Ports of Baltimore & Philadelphia - Right Whale Ship Strike Reduction Measures

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NOAA Fisheries , Northeast Region

Goals Today

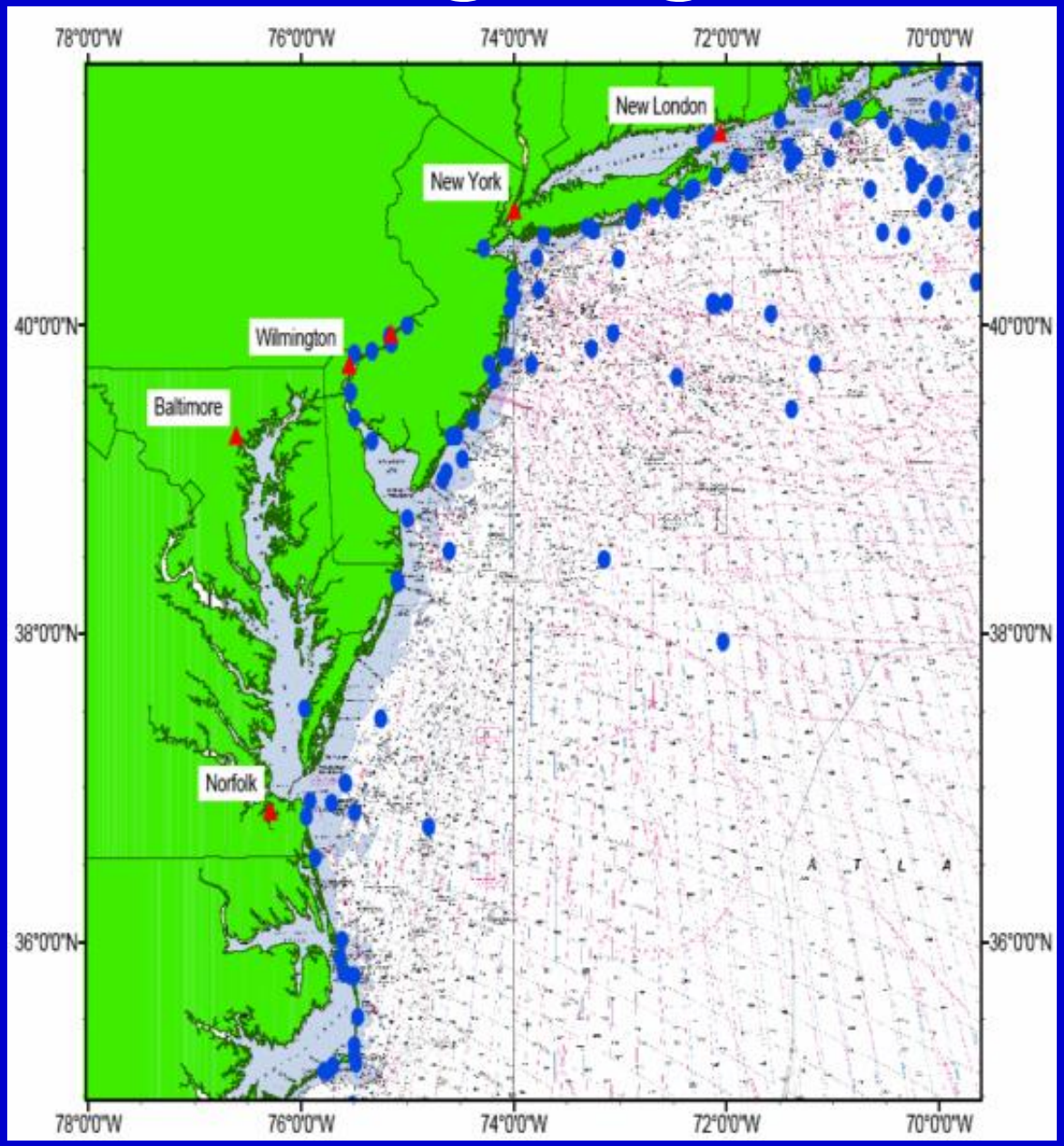
- Brief overview of proposed measures
- Obtain industry input – comments, concerns, additional data to be considered,etc.
- NOAA Fisheries & US Coast Guard need your input!

Mid-Atlantic Region

- Area south & east of Block Island Sound, Rhode Island to Port of Savannah, Georgia
- Between known high use areas in NE & winter calving area in SE

Right Whale Sightings

- Generally observed in waters relatively close to shore
  - 94% of sightings within 30 nm of shore



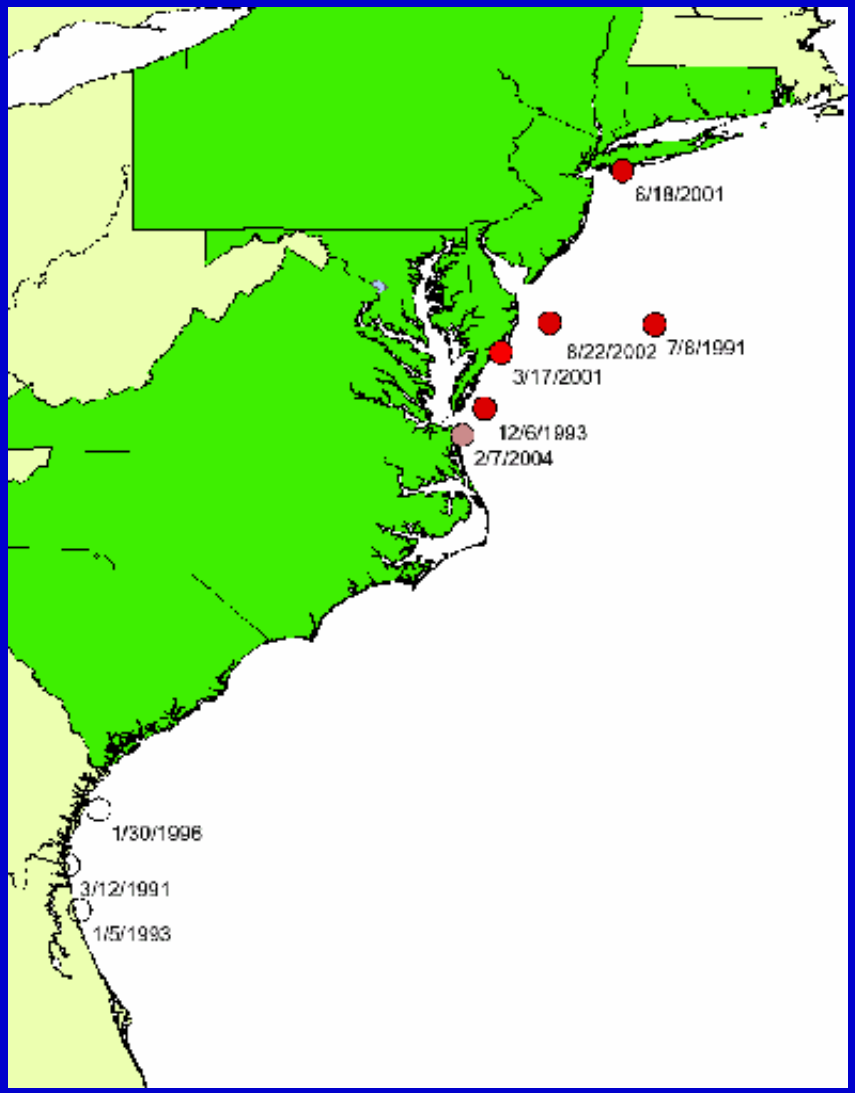
Knowlton et al, unpublished report

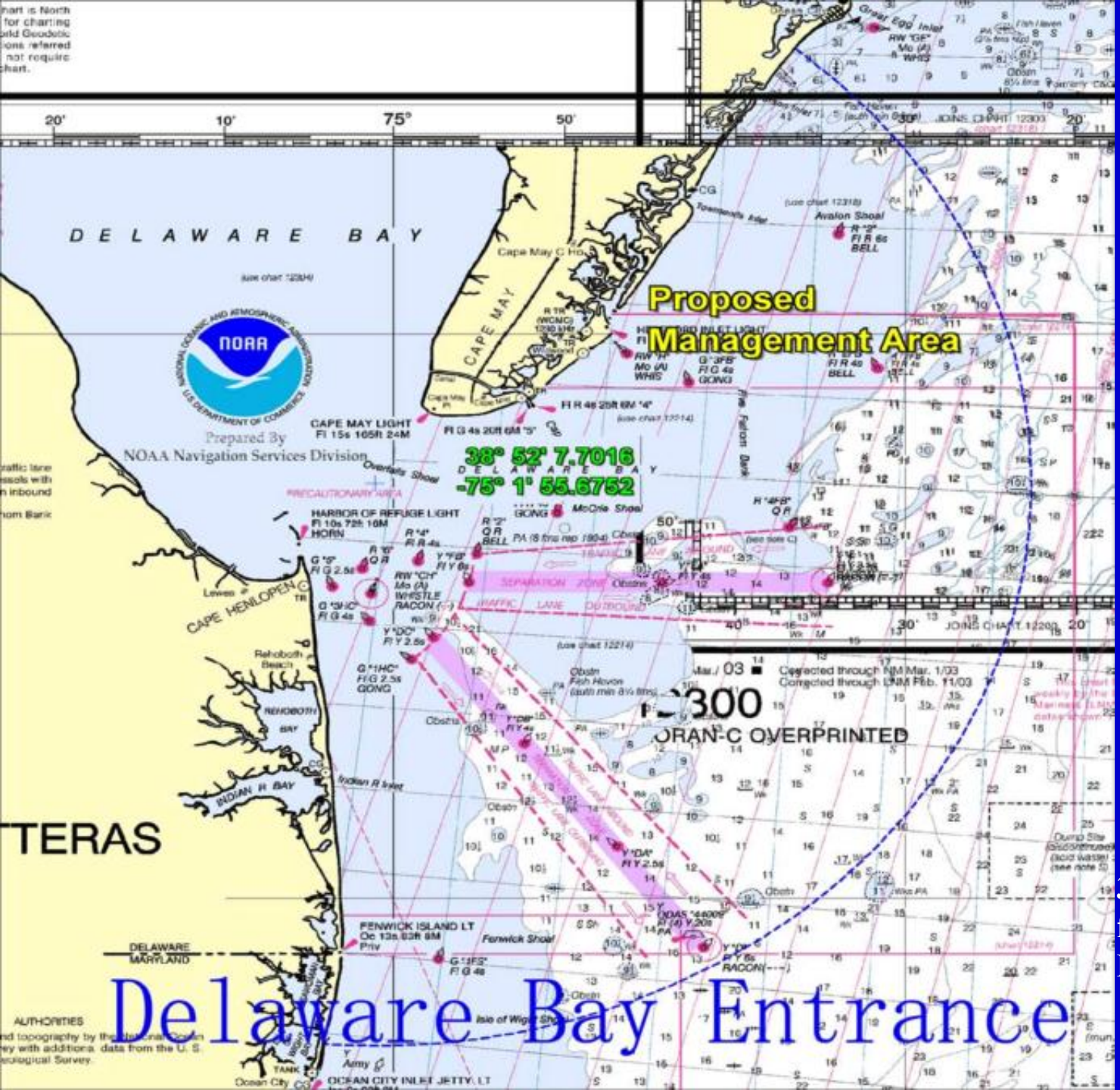
Seasonal Use of Mid-Atlantic Region

- **Migratory Corridor for**
  - ***Pregnant Females*** **moving from NE to SE in fall (Sept-Nov)**
  - **Other Population Segments – juveniles, males**
  - **Mother/Calf pairs Departing Winter Calving Area in SE for NE Areas (March – May)**

Mid-Atlantic Ship Strike Mortalities
1991 - 2002

- 5 of 14 confirmed ship strike mortalities in the mid-Atlantic
- 3 ship strike mortalities occurred in last 3 years
  - Assateague Island Mar 2001
  - Long Island, NY June 2001
  - Ocean City, MD Aug 2002
- "Stumpy" in Feb 2004?





Delaware Bay Entrance

30nm radius shown for Seasonal Management Area

Delaware Bay (ports of Philadelphia & Baltimore) Measures

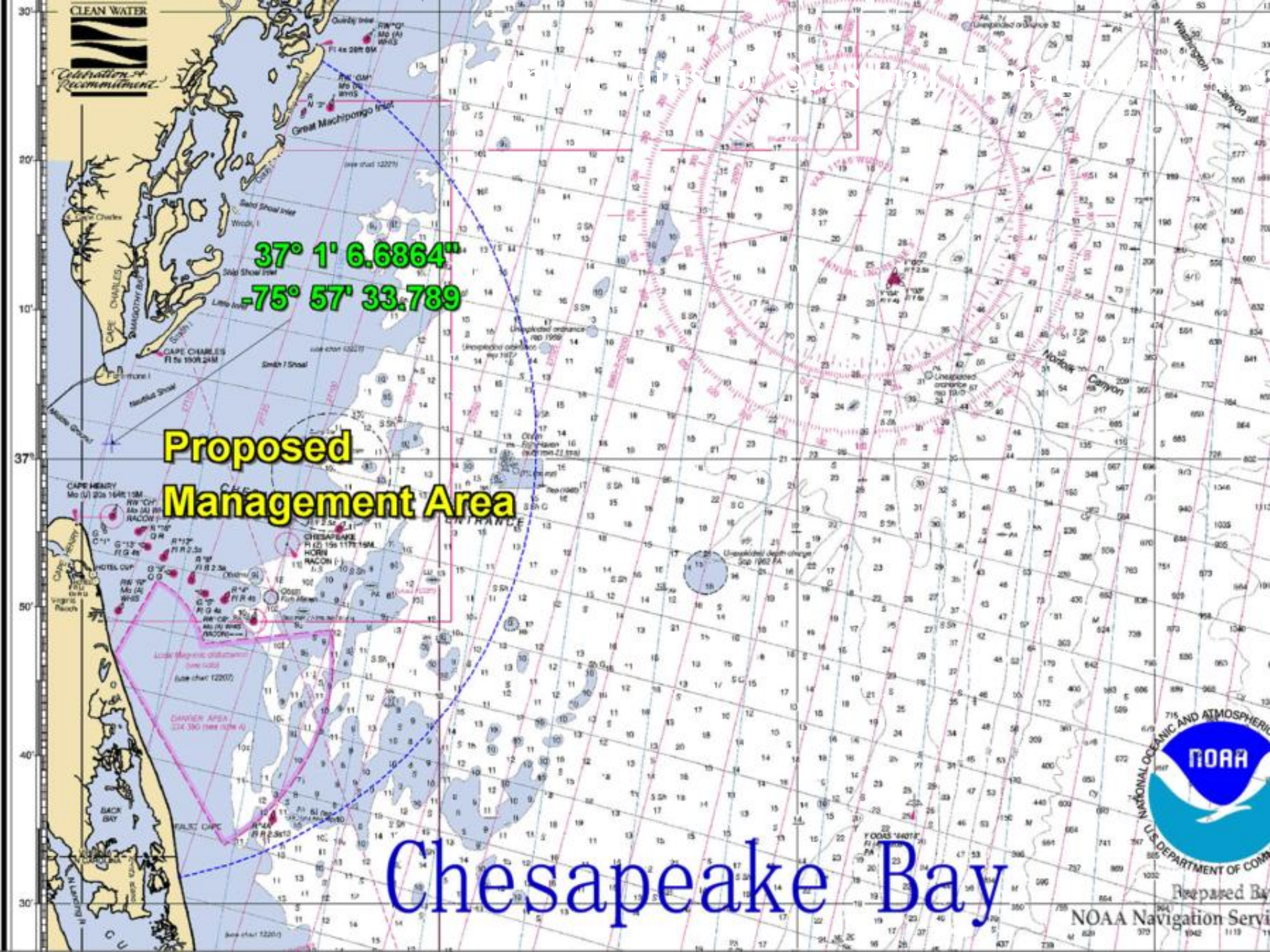
- Seasonal Management Area (SMA)
  - Speed restrictions within 20-30 nm of the Bay COLREGS line --- 10 –14 knots *
  - Applicable period February – April and October - December * (~180 days/yr)
- Dynamic Management applicable outside period of SMA
- *Distance, duration and speed subject to further analysis

Baltimore Traffic from 1999 ACOE data

- Port calls by ships ~1860
  - Dry bulk
  - Container
  - Tankers
  - LNG
- Port calls by tug & barges ~3500

Philadelphia Traffic from ACOE data 1999; Kite-Powell & Hoagland, 2002

- Port calls by ships ~3100
  - Dry bulk
  - Tankers
  - Container
- Port calls by tug & barges ~7200

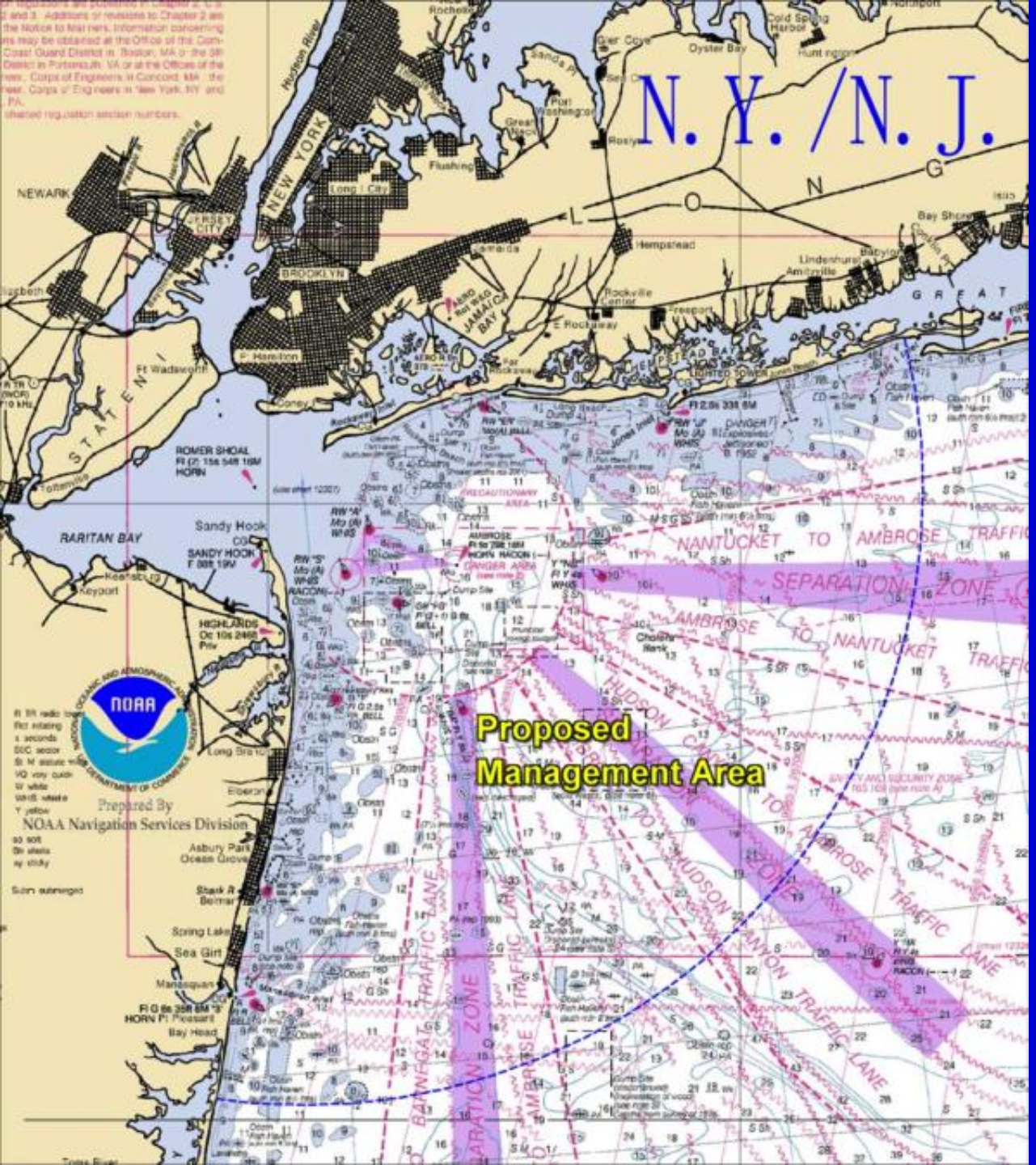

37° 1' 6.6864"
-75° 57' 33.789
Proposed
Management Area
Chesapeake Bay
CLEAN WATER
Great Machipongo Inlet
CAPE CHARLES
CAPE HENRY
CHESAPEAKE
Prepared By
NOAA Navigation Servi

Chesapeake Bay Measures (ports of Hampton Roads & Baltimore)

- Seasonal Management Area (SMA)
  - Speed restrictions within 20-30 nm of the Bay COLREGS line --- 10 –14 knots *
  - Applicable period February – April and November - December * (~150 days/yr)
- Dynamic Management applicable outside period of SMA
- *Distance, duration and speed subject to further analysis

Hampton Roads Traffic from ACOE data 1999; Kite-Powell & Hoagland, 2002

- Port calls by ships ~4000
  - Dry bulk
  - Container
  - Tankers
- Port calls by tug & barges ~4900



30nm radius for NY/NJ Seasonal Management Area

Ports of New York & New Jersey Measures

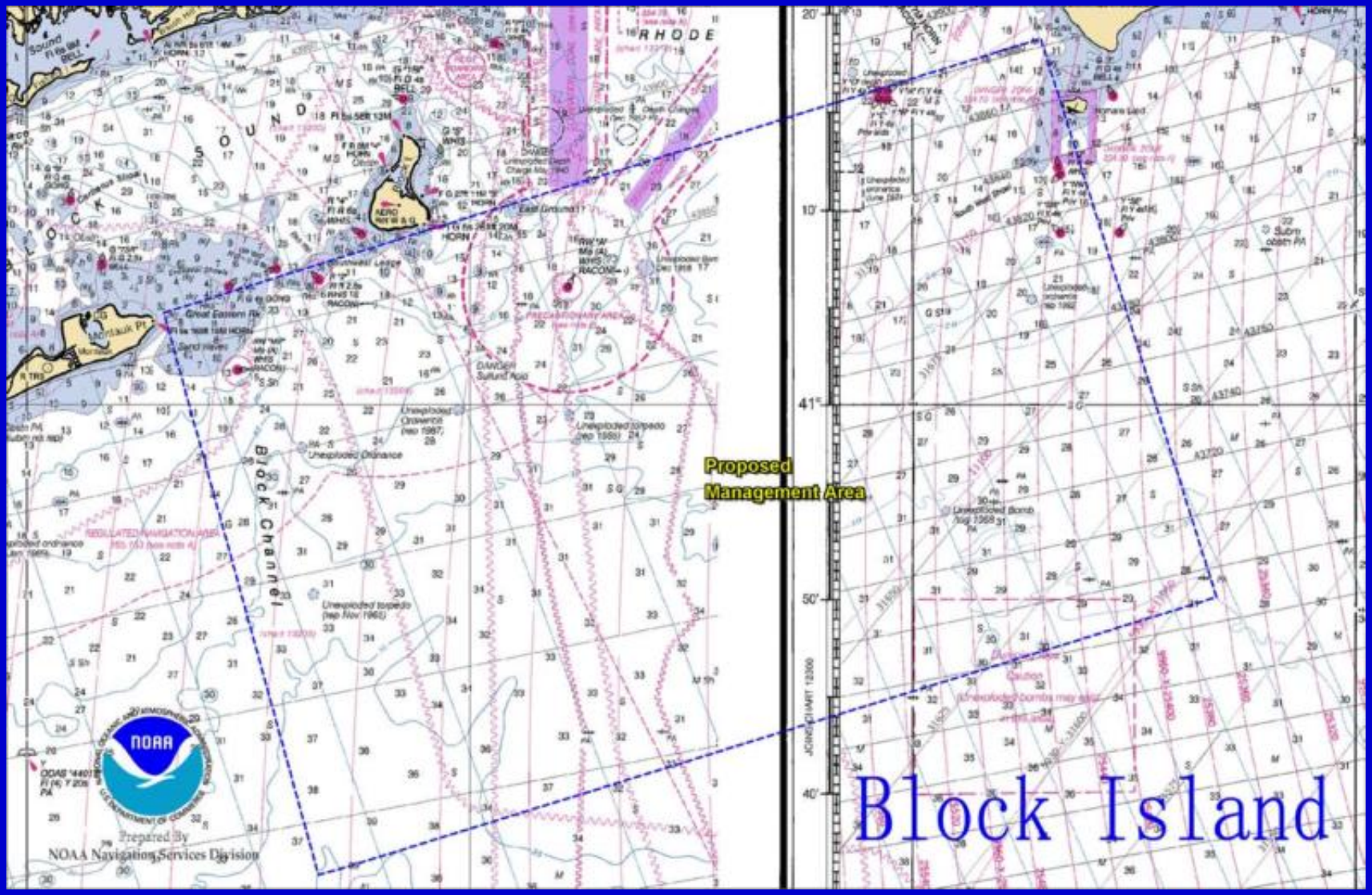
- Seasonal Management Area (SMA)
  - Speed restrictions within 30 nm of the COLREGS line --- 10 –14 knots *
  - Applicable period February - April and September & October * (~150 days/yr)
- Dynamic Management applicable outside period of SMA
- *Distance, duration and speed subject to further analysis

NY/NJ Traffic from 1999 ACOE data

- Port calls by ships ~10,990
  - Containers
  - Tankers
  - LNG
  - Dry bulk
  - Cruise
- Port calls by tug & barges ~1600

Kite-Powell & Hoagland, 2002

Right Whale Floater off Long Island June 2001



Block Island Sound SMA – box approximately from Montauk Pt. To Gay Head, Martha's Vineyard

Block Island Sound and Approaches Measures

- Seasonal Management Area (SMA)
  - Speed restrictions within the boxed area (30 x40 nm) --- 10 – 14 knots *
  - Applicable period March & April and September & October * (~120 days/yr)
- Dynamic Management applicable outside period of SMA
- *Distance, duration and speed subject to further analysis

Economic and Vessel Traffic Management Analyses

- **Economic Aspects of Right Whale Ship Strike Management Measures – Kite - Powell & Hoagland, 2002**

- **Vessel Traffic Management Scenarios Based on Recommended Measures to Reduce Ship Strikes of Northern Right Whales - Russell, Knowlton & Beaudin Ring, 2003**

Vessel Traffic Characterization (US ACOE 1999)

		NY/NJ	Philadelphia	Baltimore	Hampton Roads	Wilmington
dry bulk	*handy*	570				
	handymax	270				
	Panamax	50	1,900	1,100	2,500	250
	Cape	20				
tanker	*product*	1,710				
	Aframax	650				
	Suezmax	70	1,100	160	430	270
	VLCC					
container	*1000 TEU*	1,400				
	1500 TEU	1,000				
	2000 TEU	1,000				
	3000 TEU	1,000	100	500	1,200	110
	4000 TEU	1,200				
LNG				100		
car carrier/RORO		1,500				
cruise		550				
tug/barge	*dry*	600	2,200	1,700	4,000	1,000
	tank	1,000	5,000	1,800	860	600
total	***ships only***	**10,990**	**3,100**	**1,860**	**4,130**	**630**
	ships&barges	**12,590**	**10,300**	**5,360**	**8,990**	**2,230**

Table 1c: Port calls by port and vessel type, estimated from USACE (1999). Additional information provided by the Port of New York and New Jersey.

Kite-Powell & Hoagland, 2002

Vessel Operating Speeds

- **Dry bulk - 14.5 knots**
- **Tanker - 14.5 knots**
- **Container – 24.0 knots**
- **Tug & barge - 12.0** knots

Kite-Powell & Hoagland, 2002

Estimated Economic Impact – Baltimore ($388/ship call)

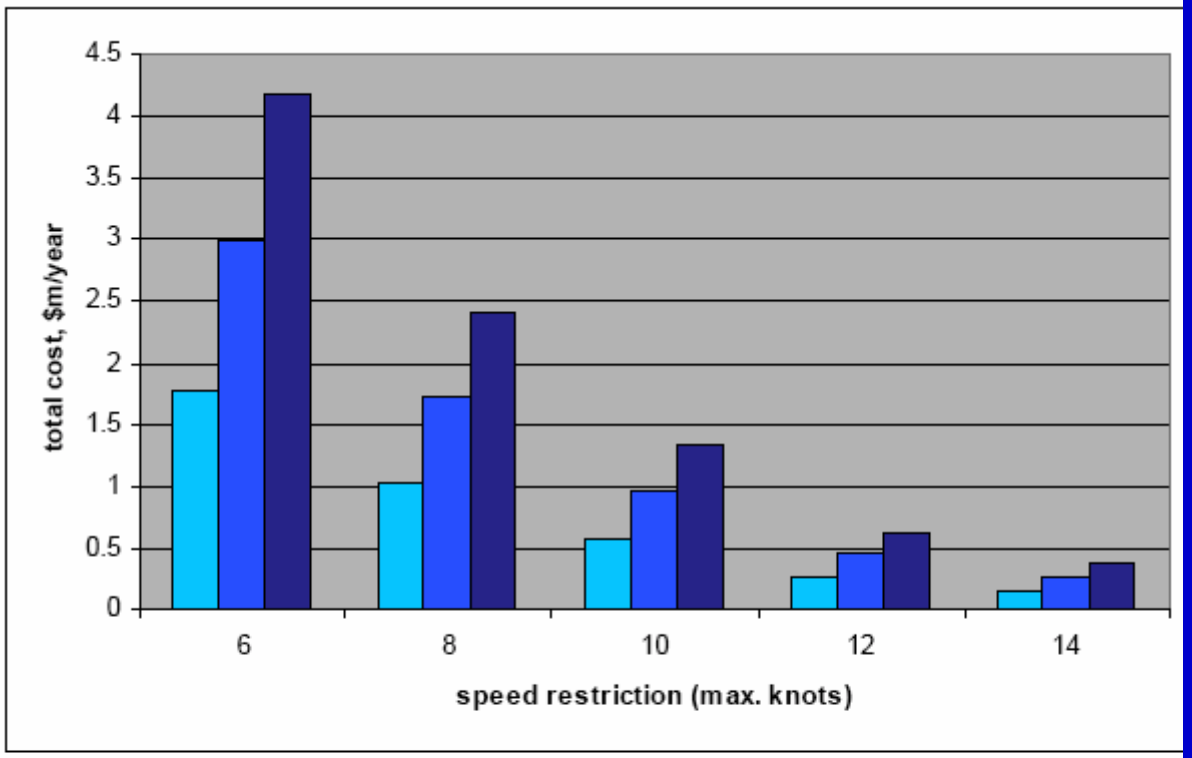


Figure 12: Annual operating cost increase due to speed restrictions for Baltimore traffic.
Base case: 10 knots limit over 25 nm for 60 days/year: $962,000.
Sensitivity analysis on effective distance and duration of speed restriction:

restriction in place 60 days/year, and	15 nm	25 nm	35 nm
speed restriction over 25 nm, and	36 days/year	60 days/year	84 days/year

Kite-Powell & Hoagland, 2002

Estimated Economic Impact – Philadelphia ($213/ship call)

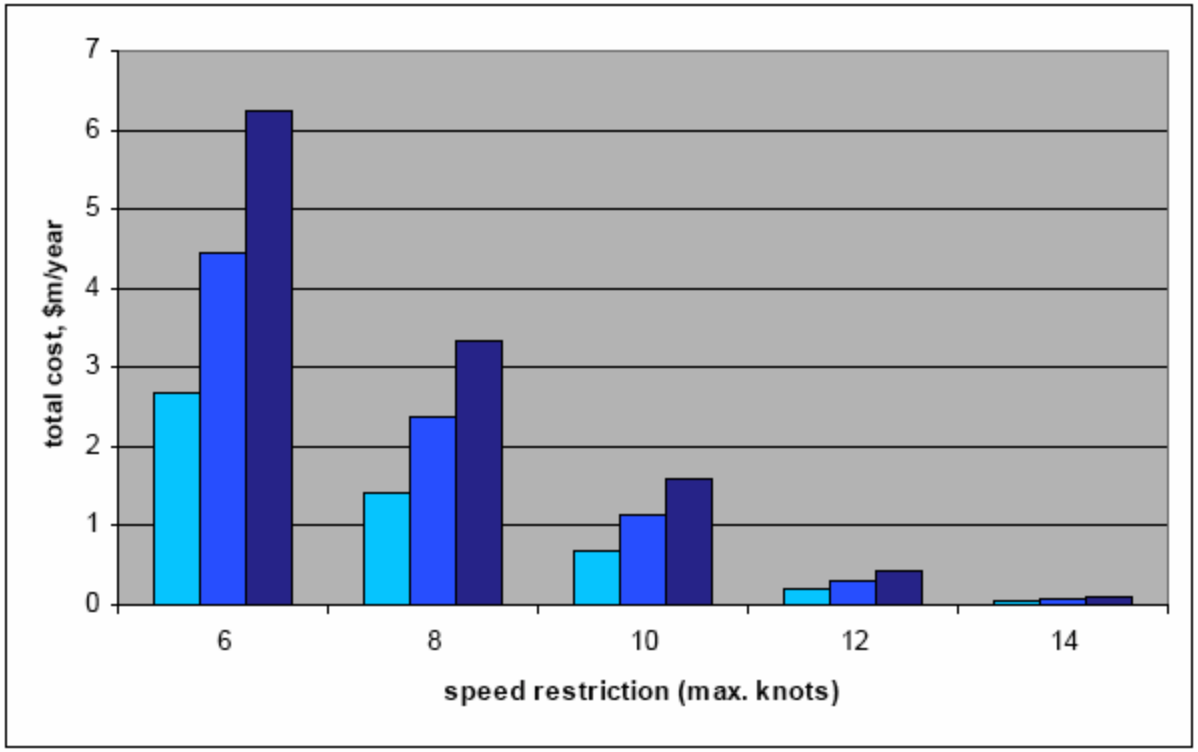


Figure 11: Annual operating cost increase due to speed restrictions for Philadelphia traffic.
Base case: 10 knots limit over 25 nm for 60 days/year: $1,152,000.
Sensitivity analysis on effective distance and duration of speed restriction:

restriction in place 60 days/year, and	15 nm	25 nm	35 nm
speed restriction over 25 nm, and	36 days/year	60 days/year	84 days/year

Kite-Powell & Hoagland, 2002

Estimated Economic Impact – Hampton Roads ($353/ship call)

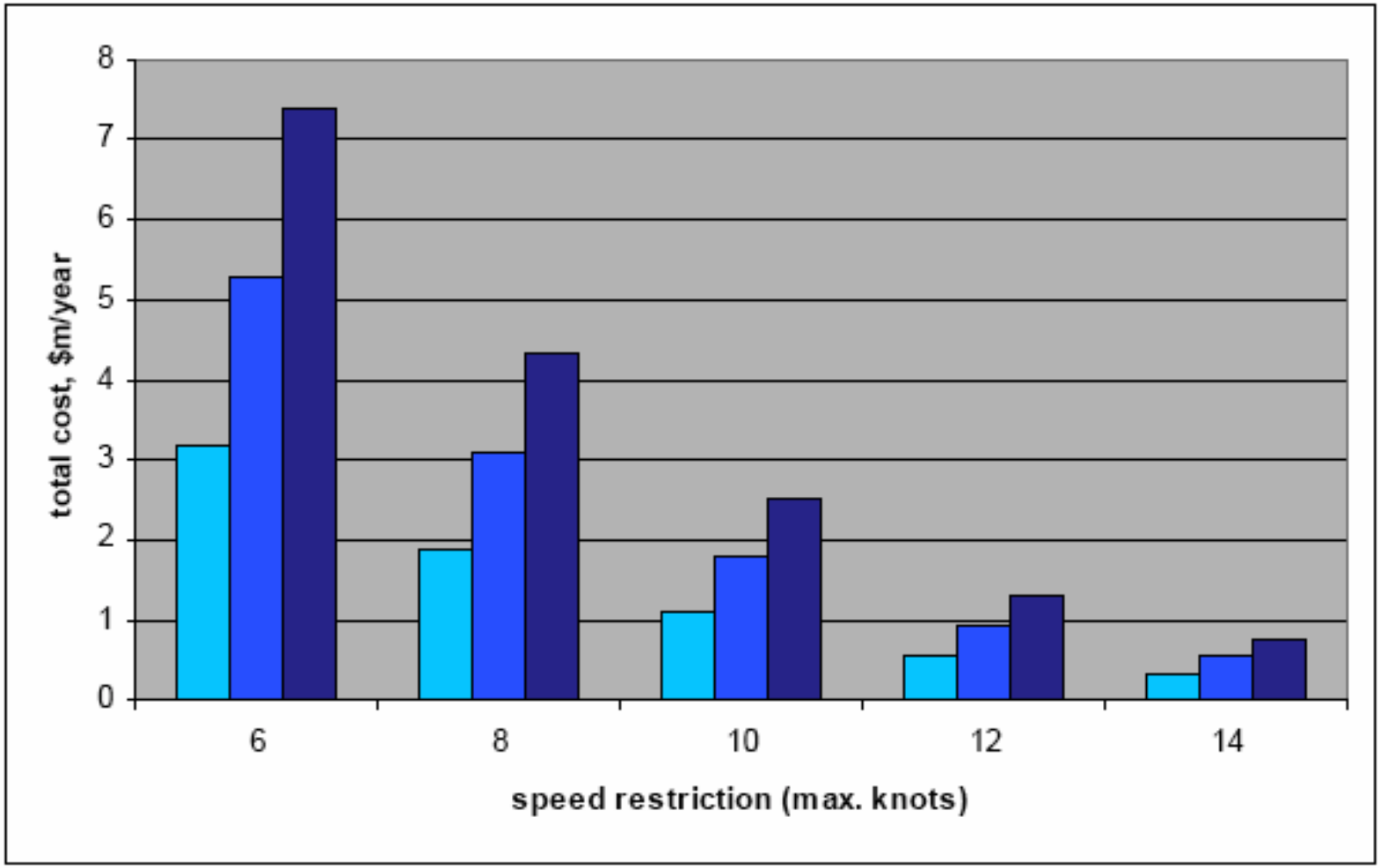


Figure 12: Annual operating cost increase due to speed restrictions for Hampton Roads traffic.
Base case: 10 knots limit over 25 nm for 60 days/year: $1,789,000.
Sensitivity analysis on effective distance and duration of speed restriction:

restriction in place 60 days/year, and	15 nm	25 nm	35 nm
speed restriction over 25 nm, and	36 days/year	60 days/year	84 days/year

Estimated Economic Impact – NY/NJ ($424/ship call)

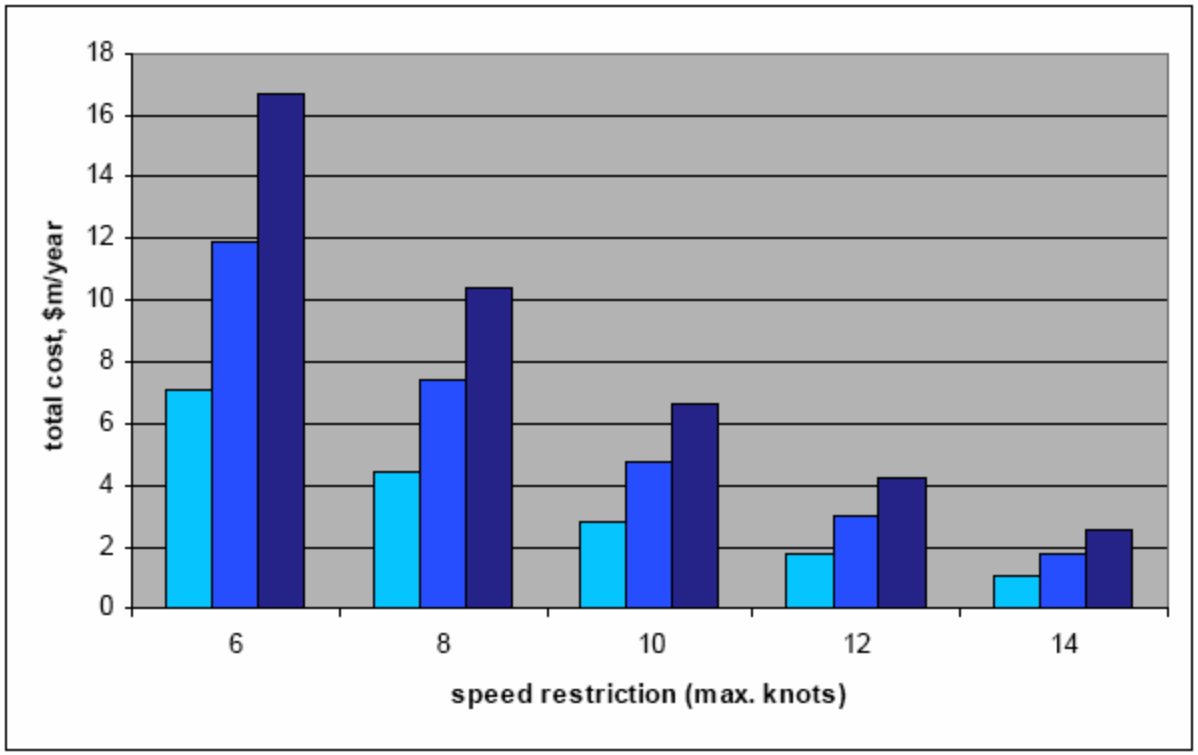


Figure 10: Annual operating cost increase due to speed restrictions for New York/New Jersey traffic.
Base case: 10 knots limit over 25 nm for 60 days/year: $4,771,000.
Sensitivity analysis on effective distance and duration of speed restriction:

restriction in place 60 days/year, and	15 nm	25 nm	35 nm
speed restriction over 25 nm, and	36 days/year	60 days/year	84 days/year

Kite-Powell & Hoagland, 2002

Additional Transit Time - Sea Speed to Maneuvering Speed

Table 1

Vessel Type or Category	Average Vessel Speed, knots	Additional Transit Time, $\Delta T_{VS\text{-}RS}$, in minutes, for a vessel to slow from sea speed to maneuvering speed		
		10 Knot speed restriction	12 Knot speed restriction	13 Knot speed restriction
Dry bulk---- handy	14	9	4	2
handymax	14	9	4	2
Panamax	14.5	9	5	3
Cape	14.5	9	5	3
tanker--product	14	9	4	2
Aframax	15	10	6	4
Suezmax	14.5	9	5	3
VLCC				
Containership--1000TEU	15	10	6	4
1500TEU	15	10	6	4
2000TEU	24	18	15	14
3000TEU	24	18	15	14
4000TEU	24	18	15	14
LNG	20	15	12	11
Car Carrier	16	11	8	6
Cruise ship	25	18	16	14
tug/barge--freight	12	5	0	0
--tank	12	5	0	0

Table 1 shows the average sea speed for various vessel types calling at US East Coast Ports (Kite-Powell and Hoagland, March 2002); and the additional transit time, $\Delta T_{VS\text{-}RS}$, as a function of proposed speed restrictions, for vessels to slow from sea speed to maneuvering speed. A vessel departing a DMA would also incur this

Kite-Powell &Hoagland,2002; Russell et al, 2003

Pilot Embarkation Points and Maneuvering Speeds Requested by Pilots for Boarding

Port Entrance	Pilot embarkation	Speed at Pilot Buoy, VS_{PB}	Location of "Pilot Buoy" relative to harbor baseline or closing line
NY/NJ	Triangular cruising area west of Ambrose Light	No speed specified	6.8 nm
Delaware Bay	2.5nm SE of Cape Henlopen, DE	5 knots	2.5 nm
Chesapeake Bay	LWB "C"	No speed specified	2.85 nm

Russell et al, 2003; US Coast Pilots 2,3,4

* Further analysis of vessel traffic for BIS, CCB, GSC funded in 2004 by NOAA Fisheries , NEIT

Additional Transit Times Based on 10,12,13 knots – NY/NJ

Ports of NY / NJ		*Additional Transit Time, minutes @ RS = 10 Kts*			*Additional Transit Time, minutes @ RS = 12 Kts*			*Additional Transit time, minutes @ RS = 13 Kts*		
Location of Pilot buoy @ 6.8nm		20nm	25nm	30nm	20nm	25nm	30nm	20nm	25nm	30nm
Vessel Category	**Speed**									
dry bulk—handy	14	25	28	33	17	15	16	13	10	9
Handymax	14	25	28	33	17	15	16	13	10	9
Panamax	14.5	26	30	36	18	17	19	14	12	12
Cape	14.5	26	30	36	18	17	19	14	12	12
Tanker—product	14	25	28	33	17	15	16	13	10	9
Aframax	15	28	32	39	19	19	22	16	14	15
Suezmax	14.5	26	30	36	18	17	19	14	12	12
VLCC										
Container-1000TEU	15	28	32	39	19	19	22	16	14	15
--1500TEU	15	28	32	39	19	19	22	16	14	15
--2000TEU	24	35	53	68	26	41	51	23	35	44
--3000TEU	24	35	53	68	26	41	51	23	35	44
--4000TEU	24	35	53	68	26	41	51	23	35	44
LNG	20									
Car Carrier	16	30	35	44	22	23	27	18	18	20
Cruise ship	25	35	54	69	26	42	53	23	37	46
tug/barge--freight	12	19	18	20	0	0	0	0	0	0
------tank	12	19	18	20	0	0	0	0	0	0

Table 3a shows the additional time required with proposed speed restrictions of 10, 12 and 13 knots and proposed geographic extent of the seasonal management areas (SMA) of 20, 25 and 30 nautical miles for vessels calling at the ports of New York and New Jersey.

Russell et al, 2003

Baltimore – additional time (one way) with proposed speed restrictions (maximum & minimum)

Ship Type	Max Addt'l Time (minutes)	Speed (Knots)	Distance (nm)	Min Addt'l Time (minutes)	Speed (Knots)	Distance (nm)
Tanker	43	10	30	14	13	25 & 30
Dry Bulk	43	10	30	14	13	25 & 30
Container	81	10	30	36	13	20
LNG	70	10	30	31	13	20
Cruise	84	10	30	39	13	20
Car	52	10	30	21	13	20 & 25
Tug/barge	23	10	30	-	-	-

Russell et al, 2003

Philadelphia – additional time (one way) with proposed speed restrictions (maximum & minimum)

Ship Type	Max Addt'l Time (minutes)	Speed (Knots)	Distance (nm)	Min Addt'l Time (minutes)	Speed (Knots)	Distance (nm)
Tanker	44	10	30	14	13	25 & 30
Dry Bulk	43	10	30	14	13	25 & 30
Container	83	10	30	39	13	20
Tug/barge	24	10	30	-	-	-

Russell et al, 2003

Hampton Roads – additional time (one way) with proposed speed restrictions (maximum & minimum)

Ship Type	Max Addt'l Time (minutes)	Speed (Knots)	Distance (nm)	Min Addt'l Time (minutes)	Speed (Knots)	Distance (nm)
Tanker	43	10	30	14	13	25 & 30
Dry Bulk	43	10	30	14	13	25 & 30
Container	81	10	30	38	13	20
Tug/barge	23	10	30	-	-	-

Russell et al, 2003

NY & NJ – additional time (one way) with proposed speed restrictions(maximum & minimum)

Ship Type	Max Addt'l Time (minutes)	Speed (Knots)	Distance (nm)	Min Addt'l Time (minutes)	Speed (Knots)	Distance (nm)
Container	68	10	30	14	13	25
Tanker	36	10	30	9	13	30
Dry bulk	36	10	30	9	13	30
Cruise	69	10	30	23	13	20
Car carrier	44	10	30	18	13	20 +25
Tug/barge	20	10	30	-	-	-

Russell et al, 2003

Dynamic Management Areas (DMAs) 1998-2002 – Retrospective Analysis

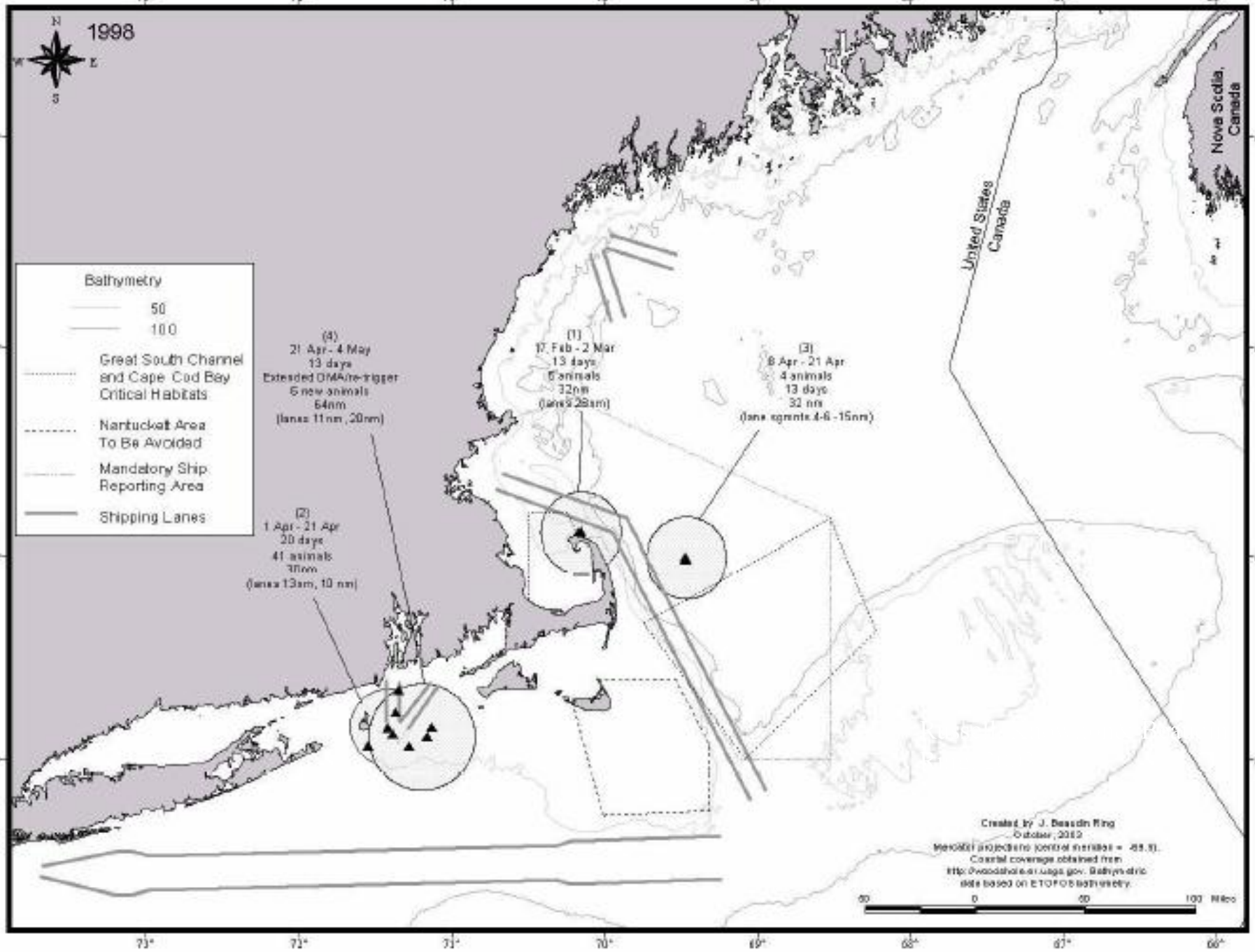
- **From** ***Vessel Traffic-Management Scenarios Based on Recommended Measures to Reduce Ship Strikes of North Atlantic Right Whales*** – a report submitted to the NMFS Northeast Implementation Team by B. Russell, A. Knowlton & J.Beaudin Ring, December 2003
- **Analysis of sightings from 1998 –2002 (& previous years)**

Trigger Events For DMA per Russell, Knowlton & Beaudin Ring, 2003)

- **Trigger Events :**
  - 3 or more animals
  - 3 animals w/in 10 nm of each other
  - mother/calf pair w/in 15 nm of shipping lane
  - 2 or more animals closer than 10 nm to each other w/in shipping lane if resident or feeding
  - 1 or more animals in the Cape Cod Canal or any harbor area

DMAs (Russell et al, 2003)

- Circle with 15nm radius around periphery of sightings
- 13 day duration
- Addt'l sightings during the DMA in same area, period extended another 13 days


1998
N
S
E
W
Bathymetry
50
100
Great South Channel and Cape Cod Bay Critical Habitats
Nantucket Area To Be Avoided
Mandatory Ship Reporting Area
Shipping Lanes
(4)
21 Apr - 4 May
13 days
Extended DMA/re-trigger
6 new animals
64nm
(lanes 11nm, 20nm)
(1)
17 Feb - 2 Mar
13 days
6 animals
32nm
(lanes 9.28nm)
(3)
8 Apr - 21 Apr
4 animals
13 days
32 nm
(lane segmnts 4-6 - 15nm)
(2)
1 Apr - 21 Apr
20 days
41 animals
30nm
(lanes 13nm, 10 nm)
United States
Canada
Nova Scotia, Canada
Created by J. Beasdin Ring
October, 2002
Coastal coverage obtained from
http://woodshole.er.usgs.gov. Bathymetric
data based on ETOPO5 bathymetry.
50
0
50
100 Miles
73°
72°
71°
70°
69°
68°
67°
66°
44°
43°
42°
41°

Figu

1998

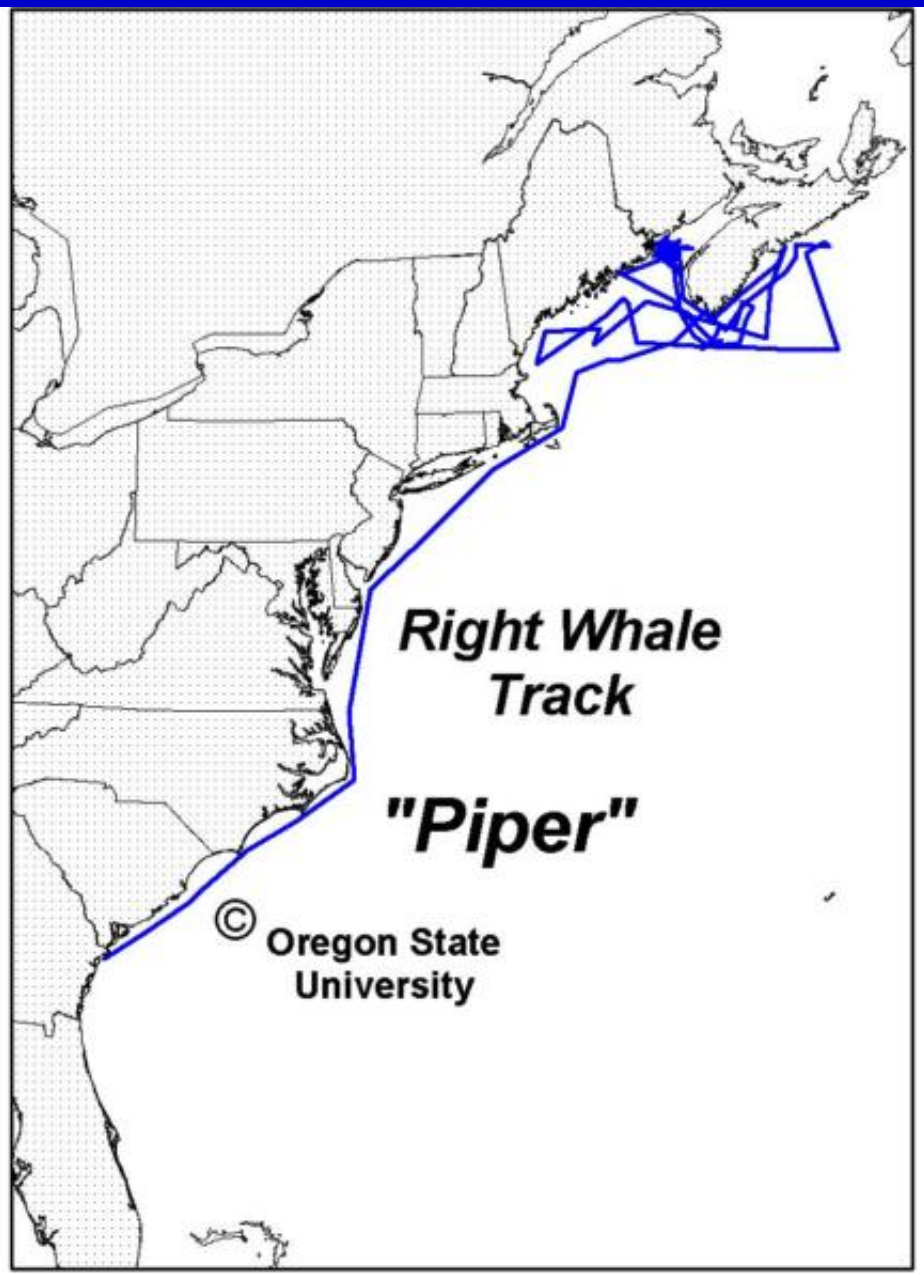
- 4 retrospective DMAs (Boston TSS, GSC/TSS & Providence)
  - Boston TSS (1) 17 Feb – 2 Mar
  - Providence (2) 1 Apr – 4 May
  - GSC/TSS (1) 8 –21 April

Technology –A Small Snapshot of Ongoing Efforts

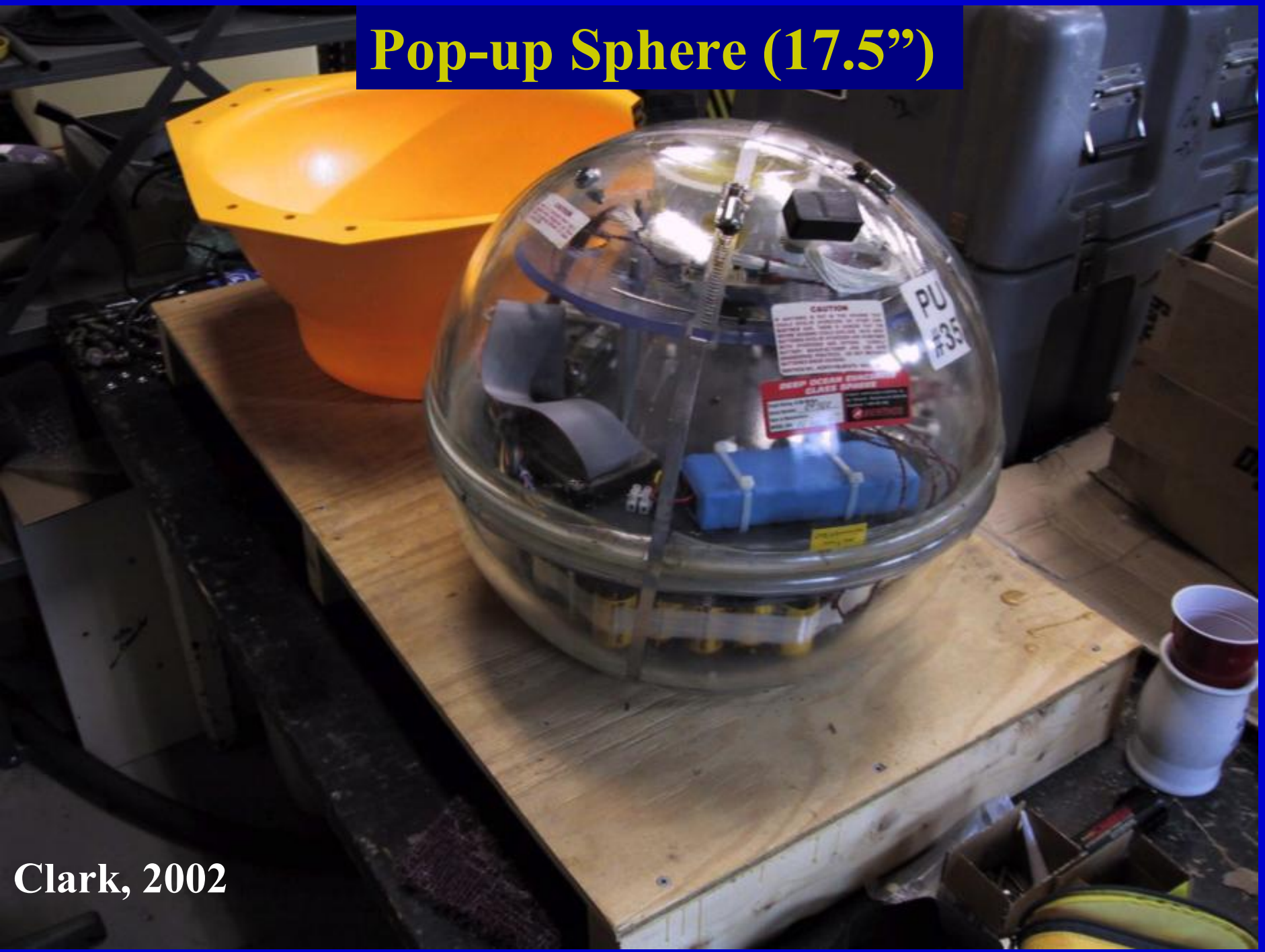
- Tagging
- Active and Passive Acoustics

Right Whale Tagged in 2001

- tag on female for approximately 5 months
- Whale traveled through most east coast TSS
- Sighted by aerial survey off GA at about time tag failed

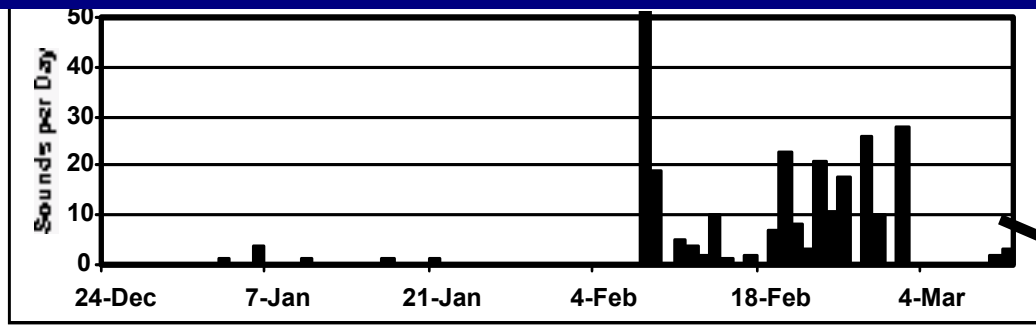


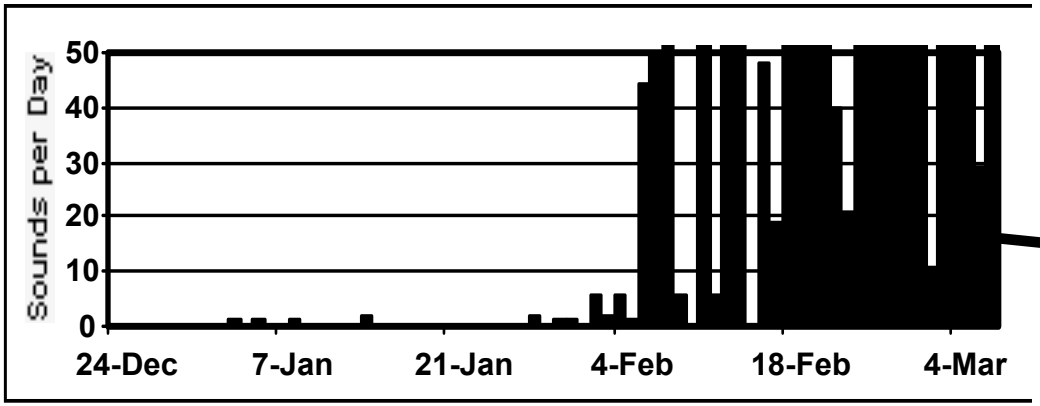
Pop-up Sphere (17.5”)

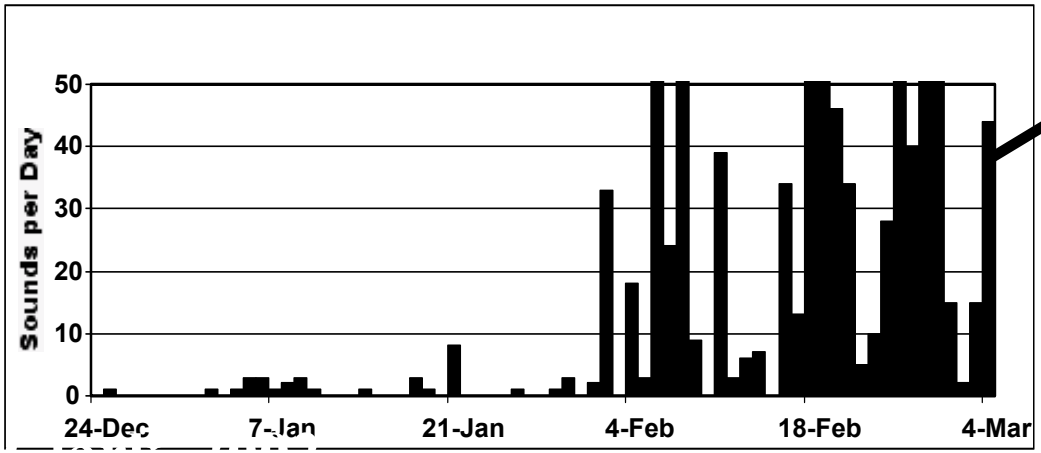


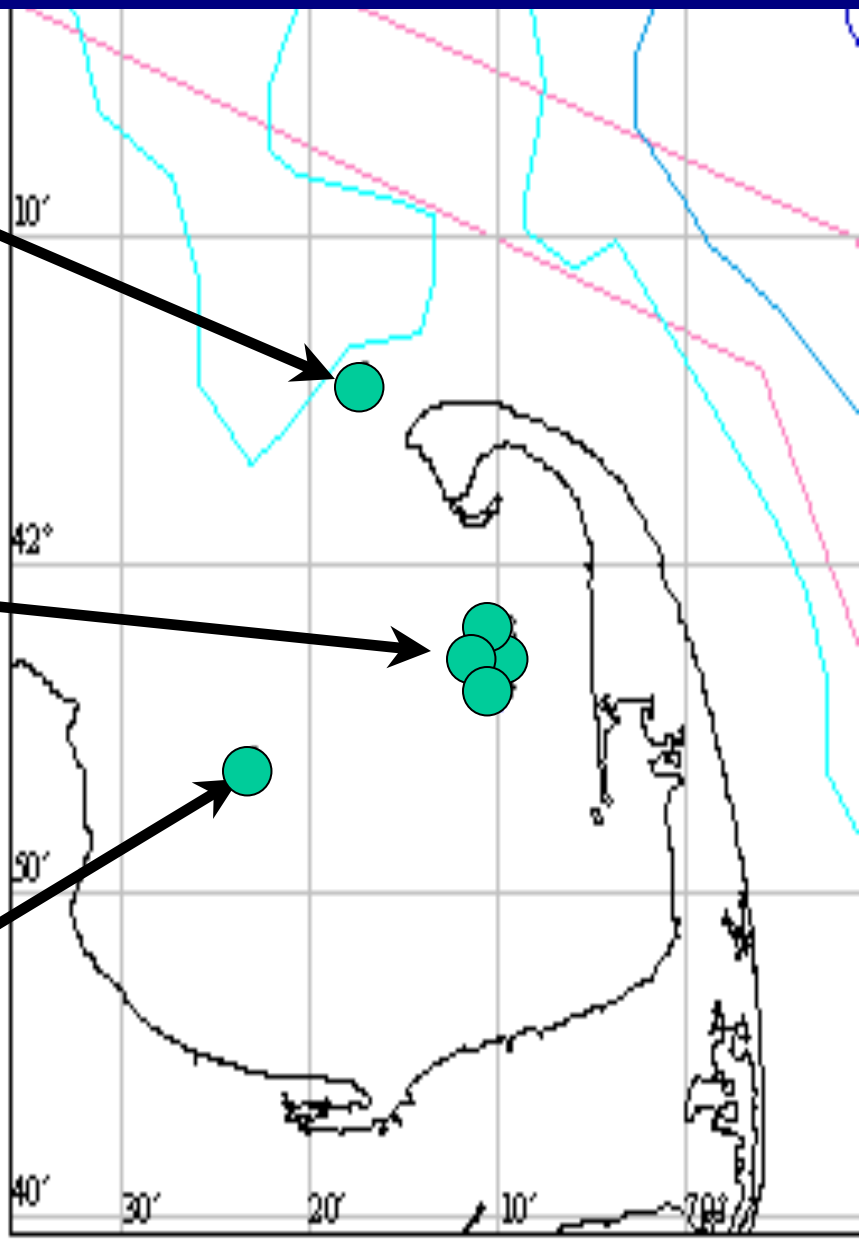
Clark, 2002

Some pop-up detection results from Cape Cod Bay in 2002









Summary

Right Whale Acoustic Detection Research

- **Passive acoustic monitoring is a realistic mechanism to reliably detect whales and to estimate distribution and relative abundance.** [For example, whales were detected acoustically in very low numbers (1-3 animals) throughout January 2002 in Cape Cod Bay, but were not detected during aerial surveys during this period (e.g. first whale heard on 25 Dec. 2001, but first whale seen on 7 Feb. 2002).]
- **Right whales are acoustically active throughout the year.**

Clark, 2002