14.2	13.7	13.2	13.9	15.3	13.4	14.3	13.6	13.4							13.6
Tank Ship	9.6	12.3	11.6	12.7	11.0	12.4	12.1	12.3	11.9	11.9	11.8	11.8	11.3	11.1	10.9	11.3	10.3	11.2	11.7
Towing Vessel	8.2																		8.2
Total	9.3	13.7	13.4	13.6	12.9	13.0	13.5	12.5	13.0	12.6	13.9	13.7	11.5	12.0	10.9	11.3	10.3	11.2	11.9
Source: Nathan Associates Inc.																			

Average vessel operating speeds through SMAs in 2009 during period when the Rule was in effect declined to an overall average of 10.0 knots (Table 2-6). Containerships slowed from an average of 14 knots to 10.6 knots. Ro-ro vessels slowed from 13.6 knots to 10.5 knots. The fastest average vessel speed through SMA active areas was by refrigerated cargo ships at 13.1 knots just slightly slower than the 13.9 knots recorded during non-active SMA periods.

Table 2-6. Average Vessel Operating Speed through SMAs by Type and Size of Vessel for Areas Subject to Rule During Periods When Rule Is in Effect, 2009 (knots)

	DWT Size Range																		
Vessel Type	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-60	60-70	70-80	80-90	90-100	100-120	120-150	150+	Total
Bulk Carrier		10.5	10.4	11.4	9.1	10.6	10.3	9.9	10.3	10.3	10.7	9.6	10.4	10.8	9.6		10.6	9.2	10.3
Combination Carrier (e.g. OBO)		10.6						6.8					8.5	10.0					8.2
Container Ship	12.3	11.1	10.7	10.6	10.3	10.2	11.1	11.1	11.0	10.1	10.6	10.5	10.7	10.4					10.6
General Dry Cargo Ship	10.5	11.4	11.6	11.1	11.5	10.6	11.2	10.8	11.0	10.5	9.2	9.9							11.2
Passenger Ship	9.1	10.7	11.5																9.7
Refrigerated Cargo Ship		13.4	13.8	11.8	12.9	9.4	11.7		9.9		9.9								13.1
Ro-Ro Cargo Ship	9.3	10.8	10.3	10.5	10.7	10.6	10.3	10.4	11.1	10.9	10.2	10.8							10.5
Tank Barge										10.6									10.6
Tank Ship	9.2	10.1	10.5	10.8	10.3	10.9	10.3	10.4	10.5	10.3	10.5	10.0	9.9	9.8	9.6	10.6	9.7	10.9	10.3
Towing Vessel	8.2																		8.2
Total	8.6	10.9	11.0	10.7	10.5	10.5	10.9	10.5	10.8	10.2	10.6	10.4	10.2	10.4	9.6	10.6	9.8	10.7	10.0
Source: Nathan Associates Inc.																			

AVERAGE DELAYS DUE TO RULE BY TYPE AND SIZE OF VESSEL

The primary operational impact of the Rule on the shipping industry is the extra sailing time incurred caused by vessels having to slow down within the restricted areas. Estimates of the extra sailing time were calculated by subtracting the time required to sail through each restricted area using the detailed average vessel operating speeds for that restricted area during periods when the Rule was not in effect from the time required at a sailing speed of 10 knots. Only average vessel speeds of greater than 10 knots during non-Rule periods were used for these calculations. A summary across all restricted areas of the average extra time per vessel transit by vessel type and size is presented in Table 2-7. The average delay for all vessels is 0.37 of an hour or 22 minutes. The highest average delay by vessel type is 37minutes (0.62 hours) for combination carriers followed by 34 minutes for Ro-Ro carriers and 32

minutes for containerships. Refrigerated cargo ships only experienced an average delay of 5 minutes.

Table 2-7. Average Delays per Vessel Transit through SMAs due to Rule by Type and Size of Vessel, 2009 (hours)

	DWT Size Range																		
Vessel Type	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-60	60-70	70-80	80-90	90-100	00-12(	20-15(	150+	Total
Bulk Carrier		0.12	0.17	0.08	0.12	0.16	0.18	0.16	0.21	0.37	0.33	0.39	0.19	0.00			0.34	0.31	0.20
Combination Carrier (e.g. OBO)		0.75						0.93					0.50						0.62
Container Ship	0.02	0.36	0.61	0.46	0.47	0.78	0.49	0.45	0.45	0.64	0.59	0.55	0.53	0.59					0.54
General Dry Cargo Ship	0.19	0.04	0.29	0.20	0.17	0.16	0.19	0.08	0.16	0.44	0.62								0.17
Passenger Ship	0.17	0.84	0.42																0.35
Refrigerated Cargo Ship		0.11	0.08	0.32			-0.06		0.54		0.62								0.08
Ro-Ro Cargo Ship	0.00	0.46	0.64	0.66	0.51	0.48	0.60	0.72	0.35	0.43	0.54	0.49							0.56
Tank Ship	0.14	0.45	0.23	0.33	0.12	0.28	0.30	0.36	0.29	0.36	0.27	0.38	0.29	0.27	0.27	0.13	0.12	0.07	0.29
Total	0.19	0.55	0.42	0.49	0.42	0.45	0.41	0.36	0.37	0.46	0.54	0.54	0.25	0.29	0.27	0.13	0.12	0.09	0.37
Source: Nathan Associates Inc.																			

VESSEL OPERATING COSTS AT SEA BY TYPE AND SIZE OF VESSEL

The U.S. Army Corps of Engineers (USACE) prepares estimates of vessel operating costs to be used by planners in studies to determine the potential benefits of harbor improvement projects. Vessel operating costs include annual capital costs as determined by the replacement cost of the vessels and application of capital recovery factors; estimates of fixed annual operating costs such as for crew, lubricating materials and stores (supplies), maintenance and repair, insurance and administration; the number of operational days per year; and fuel costs at sea and in port.

The type and DWT size of vessels for which operating costs are reported by the USACE is shown in Table 2-8 below. Vessel operating costs are presented separately for U.S. flag and foreign flag vessels, for five vessel types, and up to 14 vessel DWT sizes within a vessel type.

Table 2-8. Type and Size of Vessels for which USACE Reports Vessel Operating Costs (DWT)

Foreign flag					U.S. flag				
General cargo vessel	Container ship	Bulk carrier	Tanker (double hull)	Tanker (single hull	General cargo vessel	Container ship	Bulk carrier	Tanker (double hull)	Tanker (single hull
11,000	9,000	15,000	20,000	20,000	11,000	9,000	15,000	20,000	20,000
14,000	14,000	25,000	25,000	25,000	14,000	14,000	25,000	25,000	25,000
16,000	17,000	35,000	35,000	35,000	16,000	17,000	35,000	35,000	35,000
20,000	20,000	40,000	50,000	50,000	20,000	20,000	40,000	50,000	50,000
24,000	23,000	50,000	60,000	60,000	24,000	23,000	50,000	60,000	60,000
30,000	28,000	60,000	70,000	70,000	30,000	28,000	60,000	70,000	70,000
	31,000	80,000	80,000	80,000		31,000	80,000	80,000	80,000
	35,000	100,000	90,000	90,000		35,000	100,000	90,000	90,000
	39,000	120,000	120,000	120,000		39,000	120,000	120,000	120,000
	42,000	150,000	150,000	150,000		42,000	130,000	150,000	150,000
	49,000	175,000	175,000	175,000		49,000		175,000	175,000
	55,000	200,000	200,000	200,000		55,000		200,000	200,000
	66,000		265,000	265,000		66,000		265,000	265,000
	82,000		325,000	325,000					

Source: U.S. Army Corps of Engineers, Economic Guidance Memorandum 02-06, Deep Draft Vessel Operating Costs

As the USACE data includes more vessel size ranges than necessary for this economic impact analysis We applied regression techniques to the USACE vessel operating cost data in order to match with the vessel size categories with thoase used in this analysis of U.S. East Coast vessel arrivals. A logarithmic equation was specified relating hourly operating costs at sea with vessel DWT for each of the vessel types used in this economic impact analysis.

A concern over the use of the USACE operating cost estimates is the variability of actual vessel operating costs due to the fluctuations in the price of bunker fuel. The USACE estimates include the assumed fuel consumption per day at sea for the primary propulsion and auxiliary propulsion for each vessel type and DWT size. The primary propulsion is assumed to use heavy viscosity oil while the auxiliary propulsion is assumed to use marine diesel oil. We updated the USACE vessel operating costs to reflect the average bunker fuel prices per ton for New York for using an annual average 2009 calculated from data reported by Bunkerworld. The average price for heavy viscosity oil for 2009 was $347 per metric ton and marine diesel oil was $685 per metric ton. The resulting estimates of vessel operating costs by type and size of vessel for 2009 are presented for foreign flag and U.ZS.-flag vessels in Table 2-9 and Table 2-10, respectively. These estimated vessel operating costs for 2009 represent the best method to value the actual impact on the shipping industry of the Rule that year.

It is important to distinguish between foreign flag and U.S. flag vessels as their costs structures differ considerably. Overall, U.S.-flag vessels have operating costs 40-70 percent

higher than foreign flag vessels. This is principally due to higher costs for U.S. crews, vessel maintenance and insurance requirements that U.S.-flag vessels have to satisfy[2].

Table 2-9. Hourly Vessel Operating Costs at Sea for Foreign Flag Vessels by Type Size of Vessel Using Average 2009 ($000s)

	DWT Size Range (000s)																	
Vessel type	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-60	60-70	70-80	80-90	90-100	100-120	120-150	150+
Bulk Carrier	786	805	825	845	865	886	907	929	951	974	1,010	1,059	1,110	1,164	1,221	1,311	1,477	1,703
Combination Carrier (e.g. OBO)	826	846	866	887	908	930	952	975	999	1,023	1,060	1,112	1,166	1,223	1,282	1,377	1,551	1,789
Container Ship	788	888	1,000	1,126	1,267	1,427	1,607	1,809	2,037	2,294	2,740	3,474	4,405	5,584	7,080	10,107	-	-
Freight Barge	485	594	728	892	1,093	1,339	1,641	2,010	2,463	3,017	-	-	-	-	-	-	-	-
General Dry Cargo Ship	485	594	728	892	1,093	1,339	1,641	2,010	2,463	3,017	-	-	-	-	-	-	-	-
Passenger Ship a/	3,551	5,069	7,237	10,962	13,897	-	-	-	-	-	-	-	-	-	-		-	-
Refrigerated Cargo Ship	1,774	1,997	2,249	2,532	2,851	3,211	3,615	4,071	4,583	5,161	6,166	-	-	-	-	-	-	-
Ro-Ro Cargo Ship	867	977	1,100	1,238	1,394	1,570	1,767	1,990	2,241	2,523	3,014	3,822	4,845	-	-	-	-	-
Tank Ship	960	978	996	1,015	1,034	1,053	1,073	1,093	1,113	1,134	1,166	1,210	1,256	1,304	1,353	1,431	1,570	1,755
Towing Vessel	960	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other b/	485	594	728	892	1,093	1,339	1,641	2,010	2,463	3,017	-	-	-	-	-	-	-	-
a/ Includes recreational vessels.																		
b/ Includes fishing vessels, industrial vessels, research vessels, and school ships.																		
Source: Prepared by Nathan Associates Inc. as decribed in text from data provided in U.S. Army Corps of Engineers, Economic Guidance Memorandum 05-01, Deep Draft Vessel Operating Costs and adjusted for bunker fuel prices reported by Bunkerworld for IFO380 and MDO for New York.																		

Table 2-10. Hourly Vessel Operating Costs at Sea for U.S. Flag Vessels by Type Size of Vessel Using Average 2009 ($000s)

	DWT (000s)																	
Vessel type anf flag	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-60	60-70	70-80	80-90	90-100	100-120	120-150	150+
Bulk Carrier	1,321	1,358	1,396	1,435	1,476	1,517	1,559	1,603	1,648	1,694	1,766	1,866	1,972	2,084	2,203	2,393	2,748	3,243
Combination Carrier (e.g. OBO)	1,387	1,426	1,466	1,507	1,549	1,593	1,637	1,683	1,730	1,779	1,854	1,960	2,071	2,189	2,313	2,513	2,885	3,405
Container Ship	1,064	1,194	1,340	1,503	1,687	1,894	2,125	2,385	2,676	3,003	3,571	4,497	5,664	7,133	8,984	12,698	-	-
Freight Barge	932	1,113	1,331	1,590	1,901	2,272	2,715	3,245	3,878	4,634	6,055	-	-	-	-	-	-	-
General Dry Cargo Ship	932	1,113	1,331	1,590	1,901	2,272	2,715	3,245	3,878	4,634	6,055	-	-	-	-	-	-	-
Passenger Ship a/	4,775	6,749	9,539	14,283	17,989	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigerated Cargo Ship	2,393	2,686	3,014	3,383	3,796	4,260	4,781	5,366	6,022	6,758	8,034	-	-	-	-	-	-	-
Ro-Ro Cargo Ship	1,170	1,313	1,474	1,654	1,856	2,083	2,337	2,623	2,944	3,304	3,928	4,947	6,230					
Tank Barge	1,784	1,818	1,853	1,888	1,924	1,960	1,998	2,036	2,074	2,114	2,174	-	-	-	-	-	-	-
Tank Ship	1,784	1,818	1,853	1,888	1,924	1,960	1,998	2,036	2,074	2,114	2,174	2,258	2,344	2,434	2,528	2,675	2,939	3,291
Towing Vessel	1,784	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other b/	932	1,113	1,331	1,590	1,901	2,272	2,715	3,245	3,878	4,634	6,055	-	-	-	-	-	-	-
Source: Prepared by Nathan Associates Inc. as decribed in text from data provided in U.S. Army Corps of Engineers, Economic Guidance Memorandum 05-01, Deep Draft Vessel Operating Costs and adjusated for bunker fuel prices reported by Bunkerworld for IFO380 and MDO for New York.																		

DIRECT ECONOMIC IMPACT OF SMAS

The estimated direct economic impact on the shipping industry of the Rule in 2009 is presented in Table 2-11. Across all SMAs, the total direct economic impact is estimated $19.6 million. More than 63 percent of the total direct impact incurred by containerships at $12.4 million followed distantly by Ro-Ro cargo ships at $2.2 million, tank ships at $1.6 million and passenger at $1.5 million.

[2] Some studies report a much higher differential (up to 2.7 times) between U.S.-flag and foreign flag vessel operating costs. However, those studies do not include fuel and capital costs in their comparisons.

Table 2-11. Direct Economic Impact of SMAs on Shipping Industry by Type and Size of Vessel, 2009 ($000s)

Vessel Type	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-60	60-70	70-80	80-90	90-100	100-120	120-150	150+	Total
Bulk Carrier	-	17	21	7	9	27	24	81	25	49	62	60	82	-	-	-	7	6	476
Combination Carrier (e.g. OBO)	-	3	-	-	-	-	-	16	-	-	-	-	2	-	-	-	-	-	21
Container Ship	1	90	267	78	203	286	446	353	625	668	2,881	6,128	70	295	-	-	-	-	12,392
General Dry Cargo Ship	24	3	53	27	19	14	19	9	42	60	-	-	-	-	-	-	-	-	271
Passenger Ship a/	405	806	245	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,455
Refrigerated Cargo Ship	-	28	28	28	-	-	-	-	7	-	23	-	-	-	-	-	-	-	114
Ro-Ro Cargo Ship	-	54	352	665	355	303	95	61	86	12	244	11	-	-	-	-	-	-	2,239
Tank Ship	0	73	39	85	7	22	51	227	116	438	127	118	122	24	68	49	32	19	1,616
Towing Vessel	194	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	194
Other b/	563	263	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	826
Total	1,187	1,336	1,005	889	594	651	634	746	902	1,227	3,338	6,318	277	319	68	49	39	26	19,604
a/ Includes recreational vessels.																			
b/ Includes freight barges, fishing vessels, industrial vessels, research vessels, and school ships.																			
Source: Nathan Associates Inc.																			

The direct economic impact on the shipping industry by SMA is presented in Table 2-12. The largest impact is recorded for the SMA from North Carolina to Georgia at $5.9 million followed by New York at $5.5 million and Norfolk at $4.2 million. As previously mentioned these areas have the majority of containership transits along the U.S. East Coast. These three SMAs account for nearly 80 percent of the direct econom,ic impact of the Rule on the the shipping industry.

Table 2-12. Direct Economic Impact of SMAs on Shipping Industry by SMA and Type of Vessel, 2009 ($000s)

SMA	Bulk Carrier	Combination Carrier (e.g. OBO)	Container Ship	General Dry Cargo Ship	Passenger Ship a/	Refrigerated Cargo Ship	Ro-Ro Cargo Ship	Tank Ship	Towing Vessel	Other b/	Total
Off Race Point	9	-	74	2	4	-	7	37	3	0	136
Cape Cod Bay	7	-	2	1	1	-	3	25	20	6	65
Great South Channel	15	-	139	4	185	0	12	60	0	0	416
Block Island	55	1	37	11	27	5	84	129	10	4	362
New York	73	11	3,631	27	349	16	473	593	62	271	5,506
Philadelphia	48	-	375	43	169	73	137	229	38	26	1,138
Norfolk	174	8	2,830	61	187	8	505	111	16	267	4,166
Morehead City	5	-	8	2	4	-	2	7	2	87	117
North Carolina to Georgi	55	1	4,805	79	123	8	382	321	24	101	5,897
Southeast	37	-	490	41	406	5	634	103	20	64	1,800
Total	476	21	12,392	271	1,455	114	2,239	1,616	194	826	19,604
a/ Includes recreational vessels.											
b/ Includes freight barges, fishing vessels, industrial vessels, research vessels, and school ships.											
Source: Nathan Associates Inc.											

DIRECT ECONOMIC IMPACT OF DMAS

The Rule specifies that voluntary dynamic management areas would be implemented along the U.S. Exclusive Economic Zone when right whale sightings occur. Triggers for implementing a DMA are based on those specified for the Atlantic Large Whale Take

Reduction Plan (ALWTRP) Dynamic Area Management fishing restrictions.[3] A DMA action would be triggered by a single reliable report from a qualified individual of an aggregation of three or more right whales within 75 square nautical miles (nm^2) (257 km^2), such that right whale density is equal to or greater than 0.04 right whales per nm^2 (3.43 km^2), equivalent to four right whales per 100 nm^2 (343 km^2). Once a DMA is triggered, NMFS would use the following procedures and criteria to establish a DMA:

- A circle with a radius of at least 2.8 nm (5.2 km) would be drawn around the location of each individual sighting. This radius would be adjusted for the number of observed whales, so as to size the DMA to maintain a density of four right whales per 100 nm^2 (343 km^2). Information on how to calculate the length of the radius can be found in the Proposed Rule to amend the regulations that implement the ALWTRP (67 FR 1133). For a group of three whales the DMA would consist of a core area with a radius of 4.8 nm (8.9 km).

- If any circle or group of contiguous circles includes three or more right whales, this core area and its surrounding waters would be a candidate DMA zone.

Once NMFS identifies a core area containing three or more whales, the agency would expand this initial core area to provide a buffer in which the whales could move and still be protected. NMFS will determine the extent to the DMA zones as follows:

- A large circular zone would be drawn extending 15 nm (27.8 km) from the perimeter of a circle around each core area.

- The DMA would be a polygon drawn outside, but tangential to, the circular buffer zone(s), defined by the latitudinal and longitudinal coordinates of its corners.

Hence each DMA consists of the core area with a radius of 4.8 nm (for a group of three whales) plus the buffer with a radius of 15 nm for a total radius of 19.8 nm. The diameter of the DMA is thus 39.6 nm. The DMA zone would automatically expire after 15 days from the day of the original sighting, unless subsequent surveys within the 15-day period demonstrated (a) whales are present in the zone, or (b) the aggregation had persisted, in which case the period would be extended 15 days from the date of any subsequent sightings in the zone.

Impact on Vessel Operations

In all regions, mariners have the option of either routing around the DMA or proceeding through it at a restricted speed. The measures are voluntary and vessel operators are not

[3]See the January 9, 2002 Federal Register Proposed Rule (as amended by the October 28, 2002 technical amendment to the final rule) for the definition of Procedures and Criteria to Establish a DAM Zone, Criteria to Determine the Extent of the DAM Zone, and Duration of DAM Zones.

currently required to take either measure. For this analysis we have compared the average speeds for each vessel type passing through areas where DMAs were implemented in 2009 with speeds for same types of vessel through those same areas when the DMA was not in effect. The direct impact of a DMA on vessel operations is the increased time required to transit through the DMA when it is in effect.

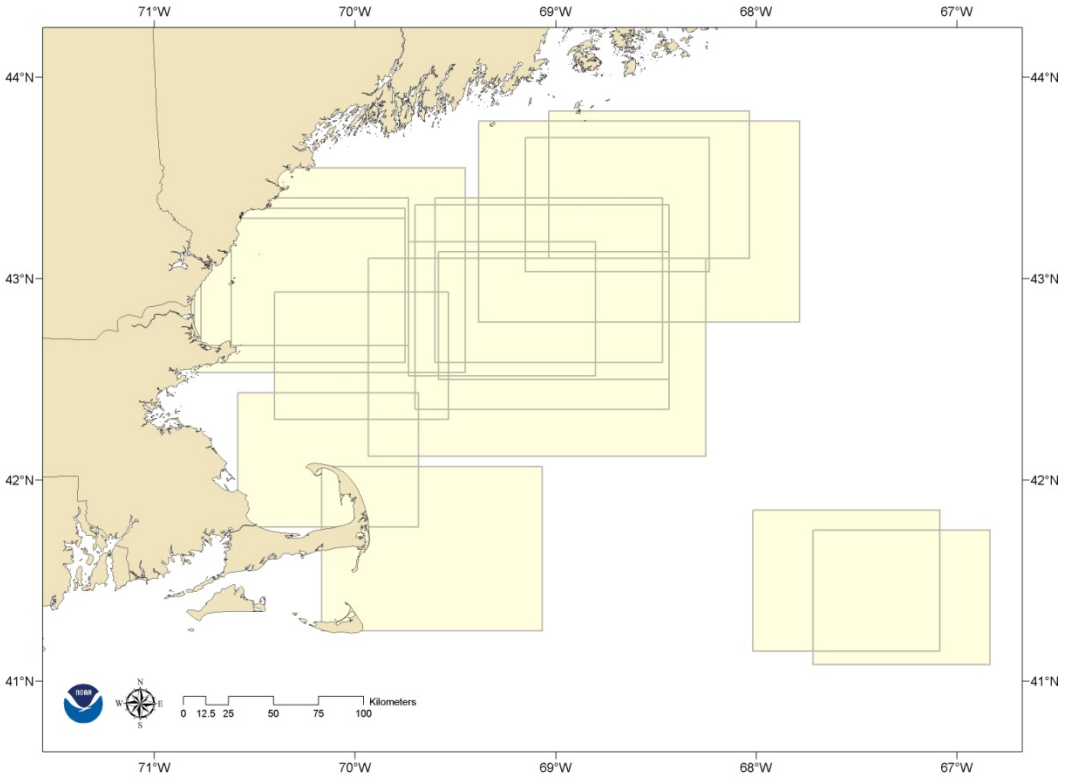
In 2009, there were18 DMAs implemented based on the sightings of right whales. Information on each of these DMAs is presented in Table 2-11 and the locations of the DMAs are shown in Figure 2-1. The average duration of the DMAs in 2009 was 18.6 days. The DMAs range in size from 1448 nm^2 to 4391 nm^2.

Table 2-13. DMAs Implemented in 2009

DMA No.	No. of Whales	Area (nm^2)	Start date	End date	Duration Days
NE_04	28	1997	1/13/2009	2/10/2009	28
NE_05	3	1605	1/16/2009	1/29/2009	13
NE_06	6	1448	2/11/2009	2/25/2009	14
NE_07	5	1456	2/11/2009	2/25/2009	14
NE_08	12	2419	2/11/2009	2/25/2009	14
NE_09	3	1592	3/17/2009	3/28/2009	11
NE_10	5	1764	4/13/2009	4/25/2009	12
NE_11	15	1926	5/12/2009	5/27/2009	15
NE_12	3	1602	5/13/2009	5/27/2009	14
NE_13	44	4391	6/2/2009	6/29/2009	27
NE_14	3	4391	7/9/2009	7/21/2009	12
NE_15	5	1644	9/2/2009	9/16/2009	14
NE_16	26	2124	10/15/2009	11/11/2009	27
NE_17	24	1918	10/22/2009	12/1/2009	40
NE_18	16	2441	10/27/2009	11/10/2009	14
NE_19	41	3661	11/10/2009	12/17/2009	37
NE_20	47	3403	11/10/2009	11/24/2009	14
NE_21	27	4198	12/4/2009	12/19/2009	15

Source: NOAA, Office of Protected Resources, National Marine Fisheries Service.

Figure 2-1. Locations of DMAs in 2009



The average vessel operating speeds by vessel type during periods when DMA were in effect and not in effect in 2009 are presented in Table 2-14. There were 11,924 transits recorded in the DMA areas at times when the DMAS were not in effect and 1,937 transits during the DMAs. The overall weighted average speed during the non-active periods was 8.0 knots whereas an average of 8.5 knots was recorded for the period when DMAs were in effect. Interestingly, only six vessel types had average speeds greater than 10 knots through the DMA areas, and of these only two vessel types, bulk carriers and passenger ships actually recorded a reduction in speed during active DMAs. For bulk carriers the reduction was minor from 10.1 knots to 9.8 knots and for passenger vessels the speed reduction was from 12.0 knots to 9.0 knots.

Table 2-14. Average Vessel Operating Speed through DMAs by Type of Vessel, 2009 (knots)

	Number of transits			Average speed		
Vessel type	Not in effect	In effect	Total	Not in effect	In effect	Speed reduction
Bulk Carrier	396	97	493	10.10	9.80	0.29
Container Ship	528	91	619	14.90	15.00	
Freight Barge	86	9	95	8.90	9.54	
General Dry Cargo Ship	163	26	189	11.36	11.67	
Industrial Vessel	42	7	49	6.09	9.23	
Passenger Ship	544	72	616	12.00	9.00	3.00
Recreational	120	6	126	6.88	9.77	
Research Vessel	44	14	58	9.88	11.18	
Ro-Ro Cargo Ship	155	19	174	13.52	13.60	
School Ship	62	15	77	5.66	7.31	
Tank Ship	1,697	431	2,128	11.34	11.53	
Towing Vessel	2,075	310	2,385	7.53	7.60	
#N/A	5,995	840	6,835	5.93	6.10	
Total	11,924	1,937	13,861	8.01	8.49	

Source: Nathan Associates Inc.

As previously mentioned, the speed restrictions under DMAs are voluntary. As such, a large segment of the shipping industry did not reduce speeds through active DMAs in 2009. For this reason, there was no or minimal economic impact of DMAs on the shipping industry in 2009.

OTHER DIRECT IMPACTS ON SHIPPING INDUSTRY

Cumulative Effect of Multi-Port Strings for Containerships

Many of the vessels calling at U.S. East Coast ports occur as part of a "string" of port calls by the vessel. For containerships, Ro-Ro cargo ships and some specialty tankers these multi-port calls constitute a scheduled cargo service offered by the shipping lines. Other types of vessels may have multiple U.S. East Coast port calls as part of a coastwise cabotage service, for delivery of specialty chemicals or other products, or to lighten or top off in order to maximize vessel utilization. There are several reasons why the cumulative effect of multiple port calls at restricted ports could impact a vessel more than the sum of the individual direct impacts presented in the prior sections. First, the delays incurred from speed restrictions at one port when combined with speed restrictions at a subsequent port may diminish the ability of the vessel to maintain its schedule and could result in missed tidal windows. Second, even brief delays at arrival at the second port could result in increased costs for scheduled, but unused, port labor. Third, some shipping lines felt that the cumulative impact of three or four port calls at port areas with restrictions could cause them to rework vessel itineraries and could result in dropping of one of the port calls in order to maintain a weekly service without having to add an additional vessel to the service.

However, these cumulative factors will not affect every vessel making multiple port calls at restricted ports. Also the impact may vary from an 8-hour delay due to a missed tidal window to incurring charges for unused labor if a vessel is late arriving at the port.[4] It is realistic to assume that the shipping industry will revise their itineraries to account for the delays imposed by the speed restrictions and that occurrences of missed tidal widows will be rare. From the calculations described in detail in the 2008 FEIS Report, we have used the same average additional delay of 11 minutes for each containership transit that is part of a multi-port string to account for this cumulative impact.[5] The economic value of this additional time has been calculated based on the average 2009 vessel operating and the 2009 vessel operating costs for containerships. The estimated impact for 2009 is $3.1 million.

Re-routing of Southbound Coastwise Shipping

Coastwise shipping or cabotage trade along the U.S. East Coast has always been an important segment of our nation's maritime heritage. In recent years, attention has been focused on the further development of coastwise shipping (also referred to as short-sea shipping) as a means of reducing highway congestion on the Eastern Seaboard. Benefits of coastwise shipping also include lowering transport and environmental costs and reducing our demand for imported fuel. For these reasons, it is important that the speed restrictions not unduly affect the development of increased coastwise shipping.

However, for commercial and navigation purposes, it appears unlikely that the speed restriction would significantly affect coastwise shipping. Northbound vessels prefer to use Gulf Stream further offshore and benefit from the enhanced operating speed and fuel efficiency. Southbound traffic routes closer to the U.S. East Coast; generally within 7-10 nautical miles of the shoreline. However, during the proposed seasonal management periods, masters of southbound vessels would likely route outside of seasonal speed restricted areas incurring an overall increase in distance. This affects southbound vessels between the entrance to the Chesapeake Bay and Port Canaveral.

The speed restrictions in the mid-Atlantic region are implemented for a radius of 20 nautical mile buffer around each port area for port areas north of Wilmington, NC.[6] A continuous 20-mile buffer was implemented from Wilmington, NC through Savannah to the northern boundary of the Southeastern SMA. The additional distance incurred by southbound vessels would be 56 nautical miles. The economic impact for this extra sailing distance is estimated at $1.1 million using 2009 vessel operating costs.

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[4] While tides occur on 12-hour cycle, it is assumed that a tidal window is open for 2 hours before and after high tide. This results in an 8-hour waiting period between tidal windows.

[5] Only a small portion of vessel arrivals should be affected by this additional delay. It is assumed that 7.5 percent of vessels could be affected by as much as an additional 8-hour delay due to missing the tidal window. This results in an average additional delay per vessel of 36 minutes.

[6] The exception is the Block Island Sound speed restriction area that is configured as a rectangle with a width of 30 nautical miles.

TOTAL DIRECT ECONOMIC IMPACT ON SHIPPING INDUSTRY

The total direct economic impact on the shipping industry consists of the various impacts analyzed above. These are the SMAs, DMAs, cumulative effect of multi-port strings and the re-routing of southbound coastwise shipping. The total direct economic impact on the shipping industry in 2009 is estimated at $23.8 million as shown in Table 2-15.

Table 2-15. Direct Economic Impact on Shipping Industry, 2009 ($millions)

Impact	Amount
Seasonal Management Areas (SMAs)	19.6
Dynamic Management Areas(DMAs)	-
Cumulative Effect of multi-port strings	3.1
Re-routing of southbound coastwise shipping	1.1
Total	23.8

Source: Prepared by Nathan Associates as described in text.

Direct Economic Impact Relative to Trade Value and Freight Costs

The U.S. Census Bureau data on U.S. imports of merchandise is compiled primarily from automated data submitted through the U.S. Customs' Automated Commercial System.[7] Data are compiled also from import entry summary forms, warehouse withdrawal forms and Foreign Trade Zone documents as required by law to be filed with the U.S. Customs Service. Information on U.S. exports of merchandise is compiled from copies of Shipper's Export Declarations (SEDs) and data from qualified exporters, forwarders or carriers. Copies of SEDs are required to be filed with Customs officials at the port of export.

For this study, the following data items have been used from the U.S. Census Bureau Foreign Trade Statistics:

- **Customs import value –** the value of imports appraised by the U.S. Customs Services in accordance with the legal requirements of the Tariff Act of 1930, as amended. This value is generally defined as the price actually paid or payable for merchandise when sold for exportation to the U.S. excluding U.S. import duties, freight, insurance and other charges incurred in bringing the merchandise to the U.S.

- **Import charges –** the aggregate cost of all freight, insurance and other charges (excluding U.S. import duties) incurred in bringing the merchandise from alongside the carrier at the port of exportation and placing it alongside the carrier at the first port of entry in the U.S.

- **F.A.S. export value –** the free alongside ship value of exports at the U.S. seaport based on the transaction price, including inland freight, insurance and other

[7] The description and definition of information from the U.S Census Bureau Foreign Trade Statistics is based on the Guide to Foreign Trade Statistics: Description of the Foreign Trade Statistical Program available on the U.S. census Bureau website.

charges incurred in placing the merchandise alongside the carrier at the U.S. port of exportation. The value, as defined, excludes the cost of loading the merchandise aboard the exporting carrier and also excludes freight, insurance and any other charges or transportation costs beyond the port of exportation.

- **Shipping weight** – the gross weight in metric tons including the weight of moisture content, wrappings, crates, boxes and containers.

- **District of exportation** – the customs district in which the merchandise is loaded on the vessel which takes the merchandise out of the country.

- **Import district of unlading**- the district where merchandise is unloaded from the importing vessel.

Table 2-18 presents data collected by the U.S. Census Bureau on volume and value of goods carried by vessels calling at U.S. East Coast ports.

Table 2-16. U.S. East Coast Maritime Trade, 2005-2011 Value ($ millions)

Year	Vessel Import Custom Value	Vessel Export Value	Total
2005	296,478	96,861	393,339
2006	327,804	113,955	441,759
2007	347,337	140,728	488,065
2008	381,869	173,475	555,344
2009	272,445	126,884	399,329
2010	329,035	153,977	483,012
2011	390,148	190,803	580,952

Note: Includes Custom districts 1,4,5,10,11 and 13 through 18

Source: Prepared by Nathan Associates Inc. from U.S. Census Bureau, Foreign Trade Statistics for 2005 to 2011.

To measure the significance of the operational measures on the shipping industry, it is interesting to compare the estimated direct economic impact with ocean freight costs associated with U.S. East Coast trade. Ocean freight costs are considered as a conservative proxy for shipping industry revenues. In 2009, ocean freight charges averaged 4.6 percent of the value of imports. Given the composition of our trade, it is reasonable to assume that ocean freight charges would represent no less than the same percentage of the value of our exports.

Table 2-17 US. East Coast Vessel Import Charges as Percent of Vessel Import Customs Value ($ millions)

Year	Vessel Import Custom Value	Vessel Import Charges	Percent
2005	293,065	14,921	5.1%
2006	324,220	16,509	5.1%
2007	344,068	16,558	4.8%
2008	378,250	17,745	4.7%
2009	269,814	12,418	4.6%
2010	326,126	14,242	4.4%
2011	386,358	15,171	3.9%

Note: Includes Custom districts 4,5,10,11 and 13 through 18. The Customs District of Portland has been excluded due to incongruences between the customs and the CIF value.
Source: Prepared by Nathan Associates Inc. from U.S.

Table 2-18 presents the significance of the estimated economic impact of the operational measures relative to the value of U.S. East Coast trade in 2009. This comparison is useful to determine whether increased shipping costs associated with the proposed operational measures would significantly affect the price and volume of traded goods via U.S. East Coast ports. In 2009, the total annual direct economic impact on the shipping industry is $23.8 million while the value of U.S. East Coast trade is $399.3 billion. Thus the direct economic impact represents six thousandth of one percent of the value of traded merchandise in 2009.

Table 2-18 also shows the direct economic impact on the shipping industry represents less than two-tenths of one percent of the ocean freight costs for U.S. East Coast trade. These results indicate that the implementation of the proposed operational measures had a minimal impact on the financial revenues and hence the financial performance of the vessel operators calling at U.S. East Coast ports.

Table 2-18. Economic Impact as a Percent of Value of U.S. East Coast Maritime Trade and Ocean Freight Costs, 2009

Item	Amount
Direct economic impact ($millions)	23.6
East Coast trade merchandise value ($ millions)	399,329
Direct economic impact as a percent of trade value (%)	0.0059
Ocean freight costs ($ millions)	15,973
Direct economic impact as a percent ofocean freight costs (%)	0.148

Source: Prepared by Nathan Associates as described in text.

Estimated Indirect Economic Impact

Depending on the nature and significance of the direct economic impact, it is possible that implementation of the proposed operational measures could have indirect economic impacts. Potential indirect economic impacts include:

- Increased intermodal costs due to missed rail and truck connections
- Diversion of traffic to other ports
- Impact on local economies of decreased income from jobs lost due to traffic diversions

There are many factors that influence a shipping line's decision to call at specific ports. These include the adequacy and suitability of port facilities and equipment, the ability of the terminal operator to quickly turnaround the vessel, overall cargo demand, efficiency of intermodal transportation, port charges, and the port location relative to other ports and cargo markets. If cargo is to divert to other ports this would be because the total additional costs associated with those routes are less than the cost of vessel time due to delays at the current port. Hence it would be double-counting to also include any additional overland transport costs to the estimated impact already presented.

A good portion of a port's traffic is often considered captive to that port. For cargoes that are destined for the port's immediate hinterland, it does not make economic sense to call at a distant port and then to ship back to the port via expensive land transport. However, most ports also accommodate traffic that is not destined for its immediate hinterland but is through traffic that may have economically attractive routing alternatives. Port areas in the Northeast and northern parts of the mid-Atlantic region serve as gateways to the inland population centers and industrial areas such as western New York, western Pennsylvania, Ohio, Indiana, Illinois and Michigan. These areas may be served via the Canadian ports of Halifax and Montreal without incurring delays caused by the right whale ship strike reduction measures.[8] These Canadian ports currently compete with Northeast U.S. ports for cargo destined for the mid-eastern U.S. and the speed restrictions implemented in the U.S. and not in Canada could shift the current competitive balance to the advantage of Canadian ports.

The Maritime Administration (MARAD), an agency of the U.S. Department of Transportation has developed a Port Economic Impact Kit that allows users to assess the economic impact of port activity on a region's economy. The MARAD Port Economic Impact Kit uses an adaptation of input-output analysis that is a widely established tool for undertaking economic impact assessments. The model calculates the total economic impacts or multiplier effect of

[8] Vessels may divert to other U.S. ports in addition to those diverting to Canada. While this is possible, for the total economic impact analysis only diversions to non-U.S. ports are included. For diversion to ports within the U.S. the negative economic impact for one U.S. port are offset by gains in another U.S. port.

deep-draft port industry and includes an indirect effect that reflects expenditures made by the supplying firms to meet the requirements of the deep-draft port industry as well as expenditures by firms stocking the supplying firms. The model also includes an induced effect that corresponds to the change in consumer spending that is generated by changes in labor income accruing to the workers in the deep-draft port industry as well as employment in the supplying businesses.

We have estimated the indirect economic of port diversions based on the detailed methodology described in the 2008 FEIS adjusted for the actual observed delays incurred in 2009 from the AIS data analysis and using the updated vessel operating costs for 2009. The estimated indirect economic impact of port diversion for 2009 is $15.8million.

3. Economic Impact of Rule on Other Market Segments

The AIS data captures the vast preponderance of commercial maritime activity that would be subject to the speed restrictions and other operational measures. However, there are some market segments that may be impacted by the speed restrictions and other operational measures whose maritime activities are not adequately captured in the AISA data. In this section, we identify the most relevant of these market segments and discuss the potential economic impact. Those market segments or potential impacts include:

- Commercial fishing
- Charter fishing
- Passenger ferries
- Whale watching

The economic impact for each of these elements is presented below.

Commercial Fishing

Commercial fishing is a multimillion dollar industry along the U.S. East Coast. In 2011, commercial fish landings at U.S. East Coast ports totaled $934 million (Table 3-1). The port of New Bedford, MA is the leading U.S. port in terms of value of commercial fish landings with $369.0 million in 2011.

Table 3-1. U.S. East Coast Commercial Fishery Landings by Port, 2002 through 2011 (millions of dollars)

Port	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
New Bedford, MA	168.6	176.2	207.7	282.5	281.4	268.0	241.3	249.2	306.0	369.0
Cape May-Wildwood, NJ	35.3	42.8	60.2	68.4	37.6	58.8	73.7	73.4	81.0	103.0
Hampton Roads Area, VA	69.5	79.6	100.8	85.2	51.0	70.2	12.3	68.1	75.0	88.0
Gloucetser, MA	41.2	37.8	42.8	45.9	47.3	46.8	54.2	50.4	57.0	59.0
Stonington, ME	21.7	20.5	22.4	32.3	34.3	23.5	15.4	26.5	45.0	48.0
Point Judith, RI	31.3	32.4	36.0	38.3	46.8	36.7	36.9	32.4	32.0	40.0
Point Pleasnat, NJ	19.7	22.8	19.2	21.6	22.6	23.1	22.1	20.2	23.0	37.0
Reedville, VA	24.2	24.2	26.1	27.1	23.7	27.3	23.9	25.9	34.0	36.0
Long Beach-Barnegat, NJ	14.6	16.4	20.6	26.7	24.5	23.1	22.9	21.7	26.0	34.0
Portland,ME	40.4	28.7	34.6	34.6	27.8	24.1	22.6	16.6	19.0	28.0
Provincetown-Chatham, MA	15.2	13.5	14.2	19.8	20.6	18.3	18.3	20.0	20.0	27.0
Rockland, ME	4.3	4.1	2.7	7.4	n.a.	n.a.	n.a.	n.a.	11.0	24.0
Wanchese-Stumpy Point, NC	23.2	21.0	20.6	19.6	21.7	20.6	22.4	23.1	22.0	22.0
Montauk, NY	11.1	11.0	13.1	16.5	16.8	15.7	14.3	14.6	18.0	19.0
Newport, RI	n.a.	n.a.	n.a.	n.a.	20.8	12.4	n.a.	n.a.	n.a.	n.a.
Boston, MA	8.6	8.9	8.8	10.6	n.a.	n.a.	n.a.	11.9	15.1	n.a.
Beaufort- Morehead City, NC	19.1	15.0	16.9	9.7	n.a.	n.a.	11.1	23.1	n.a.	n.a.
Atlantic City, NJ	22.4	20.8	17.7	18.5	24.2	27.5	24.1	22.2	17.3	n.a.
Other	76.2	74.9	55.2	51.1	-	-	-	-	-	-
Total	646.6	650.6	719.6	815.8	701.1	696.1	615.5	699.3	801.4	934.0
Source: NOAA Fisheries.										

The right whale ship strike reduction operational measures apply to vessels with a length of 65 feet and above. Because the AIS data lacks adequate records on commercial fishing vessels[9], we also evaluated data which included fishing vessels which are over 65 feet in length and weigh less than 150 tons, using information provided by NMFS' database of commercial fishing permits.

Table 3-2 shows that for the Southeast region nearly 80 percent of the fishing vessels over 65 feet are less than 150 tons. For the Northeast region, 63 percent of the fishing vessels over 65 feet are less than 150 tons.

[9] Commercial fishing vessels greater than 65 are required to have AIS transponders. However, the data set we received only included 147 transits of fishing vessels on the entire US East Coast during 2009 which was felt to be too small to be accurate.

Table 3-2. Fishing Vessel Permits Issued to Vessels 65 Feet and Above in LOA by Region, 2009-2011

		2009		2010		2011	
Region	Vessel size	Fishing permits	%	Fishing permits	%	Fishing permits	%
Southeast	All vessels	279	100%	260	100%	247	100%
Region	Vessels less than 150 GRT	220	79%	204	78%	195	79%
Northeast	All vessels	807	100%	773	100%	722	100%
Region	Vessels less than 150 GRT	523	65%	496	64%	453	63%

Source: Prepared by Nathan Associates Inc. from data provided by NOAA Fisheries Service, Southeast Regional Office (SERO) and Northeast Regional Office (NERO).

The estimated economic impact of the operational measures on commercial fishing vessels in 2003 is presented in Table 3-3. The analysis assumes that the commercial fishing vessels are affected for an effective distance of 20 nautical miles each way as they steam to and from fishing areas.

Many commercial fishing vessels steam at 10 knots or below and will not be affected by the operational measures if they were implemented at the 10-knot speed restriction. The typical steaming speed for other commercial fishing vessels is assumed at 12 knots. Average operating costs per hour of $400 includes fuel costs of June 2009. The duration of the speed restrictions vary from 181 days per year for the mid-Atlantic to 61 days per year for the Northeastern US. For purposes of the economic analysis, we have assumed that the speed restrictions were in effect for 181 days for commercial fishing..

Table 3-3. Estimated Economic Impact on Commercial Fishing Vessels by Region, 2009

Item	Northeast Region	Southeast Region	Total
Commercial fishing permits for vessels over 65 ft LOA and under 150	523	220	743
Percent with steaming speed over 10 knots	40%	40%	40%
Vessels potentially affected by speed restrictions	209	88	297
Typical steaming speed of affected vessels (knots)	12	12	12
Number of trips per year per vessel	25	25	25
Minutes of delay per trip with restricted speed of 10 knots	38.0	38.0	38.0
Operating cost per hour of steaming (dollars)	400	400	400
Estimated impact per year (dollars)	657,022	276,376	933,398

Source: Prepared by Nathan Associates Inc.

The estimated impact in 2009 on commercial fishing vessels is estimated at $0.7 million for the Northeast Region and $0.3 million for the Southeast Region. The combined Northeast and Southeast regional economic impact of $0.9 million is only one-tenth of one percent of the value of U.S. East Coast commercial fishery landings of $699 million in 2009.

These results indicate that the implementation of the operational measures will not have an undue adverse impact on the commercial fishing industry along the U.S. East Coast.

Charter Fishing

In some areas, charter vessels travel up to 50 nautical miles offshore to reach prime fishing areas. At vessel speeds of up to 17 knots they can reach their fishing areas in less than 3 hours. Under the Rule, speed restrictions of 10 knots for 20 nautical miles add about 100 minutes to the roundtrip steaming time, and could severely affect client demand.

The charter fishing industry is active along the U.S. East Coast with concentration in the Carolinas, Virginia, Florida, New Jersey and Massachusetts. The industry consists of half-day charters of about 6 hours that typically go up to 20 nautical miles offshore; full-day charters of 11-12 hours that can go up to 40 nautical miles offshore; and extended full day charters that can be from 18-24 hours and go up to 50 miles offshore. The vast majority of the charter fishing industry consists of modern and well-equipped fishing boats of less than 65 feet LOA and thus would not be subject to the speed restrictions and other operational measures.

A small segment of the industry referred to as head boats often uses vessels of 80 feet LOA and above that can accommodate 60 to 100 passengers. These vessels go up to 50 miles offshore stop and anchor over wreck and rock formations for fishing species as red snapper, grouper, trigger fish, amberjack. The charter fee for a head boat is typically $50- $80 per person.

As described above an increase of 100 minutes roundtrip steaming time would reduce the competitiveness of the larger head boats (more than 65 foot LOA) particularly for the half-day and full-day charters. It is likely that vessels of less than 65 foot LOA would increase their share of those market segments, partially offsetting the economic impact incurred by the larger head boats. For extended full-day charters, head boats of LOA in excess of 65 feet would incur additional costs associated with the 100 minutes increase in roundtrip steaming time. It is estimated that annual economic impact of the speed restriction of 10 knots for these vessels over 20 nautical miles is approximately $1.0 million.[10]

Passenger Ferries

The vast majority of passenger vessels operating along the U.S. East Coast sail within the COLREGS line and as such will not be affected by the Rule. However, in the southern New England area, there is a well-developed passenger ferry sector that operates beyond the COLREGS line and hence is subject to the Rule's operational measures. A list of major New

[10] This calculation assumes 50 head boat vessels with 30 roundtrips during the off-season months of November through April and an hourly steaming operating cost of $400. These calculations do not include any offsetting impact of revenue gains by operators of smaller charter fishing vessels.

England passenger ferry operators, routes served and service characteristics are presented in Table 3-4.

Table 3-4. New England Ferry Operators, 2011

Operator	Route	Max Vessel Speed (knots)	Distance (nm)	Summer Schedule	Non-summer schedule	Travel Time (minutes)	Summer Season Adult Fare ($) Round trip
SOUTHERN NEW ENGLAND							
Fast Ferries							
Bay State Cruise Company	Boston, MA-Provincetown, MA	30	50	6 trips daily	none	90	85
Boston Harbor Cruises	Boston, MA-Provincetown, MA	40	50	4 trips daily	none	90	83
Boston Harbor Cruises	Boston, MA-Salem, MA	33	25	8 trips daily	none	60	27
Cross Sound Ferry Sevices	New London, CT-Orient Point LI, NY	30	16	12 trips daily	All year long	45	34.25
Block Island Express	New London, CT-Block Island, RI	35	30	6 - 8 daily trips	none	75	45
Freedom Cruise Line	Harwich, MA-Nantucket, MA	24	30	6 trips daily	Spring, Fall	80	74
Hy-Line Cruises	Hyannis, MA- Nantucket, MA	30	27	12 trips daily	10 trips daily	60	77
Hy-Line Cruises	Hyannis, MA-Martha's Vineyard, MA	24	20	10 trips daily	4-6 trips daily	55	71
Block Island Ferry	Point Judith, RI-Block Island, RI	30	11	12 trips daily	Spring, Fall 8-10 trips daily	30	36
Seastreak	New Bedford, MA- Martha's Vineyard, MA	30	30	12 trips daily	Spring, Fall 4-10 trips daily	60	68
Seastreak	New York City, NY- Martha's Vineyard, MA	42	150	2 trips per weekend	Holidays	315	155
The Steamship Authority	Hyannis, MA- Nantucket, MA	35	26	10 trips daily	8 trips daily	60	67
Vineyard Fast Ferry	Quonset Point, RI-Martha's Vineyard, MA	33	50	6 trips daily	Srping, fall 4 daily trips	95	79
Regular Ferries							
Bay State Cruise Company	Boston, MA-Provincetown, MA	16	50	2 trips Sat and Sun	none	180	46
Express Ferry	Plymouth, MA-Provincetown, MA	16	25	2 trips daily	none	100	43
Cross Sound Ferry Service	New London, CT-Orient Point LI, NY	15	16	30 trips daily	All year long	80	27
Hy-Line Cruises	Hyannis, MA- Nantucket, MA	15	26	6 trips daily	1-2 trips daily	110	45
Hy-Line Cruises	Hyannis, MA-Martha's Vineyard (Oak Bluffs), MA	12	20	2 trips daily	2 trips daily	100	45
Hy-Line Cruises	Nantucket, MA-Martha's Vineyard (Oak Bluffs), MA	16	20	2 trips daily	2 trips daily	70	70
Block Island Ferry	Point Judith, RI-Block Island, RI	16.5	11	18 trips daily	All year long	55	19
Block Island Ferry	Point Judith, RI- Newport, RI	13	10	2 trips daily	none	60	13
Block Island Ferry	Newport, RI-Block Island, RI	13	22	2 trips daily	none	120	17
Patriot Party Boats	Falmouth, MA- Martha's Vineyard (Oak Bluffs), MA	15	5	16 trips daily	All year long	20	20
Falmouth Ferry	Falmouth, MA-Martha's Vineyard (Edgadtown), M	12	9	8 trips daily	Spring 6 daily trips each weekend	60	50
Island Queen	Falmouth, MA-Martha's Vineyard (Oak Bluffs), MA	12	5	14 trips daily	Spring, Fall 4-10 daily trips	35	20
The Steamship Authority	Woods Hole-Martha's Vineyard	16	7	32 trips daily	28 trips daily	35-45	16
The Steamship Authority	Hyannis, MA- Nantucket, MA	14	26	12 trips daily	6 trips daily	135	33
MAINE							
Casco Bay Lines	Portland, ME - Peaks Island, ME	12.5	3	14 trips daily	All year long	20	8
Casco Bay Lines	Portland, ME - Little Diamond Island, ME	12.5	3	18 trips daily	All year long	20	8
Casco Bay Lines	Portland, ME - Great Diamond Island, ME	12.5	4	18 trips daily	All year long	25	9
Casco Bay Lines	Portland, ME - Diamond Cove, ME	12.5	5	22 trips daily	All year long	30	10
Casco Bay Lines	Portland, ME - Long Island, ME	12.5	6	24 trips daily	All year long	35	10
Casco Bay Lines	Portland, ME - Chebeague Island, ME	12.5	12	12 trips daily	All year long	70	11
Casco Bay Lines	Portland, ME - Cliff Island, ME	12.5	10	10 trips daily	All year long	60	12
Casco Bay Lines	Portland, ME - Bailey Island, ME	12.5	20	2 trips daily	none	105	25

Source: Prepared By Nathan Associates Inc. from data on operator websites and selected interviews.

Passenger ferry operations in southern New England generally fall into two categories - fast ferry service with vessel speeds ranging from 24-39 knots and regular ferry service with vessel speeds from 12-16 knots. As shown in Table 3-4 there are ten operators providing fast ferry service on 12 routes. Key destinations include Provincetown, Block Island, Nantucket, and Martha's Vineyard, while important origins include Boston, New London, Hyannis, Harwich, Point Judith and Quonset Point.

Regular ferry service in southern New England is provided by nine operators on eleven routes. Vessel speeds range from 12-16 knots and serve many of the same origins and destinations as the fast ferry service. Additional origins served by regular ferries include Plymouth, Falmouth and Woods Hole.

Regular ferry service also operates in Southern Maine with 120 trips daily to eight destinations served by Casco Bay Lines from Portland. Service is provided to local islands including Peaks Island, Great Diamond Island, Cliff Island and Bailey Island.

IMPACT ON FERRY OPERATORS

Passenger ferry service generally is not impacted by the SMAs as they are not effective during the summer season. Speed restrictions for Cape Cod Bay are implemented from January 1 through May 15. Speed restrictions for Block Island Sound are from November 1 through April 30. In addition, the speed restricted area for Block Island Sound does not extend to the shoreline and hence does not impact fast ferry operations.[11]

However, voluntary DMAs established during the summer season could have an impact, especially if they became mandatory. Interviews with passenger ferry operators identified their particular concern of the situation where a DMA were to be implemented during the peak summer season. For a fast ferry operator, a DMA implemented directly along their route would result in the suspension of service for the entire period that the DMA is in effect[12]. There are several reasons for this conclusion. First, the demand for fast ferries that normally operate between 24-39 knots would virtually disappear if the ferries were restricted to a speed of 10 knots. Second, any remaining demand would not be sufficient to cover vessel operating costs, and third, many of the handling and comfort characteristics of fast ferries would suffer at these reduced speeds.

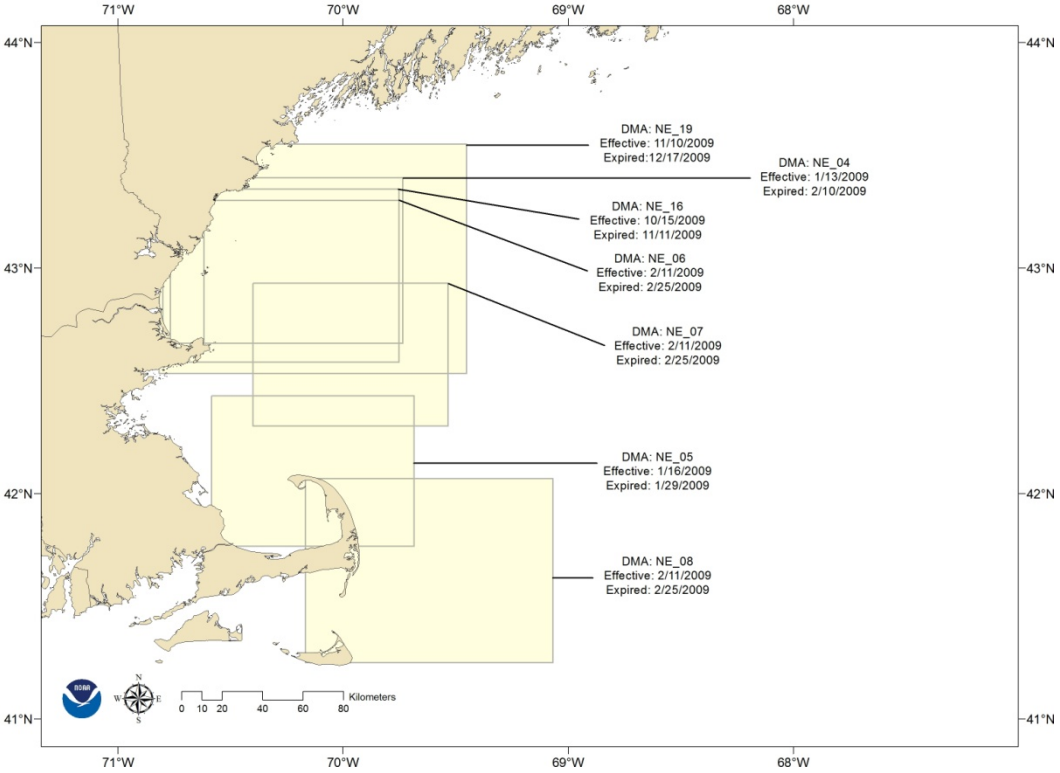
As reported in earlier in Table 2-11, there were 18 DMAs established in 2009. Figure 3-1 below shows the seven DMAs in 2009 that are in locations relevant for ferry operations. However

[11] The rectangular area proposed has its northern limits running approximately in a line from Montauk to the southwestern coast of Block Island.

[12] If a DMA were to be implemented say over a 15-day summer period, the two fast ferry operators on the Boston-Provincetown route would lose net revenues of over $500,000, nearly 10 percent of their annual sales and wipe out their annual profit. Multiple DMAs in one year or in consecutive years could force the shutdown of these services.

each of these DMAs occurred in the winter months and did not affect ferry operations. Hence, in 2009 there was no or minimal economic impact of DMAs on fast ferry operators.

Figure 3-1 DMAs in Areas Relevant for Passenger Ferry Operators



New England Whale Watching Industry

The New England whale watching industry also can be categorized into operations that deploy high-speed vessels with speeds ranging from 25-38 knots; and operations that deploy regular speed vessels with speeds from 16-20 knots. Table 3-5 presents information for the major whale watching operators in Massachusetts Bay. There are nine operators of high-speed vessels; three are based in Gloucester, three in Boston, one in Barnstable, one in Bar Harbor and one in Boothbay Harbor. These operators make 18 daily trips during the summer months. There are fifteen operators of regular speed vessels that have operations based in Massachusetts (eight operators), New Hampshire (four), Maine (two) and Rhode Island (one). Altogether these operators make 21 daily whale watching trips during the summer months.

Table 3-5. Massachusetts Bay Whale Watching Operators, 2012

Operator	Location	# Daily Trips (per Vessel)	Trip Duration (hr)	Adult Fare per Trip ($)	Max Vessel Speed (knots)	Number of Vessels
Regular-Speed Vessel						
Yankee Fleet	Gloucester, MA	1	4	n.a.	20	2
Coastal Fishing Charters	Gloucester, MA	1	4-5	100	20	1
Newburyport Whale Watch	Newburtyport, MA	2	4 - 4 1/2	48	20	1
Captian John Whale Watching and Fishing Tours	Plymouth, MA	4	3 1/2-4 1/2	45	17	4
Provincetown Whale Watches	Provincetown, MA	1	n.a.	37	20	1
The Dolphin Fleet of Provincetown	Provincetown, MA	8	3-4	44	16	4
Shearwater Excursions	Nantucket Island, MA	1	6	115	20	1
Al Gauron Whale Watching	Hapton Beach, NH	1	5	36	20	3
Atlantic Whale Watch	Rye Harbor, NH	1	4 - 4 1/2	36	20	1
Eastman's Docks	Seabrook Beach, NH	1	4 1/2	33	20	4
First Chance WhaleWatch	Kennebunk, ME	1	4 1/2	48	18	1
Odyssey Whale Watch	Portland, ME	2	4	48	20	1
Capt. Bill & Sons Whale Watch	Gloucester, MA	2	3 1/2	48	20	1
Granite State Whale Watch	Rye Harbor, NH	2	4-5	36	18	1
Frances Fleet Whale Watching	Narragansett, RI	1	4 1/2	n.a.	18	2
Subtotal		21				28
High-Speed Vessels						
Capt'n Fish's Whale Watch	Boothbay Harbor, ME	2	3-3 1/2	48	33	3
Boston Best Cruises	Boston, MA	2	4	45	33	2
Bar Harbor Whale Watch Company	Bar Harbor, ME	3	3-3 1/2	59-56	33	3
New England Aquarium Whale Watch	Boston, MA	1	3-4	45	30	1
Boston Harbor Cruises	Boston, MA	4	3	45	35	2
7 Seas Whale Watch	Gloucester, MA	2	3 1/2-4	48	35	1
Cape Ann Whale Watch	Gloucester, MA	2	3-4	48	25	1
Yankee Fleet	Gloucester, MA	1	4	n.a.	33	1
Hyannis Whale Watcher Cruises	Barnstable, MA	1	3 1/2-4	47	38	1
Subtotal		18				15
Source: Prepared by Nathan Associates from data on operator websites and selected interviews.						

Speed restrictions for Cape Cod Bay are implemented from January 1 through May 15. Hence, the peak summer whale watching season are not affected for high-speed or regular speed vessels. Similarly, the speed restrictions for an extended Off Race Point from March through April would not impact the whale watching season.

As shown earlier in Figure 3-1, there were no DMAs implemented in 2009 that were during periods that affected whale watching operations. Further, if a DMA were to be established, a whale watching operator will select an alternative location where humpback whales are present and not right whales. The whale watching community has developed an informal communications network to advise them of whale sightings. As State and Federal regulations restrict any vessel from approaching closer than 500 yards to a right whale, they would avoid right whale as a matter of course.

4.Total Direct and Indirect Economic Impact

In the sections above we have presented the analysis of individual components of the economic impact analysis of the Rule in 2009. The total direct and indirect economic impact of is $44.7 million in 2009 (Table 4-1). This cosists of $23.8 million of direct impact on the shipping industry, 1.9 million on commercial fishing and charter fishing combined, and $19.0 million of indirect impacts.

Table 4-1 Total Direct and Indirect Economic Impact, 2009 ($ millions)

Impact	Amount
Direct iimpact on shipping industry	
Seasonal Management Areas (SMAs)	19.6
Dynamic Management Areas(DMAs)	-
Cumulative Effect of multi-port strings	3.1
Re-routing of southbound coastwise shipping	1.1
Subtotal	23.8
Direct impact on other other market segments	
Commercial fishing	1.0
Charter fishing	0.9
Passenger ferries	-
Whale watching	-
Subtotal	1.9
Indirect impact	19.0
Total impact	44.7

Source: Prepared by Nathan Associates as described in text.

5.Impact on Small Business

Size Standards for Small Entities

According to the U.S. Small Business Administration[13], a small business is a concern that is organized for profit, with a place of business in the United States, and which operates primarily within the United States or makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor. Further, the concern cannot be dominant in its field, on a national basis. Finally, the concern must meet the numerical small business size standard for its industry. SBA has established a size standard for most industries in the U.S. economy.

Size standards for the industries potentially affected by the final rule are presented in Table 5-1. For international and domestic commercial shipping operators, the SBA size standard for a small business is 500 employees or less. The same threshold applies for international cruise operators and domestic ferry service operators. For whale watching operators and charter fishing operators the SBA threshold is $7.0 million of average annual receipts. For commercial fishing operators, the SBA threshold is $4.0 million of average annual receipts.

[13] United States Small Business Administration, Frequently Asked Questions About Small Business Size Standards, www.sba.gov/size/indexfaqs.html

Table 5-1. Small Business Size Standards and Firms by Employment Size and NAICS Code, 2008

Type of entity	NAICS Code	NAICS U.S. Industry Title	Size Standard ($ millions)	Size Standard Employees	Firms Employment size Total	< 20	< 500	500+
International commercial shipping operator	483111	Deep Sea Freight Transportation	n.a.	500	230	120	96	14
International cruise operator	483112	Deep Sea Passenger Transportation	n.a.	500	64	29	30	6
Domestic commercial shipping operator	483113	Coastal and Great Lakes Freight Transportation	n.a.	500	379	207	136	36
Domestic ferry service operator	483114	Coastal and Great Lakes Passenger Transportation	n.a.	500	155	103	48	4
Whale watching operators	487210	Scenic & sightseeing transportation, water	7	n.a.	1,704	1,540	152	12
Charter fishing operators	487210	Scenic & sightseeing transportation, water	7	n.a.	1,704	1,540	152	12
Commerical fishing	114111	Finfish Fishing	4	n.a.	1,060	1,017	41	2
	114112	Shellfish Fishing	4	n.a.	877	858	19	-
	114119	Other Marine Fishing	4	n.a.	34	31	3	-

Source: U.S. Small Business Administration,Table of Small Business Size Standards matched to North American Industry Classification System Codes, October 24, 2012 and SBA Office of Advocacy, Firm Size Data provided by U.S. Census Bureau on Employer Firms and Employment by Employment Size of Firm by NAICS Codes, 2008.

Table 5-1 also presents information on the total number of firms in the U.S. in 2008 by employment size ranges for these industries. The preponderance of firms involved in these industries is considered as small entities by the SBA size standards. In 2008, there were 230 firms involved in deep sea freight transportation industry of which 216 firms had 500 employees or less. In the deep sea passenger transport industry, 58 firms of the total 64 firms had 500 or fewer employees. In the Coastal and Great Lakes freight transportation industry, 343 firms of the total 379 firms had 500 or fewer employees. In the Coastal and Great Lakes passenger transportation industry, all but four firms of the 155 total firms had 500 or fewer employees.

There were 1,704 firms providing scenic and sightseeing water transportation in 2008 of which 1,692 firms had 500 or fewer employees. For the finfish fishing industry 1,058 firms of the total 1,060 firms had 500 or fewer employees; while all 877 firms involved in shellfish fishing had 500 or fewer employees.

Number of Small Entities Affected

For the FEIS Report of 2008, Nathan Associates conducted a detail analysis to determine the number of small entities involved in commercial shipping along the U.S. East Coast. Many of the firms operating within the international commercial shipping industry and international cruise industry have foreign ownership and have their primary place of business outside the U.S. and hence would not qualify as a U.S. small entity.

To identify vessel owned by U.S. entities, we analyzed information provided by the U.S. Coast Guard regarding parties owning vessels that had arrivals at the U.S. East Coast in 2004.

We were able to identify the vessel owner and/or managing owner for 99.6 percent of the vessels that had U.S. East Coast vessel arrivals in 2004.[14] The USCG data provides information on the address of the vessel owner and/or managing owner in terms of zip code, state and country. Using that information we identified vessels with U.S. East Coast arrivals in 2004 that were owned by U.S. entities or foreign entities.

Of the 27,385 U.S. East Coast vessel arrivals in 2004, 6,540 arrivals or 23.9 percent were recorded by vessels owned by parties with U.S. address (Table 5-2). The U.S. East Coast arrivals were made by 4,114 vessels of which 620 or 15.1 percent were by vessels owned by parties with a U.S. address. In terms of number of parties, the 2004 vessel arrivals were made by 3,505 parties of which 432 or 12.3 percent had a U.S. address.

Table 5-2. U.S. East Coast Vessel Arrivals by Vessels with U.S. or Foreign Parties, 2004

	Party address		
Item	U.S	Foreign	Total
Number of vessel arrivals	6,540	20,845	27,385
Percent	23.9%	76.1%	100.0%
Number of vessels	620	3,494	4,114
Percent	15.1%	84.9%	100.0%
Number of parties	432	3,073	3,505
Percent	12.3%	87.7%	100.0%

Source: Prepared by Nathan Associates Inc. from analysis of U.S. Coast Guard as described in text.

We then conducted an analysis of the entire U.S. Coast Guard vessel characteristics database to identify the number and type of vessels owned by the U.S. parties with U.S. East Coast arrivals in 2004.[15] Approximately 71 percent of the U.S.-based parties owned only one vessel and 90.7 percent owned 4 or less vessels (Table 5-3).

[14] We were not able to match party information for 198 vessels of the 4,114 vessels that had U.S. East Coast arrivals in 2004. These vessels accounted for 3.8 percent of 2004 U.S. East Coast arrivals (1,004 of the 27,385 arrivals). However using information on U.S. or foreign flag of registry, we assigned these vessels by country of ownership.

[15] For this analysis, we included all vessels owned by the party, not just those with vessel arrivals at U.S. East Coast ports in 2004.

Table 5-3. U.S-Based Parties with U.S. East Coast Arrivals by Number of Vessels Owned, 2004

Number of Vessels Owned	Number of Parties	Percentage of Parties	Number of Vessels	Percentage of Vessels
1	306	70.8	306	30.6
2	49	11.3	98	9.8
3	24	5.6	72	7.2
4	13	3.0	52	5.2
5	6	1.4	30	3.0
6	7	1.6	42	4.2
7	6	1.4	42	4.2
8	3	0.7	24	2.4
9	4	0.9	36	3.6
10	1	0.2	10	1.0
11	3	0.7	33	3.3
12	1	0.2	12	1.2
15	1	0.2	15	1.5
16	1	0.2	16	1.6
17	2	0.5	34	3.4
20	1	0.2	20	2.0
24	1	0.2	24	2.4
35	1	0.2	35	3.5
38	1	0.2	38	3.8
61	1	0.2	61	6.1
Total:	432	100	1,000	100

Source: Prepared by Nathan Associates inc. from U.S. Coast Guard data as described in text.

The next step was to determine which of these U.S. based parties should be considered a small-business for the RFA analysis. Information on the number of employees is not readily available for U.S.-based parties that own vessels with arrivals at the U.S. East Coast. However, we reviewed the list of U.S-based parties and removed the 53 parties that obviously do not qualify as a small business such as Carnival Cruise Lines, Chevron, Maersk, Holland America Line, BP Oil Shipping, etc. A further classification was made to exclude an additional 17 parties that own 5 or more vessels from the set of small businesses on the assumption that a business with 5 or more capital intensive commercial cargo vessels would employ at least 500 employees throughout its organization. We assume that the remaining set of 362 US-based parties that own vessels that had U.S. East Coast arrivals in 2004 be assumed to be small businesses for the purposes of the RFA analysis. Table 5-4 presents information on vessels and vessel arrivals for this set of vessels assumed to be operated by U.S.-based small entities.

Table 5-4. U.S. East Coast Vessel Arrivals by U.S.-Based Small Entities, 2004

Vessel Type	Number of 2004 Vessel Arrivals	Number of vessels	Number of parties
Bulk Carrier	142	25	24
Container Ship	502	30	28
Freight Barge	77	13	12
General Dry Cargo Ship	99	24	22
Multiple	435	49	31
Passenger Ship	463	33	31
Refrigerated Cargo Ship	51	6	6
Ro-Ro Cargo Ship	433	25	22
Tank Barge	702	61	51
Tank Ship	784	83	79
Towing Vessel	209	44	43
Other a/	65	14	13
Total:	3,962	407	362

a/ Other includes fishing vessels, industrial vessels, and research vessels.
Source: Prepared by Nathan Associates Inc. from U.S. Coast Guard data as described in text.

The 362 parties assumed to be small businesses operated 407 vessels that had 3,962 vessel arrivals at U.S. East Coast ports in 2004. Tank ships and tank barges are the vessel types with the most parties, vessels and vessel arrivals for the set of vessels assumed to be owned by U.S. based small businesses.

Other Industries

In Chapter 3, we presented information on entities involved in other maritime industries that would potentially be affected by the operational measures of the final rule. For purposes of this RFA analysis we have assumed that all U.S. East Coast entities involved in commercial fishing industry, domestic ferry service industry, and charting fishing industry are considered as small entities. In the whale watching industry all entities (except the New England Aquarium) are considered as small entities.

Thus as shown in Table 5-5, we estimate that there are 373 small entities potentially affected Rule. Of these, 209 entities are involved in commercial fishing in the Northeast Region and 88 entities in the Southeast region. There are 14 entities identified involved in Southern New England passenger ferry service[16], 8 entities providing whale watching services in Massachusetts Bay and 40 entities providing charter fishing service along the U.S. East Coast. Note that only the subset of charter fishing entities operating larger head boats that accommodate 60 to 100 passengers is included in this analysis. The majority of charter fishing

[16] In Table 3-4, ten entities are listed as operating fast ferries in Southern New England and eight entities that operate regular ferries. However, four of the entities operate both fast ferries and regular ferries and hence, there are only 14 entities involved in Southern New England passenger ferry service.

entities operates fishing boats of less than 65 LOA and thus are not subject to the operational measures of the Rule.

Table 5-5. Number of Small Entities in Other Industries Potentially Affected, 2009

Industry	Number of Small Entities Potentially Affected
Commercial Fishing	
Northeast Region	209
Southeast Region	88
Southern New England Passenger Ferries	14
Massachusetts Bay Whale Watching	22
Charter Fishing	40
Total	373

Source: Prepared by Nathan Associates Inc. as described in Section 3, and presented in Table 3-2, Table 3-4 and Table 3-7.

Economic Impact on Small Entities

In this section, we first present the economic impact on the small entities involved in the commercial shipping industry[17] followed the estimated impact on small entities in other maritime industries.

COMMERCIAL SHIPPING

All of the operational measures of the final rule described in Section 3 are assumed to apply to commercial shipping vessel operated by small entities. Table 5-6 presents the number of vessel arrivals by U.S. small entities in 2004 and total vessel arrivals by all U.S. entities. Those figures are used to calculate the percent of U.S. vessel in 2004 that were made by small entities. The resulting percentages are then applied to the current analysis of the 2009 economic impact on all U.S.- flagged vessels to determine the economic impact on U.S. small entities[18].

The economic impact of the Rule on U.S. small entities in the commercial shipping industry is estimated at $2.2 million in 2009. This estimate includes the direct economic impact of speed restrictions during seasonal management periods and dynamic management periods plus the cumulative effect of multi-port strings and the re-routing of southbound coastwise shipping. Containerships ($0.8 million) ro-ro cargo ships ($0.4 million) and passenger ships ($0.3 million) together account for 68 percent of the economic impact on small entities in the commercial shipping industry.

[17] Passenger cruise vessels are included in this section as the data sources, approach and methodology applied for this market segment is same as those of the commercial shipping industry.

[18] The 2004 data and relationships were used because there wass no information on the transits in 2009 by U.S. small entities within the shipping industry.

Table 5-6. Economic Impact on U.S. Small Entities by Vessel Type, 2009

	2004 Vessel Arrivals			2009 Economic Impact		
Vessel type	Arrivals by U.S. Small Entities	Arrivals by All U.S. Entities	Percent by US Small Entities	On all U.S. Entities ($000s)	On U.S. Small Entities ($000s)	As a % of Annual Revenues
Bulk Carrier	142	150	94.7	99.1	93.8	0.044%
Container Ship	502	874	57.4	1,449.6	832.6	0.106%
Freight Barge	77	270	28.5	398.4	113.6	0.307%
General Dry Cargo Ship	99	124	79.8	18.1	14.5	0.008%
Passenger Ship	272	310	87.7	319.7	280.6	0.037%
Refrigerated Cargo Ship	51	51	100.0	-	-	0.000%
Ro-Ro Cargo Ship	433	450	96.2	404.3	389.0	0.063%
Tank Barge	702	1,474	47.6	199.2	94.9	0.010%
Tanker	731	784	93.2	220.5	205.6	0.021%
Towing Vessel	209	691	30.2	194.2	58.8	0.012%
Other a/	65	65	100.0	199.2	199.2	0.267%
Total	3,283	5,243	62.6	3,502.4	2,193.1	0.042%

a/ Other includes fishing vessels, industrial vessels, research vessels, school ships. -

Note: Annual revenue estimated as average of daily operating cost at sea and daily operating cost in port by vesel type and size for 365 days for vessels accounting for 2009 SMA transits.

Daily operating cost in port was assumed at 60 percent of daily operating cost at sea.

Source:Nathan Associates Inc.

Table 5-6 also presents the economic impact on small entities as a percent of annual revenues by vessel type. For vessels operated by small entities it was assumed that they spend equal amounts of days at sea and in port.

Overall, the economic impact of the Rule represents about 4 one-hundredth of one percent of the annual revenues of vessels operated on the U.S. East Coast by small entities. For small entities operating containerships, the economic impact increases to up to one-tenths of one percent.

Based on these findings, we conclude that the operational measures of the final rule would not have a significant economic impact on a substantial number of small entities involved in commercial shipping along the U.S. East Coast.

Other Industries

The estimated economic impact on small entities in other maritime industries is presented in Section 3. The impact on small entities in the charter fishing industry in 2009 is estimated at $1.0 million (Table 5-7). The estimated economic impact on small entities in the commercial fishing industry is $0.9 million. There was no or minimal impact in 2009 on ferry operators and whale watching operators.

Table 5-7. Estimated Economic Impact of Rule on Small Entities in Other Industries, 2009 ($000s unless otherwise specified)

Industry	Estimated Economic Impact ($000s)	No. of Small Entities	Average Economic Impact per Small Entity ($000s)	Economic Impact as a % of Annual Revenues
Commercial fishing	933.4	307	3.0	0.4%
Charter fishing	1,000.0	40	25.0	4.3%

Source: Prepared by Nathan Associates Inc.

The economic impact on commercial fishing vessels is estimated at $3,000 per vessel per year and constitutes less than one-half of one percent of their annual revenues. This is not considered to be a significant economic impact.

The annual revenue of a small entity operating a charter fishing head boat is estimated at $504 thousand based on an average of 80 passenger paying $80 for 90 charters. The estimated economic impact of the final rule at is 4.3 percent of their estimated annual revenue and for purposes of the FRFA determination is not considered to be a significant economic impact.

6. Scoping Assessment of Economic Analysis of Potential Rule Modifications

As initially mandated, the Rule is due for renewal or modification in 2013. In this section, we assess the data requirements and level of analyses that would be needed to estimate the economic impact of some issues.

Update Analysis for 2010, 2011 and 2012

The economic impact analysis presented in this report is based on 2009 AIS data. By early 2013, it should be possible to obtain AIS data for 2010 through 2012. It is most efficient for data cleaning and review if the data for these years are provided together rather than at separate times. The key issue for using the additional years of AIS data is the matching of newly appearing vessels with our detailed twelve categories of vessel types and 18 deadweight ton ranges.

We have been provided AIS data for the first 11 months of 2010. Based on a review of that data, an additional year would require matching more than 2,000 newly appearing vessels, requiring about 7 days for an analyst and 4 days for a senior economist. If the three years of 2010 through 2012 were analyzed at the same time, this work could be completed with 14 days for an analyst and 8 days for a senior economist.

Reduce 65-Foot Vessel Length Threshold

The current Rule applies to vessels that are 65 feet and above in overall length (LOA). For 2009, we have worked with the AIS for vessels that are affected by the current Rule. If the length threshold was reduced to say 30 feet, this would require matching additional vessels with our detailed twelve categories of vessel types and 18 deadweight ton ranges. In terms of

the conduct of the economic impact analysis, this modification would be difficult and costly to undertake as less information is available on smaller vessels. Lowering the length threshold will also require renewed and expanded analyses for commercial fishing, ferry boats, whale watch vessels and charter fishing vessels. It is estimated that this would require 15 days for an analyst and 10 days for a senior economist.

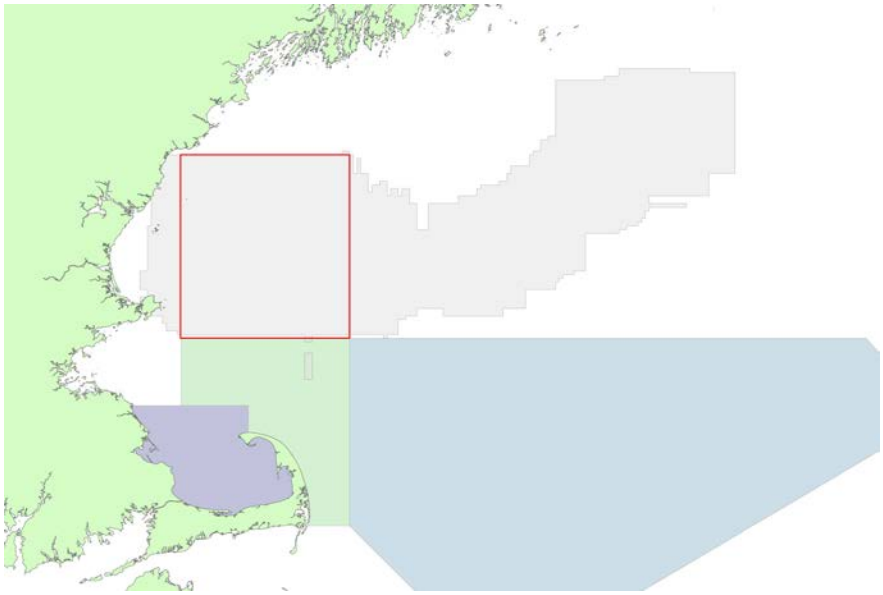
Expansion of Off-Race Point and Great South Channel SMAs

Under this modification, the existing Off-Race Point SMA and the Great South Channel SMA would be expanded to incorporate areas where DMAs regularly occur. As the vessel transits through DMAs have already been analyzed for 2009, the characteristics of those vessels have already been matched and identified. We would need to receive from NOAA a revised SMA database incorporating transits that would applicable to the newly defined geographic boundaries of the expanded SMAs. Since there would little need for matching of vessels, the economic impact for 2009 could be determined with 5 days for an analyst and 2 days for a senior economist. Other years could be conducted with the time already included for 2010-2012 update described above.

Establishment of SMAs in Waters of Coastal Maine

The current Rule does not include a SMA for waters off of Maine's coast. However, this has been an active area for right whales in recent years, as evidenced by the number of DMAs that have been implemented. The possible location of the SMA which would be effective from October 1 through February 28 is shown in Figure 5-1.

Figure 5-1. Possible Location of SMA off of Coastal Maine



We have been provided by NOAA, an AIS database that shows transits in 2009 for this possible SMA. Of the 1,734 transits made through this area in 2009 by 404 vessels, we have been able to match 1,397 transits by 305 vessels. Matching of the remaining vessels and determining the economic impact will require 3 days for an analyst and 1 days for a senior economist.

Make all DMAs Mandatory

As the vessel transits through DMAs have already been analyzed for 2009, the characteristics of those vessels have already been matched and identified. That analysis compared the amount of time needed to transit a DMA based on actual recorded speeds for the DMA areas when they were in effect and not in effect. However, since this data only corresponds to voluntary speed restrictions, it does not provide the impact for a mandatory DMA. The best estimate of the average observed speeds would be those recorded in SMAs in 2009 for each type/ size of vessel. Those speeds could b used to then calculate the impact of a mandatory DMA.

The analysis described in the paragraph above applies to the shipping industry vessels. However, making all DMAs mandatory will also require renewed and expanded analyses for commercial fishing, ferry boats, whale watch vessels and charter fishing vessels. It is estimated that this entire task would require 5 days for an analyst and 10 days for a senior economist.