

# **Reducing the Threat of Ship Strikes on Large Cetaceans in Santa Barbara Channel and Channel Islands National Marine Sanctuary: Three Case Studies**

A Report by the Channel Islands National Marine Sanctuary

By

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Technical Report

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**Primary author: Leslie Abramson  
Project Director: Sean Hastings  
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June 10, 2009

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## **Preface**

This document, “Reducing the Threat of Ship Strikes on Large Cetaceans in Santa Barbara Channel and Channel Islands National Marine Sanctuary”, is intended to satisfy the requirements of USC Sea Grant funding. Section I of the report includes an introduction and contextual orientation to the project and policy process initiated by the Channel Islands National Marine Sanctuary (CINMS). Section II, III, and IV are case studies from Stellwagen Bank National Marine Sanctuary, Glacier Bay National Park and Preserve and Hawaiian Islands Humpback Whale National Marine Sanctuary, respectively. These case studies were created to inform and guide the CINMS Sanctuary Advisory Council in their pursuit of effective, science-based policy which reduces the threat of ship strike to the endangered large whales in Santa Barbara Channel. Each section is self-contained (i.e. it has separate table of contents, references and appendices) and is designed to be read as a series or independently.

# **Section Guide**

## **Section I**

USC Sea Grant: Reducing the Threat of Ship Strikes on Large Cetaceans in Santa Barbara Channel and Channel Islands National Marine Sanctuary

## **Section II**

Protecting Right Whales by Reducing the Risk of Mortality by Ship Strike in Stellwagen Bank National Marine Sanctuary and on the Eastern Seaboard, USA

## **Section III**

Vessel Management Tools to Reduce the Risk of Humpback Whale Harassment, Injury and Mortality in Glacier Bay National Park, Alaska

## **Section IV**

Protecting Humpback Whales by Reducing the Risk of Mortality by Ship Strike in Hawaiian Island Humpback Whale National Marine Sanctuary

# **Section I**

**USC Sea Grant: Reducing the Threat of Ship  
Strikes on Large Cetaceans in Santa Barbara  
Channel and Channel Islands National Marine  
Sanctuary**

# **USC Sea Grant: Reducing the Threat of Ship Strikes on Large Cetaceans in Santa Barbara Channel and Channel Islands National Marine Sanctuary**

## **Problem Statement**

During the fall of 2007, four blue whales were found dead in the Southern California Bight. Two of these were confirmed ship strikes. Historically, the maximum number of blue whale fatalities in the region was three, occurring in both 1988 and 2002. Contributing causes to whale fatalities may be domoic acid, mid-frequency acoustic testing, ambient noise sources, or infectious disease (CINMS 2008).

Shipping has been shown to have negative effects on large whales, which are at risk of being killed or injured by ship strikes. The krill patches in the colder waters of the Channel Islands provides critical feeding ground for the largest blue whale stock in the world (Fiedler *et al.*, 1998). It has been speculated that krill aggregations in the Santa Barbara Channel and shipping lanes may lead to higher densities of several endangered baleen whale species, including humpback, blue and fin whales, making them vulnerable to ship strike in this region.

The Santa Barbara Channel contains some of the highest densities of commercial traffic in the world. Many vessels transiting to or from the Port of Long Beach-Los Angeles pass through the Channel (75% of the northbound departing vessel traffic and 65% of the arriving southbound traffic). Some 6,500 large (over 300 gross ton) vessels transit through the Channel every year, the majority of them at speeds greater than 14 knots (CINMS 2006). Ship strikes have been identified by the National Marine Fishery Service as threats to the recovery of endangered blue, right, humpback and fin whales (NMFS 1991; NMFS 1998; NMFS 2005; NMFS 2006).

While most of the work analyzing the relationship between incidence of whale strikes and ship speeds has been done on the east coast in relation to the recovery of the highly endangered North Atlantic right whale, there have been a number of collisions involving gray whales and unidentified species in the CINMS (Jensen and Silber, 2004). Of the species known to have been hit by ships on the west coast, fin whales appear most affected, but blue whales, grey whales and humpback whales are also at risk (Douglas *et al.* 2008, Laist *et al.* 2001). An analysis of ship and whale collisions showed that the chance of serious injury or death to the whale was reduced to 50% at speeds of 11.8 knots (Vanderlaan & Taggart 2007).

NOAA's National Marine Fisheries Service (NMFS) is the agency responsible for implementing the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA) and must protect species throughout their range. The Channel Islands National Marine Sanctuary (CINMS) is responsible for implementing the National Marine Sanctuary Act (NMSA) which includes protecting marine resources within the Sanctuary.

## **Policy Process**

CINMS, working with their Sanctuary Advisory Council (SAC), as well as NMFS, has developed a policy process for mitigating ship strikes in the Santa Barbara Channel. This process includes:

- **Prevention and Emergency Response Plan**  
This document exists in draft form and is currently utilized internally by CINMS and NMFS staff. It outlines agency actions to track large whales in the Santa Barbara Channel, implement precautionary actions to reduce the threat of ship strikes and respond quickly and appropriately to a stranded whale. The Emergency Response portion of the document is structured according to the Incident Command System used by the United States military (CINMS 2008).
- **Case Studies**  
In regions such as Glacier Bay National Park (GLBA), Stellwagen Bank National Marine Sanctuary (SBNMS) and Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS), regulatory and co-operative actions have been implemented to mitigate ship strikes of large whales. Analyses of successes, lessons learned and applicability to CINMS and the Santa Barbara Channel will inform the policy process. Funding for these case studies was provided by USC Sea Grant.
- **SAC Ship Strike Subcommittee Recommendations**  
In order to focus specifically on the issue of ship strikes on large whales, the Sac created a Ship Strike Subcommittee. Through case study synthesis and expert panel discussions, the Subcommittee will generate a set of recommendations to mitigate ship strikes of large whales in Santa Barbara Channel. These recommendations will be reviewed by the SAC and then sent to Superintendent of CINMS and NMFS.
- **Sanctuary Education Team (SET)**  
The SET has initiated an outreach and education program for the general public and for the maritime industry.
- **Initial Policy Meetings**  
In the last year, meetings with NMFS, CINMS, commercial shipping agents and the California Ocean Protection Council have made progress in forming mutual goals. Representatives from the shipping industry have indicated an interest and willingness to engage in cooperative policy creation in these meetings.

## **Case Studies**

The following pages contain three case studies focusing on the reduction of the threat of ship strikes on large whales. The first examines the role of the Stellwagen Bank National Marine Sanctuary in protecting the North Atlantic right whale along the eastern seaboard of the United States. The second case study focuses on humpback whale protections implemented by Glacier Bay National Park and Preserve in Alaska. The third case study, prepared by NMFS and supplemented by CINMS, looks again at humpback whales in their wintering grounds in the Hawaiian Islands National Marine Sanctuary. All case studies include a summary of the range of research and monitoring projects, education

and outreach initiatives and regulatory actions pursued to reduce ship strike threat. The case studies then present an analysis of the relevance of these actions to CINMS and the Santa Barbara Channel, with similarities and differences explicitly considered. Finally, recommendations for future opportunities are included in each study, along with key contacts and references.

## **Analysis**

The three case studies presented here indicate that dynamic (spatially and temporally explicit) management of vessel behavior can reduce the risk of ship strikes. They also minimize impact on commercial activities by limiting vessel speed or course only during necessary times or in critical areas. Scientific data such as aerial monitoring, Automatic Identification System (AIS) data of commercial vessel movements, krill abundance and distribution data, whale tagging and passive acoustic monitoring are all critical for the proper implementation of effective dynamic management. All three regions examined: Glacier Bay, Stellwagen Bank and Hawaii have implemented some form of dynamic management area to minimize whale-vessel interactions, yet these processes were time- and resource-intensive.

The case studies also demonstrate the effectiveness of mariner education and training. All three regions have required or voluntary programs for recreational and/or commercial mariner training. In the case of Glacier Bay National Park and Preserve (See Section III), all cruise ships are required to participate in marine mammal awareness and avoidance training as conditional to permit issuance.

## **Next Steps and Recommendations**

Currently, CINMS has limited funding to support the policy process for ship strike mitigation. Existing research and monitoring, such as the Sanctuary Aerial Monitoring and Spatial Analysis Program (SAMSAP) as well as vessel-of opportunity monitoring, will continue along with increased efforts to utilize Automatic Identification System (AIS) data of commercial vessel movements (CINMS 2008). Additionally, the SET team has made great strides towards effective communication with the maritime industry and has begun working on outreach products.

As the policy process continues, knowledge and involvement of stakeholders will grow, creating a positive feedback loop of information and communication. This will contribute to further development of the case studies, as well as the Prevention and Emergency Response Plan. Future management issues include securing funding and staff time for the project, especially for needed research and monitoring to determine large whale distribution, abundance and behavioral patterns in Santa Barbara Channel. Additionally, NMFS, CINMS and the SAC must continue working with industry to find creative solutions. It is only through the successful integration of multiple uses, jurisdictions and interests that ship strikes can be minimized to protect large whales, while simultaneously ensuring the vitality of our commercial maritime industry.

Collaborative decision-making and outreach to the maritime industry are appropriate short-term mitigation steps. At this time, funds should be directed towards the monitoring



and synthesis of scientific data on whale behavior, distribution and abundance in the Santa Barbara Channel. This will contribute to strong policy based on multiple interests and strong scientific data.

## References

Channel Islands National Marine Sanctuary (cited as CINMS 2008) DRAFT: Prevention and Emergency Response Plan: Reducing Ship Strikes of Large Cetaceans in the Santa Barbara Channel and Channel Islands National Marine Sanctuary. National Oceanic and Atmospheric Administration

Channel Islands National Marine Sanctuary (cited as CINMS 2006) Draft Environmental Impact Statement. National Oceanic and Atmospheric Administration

Douglas AB, *et al.* Incidence of ship strikes of large whales in Washington State. *Journal of the Marine Biological Association of the United Kingdom*, 88:1121-1132

Fiedler PC, *et al.* 1998. Blue whale habitat and prey in the California Channel Islands. *Deep Sea Research Part II: Topical Studies in Oceanography*, 45(8-9):1781-1801

Humpback Whale Recovery Team (cited as NMFS 1991) Recovery Plan for the Humpback Whale. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration

Jensen AS and Silber GK. 2004. Large Whale Ship Strike Database. NOAA Technical Memorandum NMFS-OPR-25. p.37

Laist DW, *et al.* 2001. Collisions between ships and whales. *Marine Mammal Science*, 17(1):35-75.

National Marine Fisheries Service (2006) DRAFT: Recovery Plan for the Fin Whale. Office of Protected Resources. National Oceanic and Atmospheric Administration

National Marine Fisheries Service (2005) Recovery Plan for the North Atlantic Right Whale Revision. Office of Protected Resources. National Oceanic and Atmospheric Administration

Reeves, Randall R., Phillip J. Clapham, Robert L. Brownell and Gregory K. Silber (1998) Recovery Plan for the Blue Whale. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration

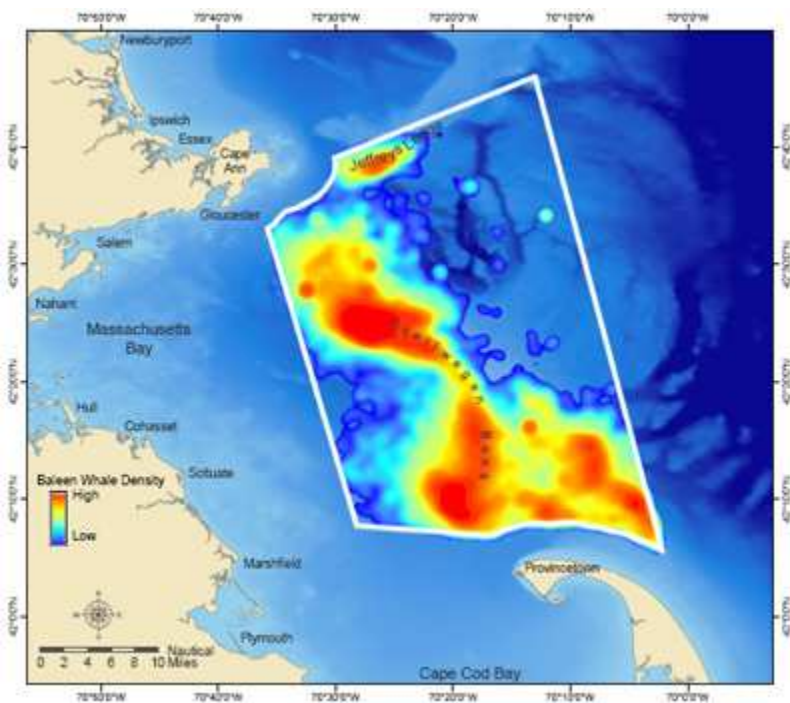
Vanderlaan A, Taggart C. 2007. "Vessel collisions with whales: the probability of lethal injury based on vessel speed." *Marine Mammal Science*, 23(1):144-156

# **Section II**

**Protecting Right Whales by Reducing the Risk of  
Mortality by Ship Strike in Stellwagen Bank  
National Marine Sanctuary and on the Eastern  
Seaboard, USA**



## Protecting Right Whales by Reducing the Risk of Mortality by Ship Strike in Stellwagen Bank National Marine Sanctuary and on the Eastern Seaboard, USA



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## **Table of Contents**

Introduction.....	II - 1
Regional Context .....	II - 1
Management Actions .....	II - 3
Analysis: Potential Application to the Santa Barbara Channel Region .....	II - 11
Opportunities and Recommendations.....	II - 13
Key Contacts and References .....	II - 14
Appendix A-NMFS Right Whale Protection Timeline, 1970- Present.....	II - 16

## **Introduction**

The North Atlantic right whale is one of the most endangered whales on the planet, with fewer than 400 individuals remaining. Human threats include: ship strikes by large commercial vessels; strikes and behavioral modification from whale watching vessels; and fishing gear entanglement (Fujiwara & Caswell 2001; Kraus et al 2005). In the early 1990s, mortalities due to ship strikes were considered a significant threat to the survival of the species and NOAA began a sightings network to better understand the distribution of the animals along the eastern Seaboard of the United States.

Management actions in the 1990s employed voluntary measures and outreach tools along with extensive research, however, ship strikes and mortalities continued each year. In 1999, it was determined that voluntary measures were insufficient to prevent the continued threat of ship strikes and improve the chances of recovery of the species. Between 1999 and 2001 NMFS hosted over 20 stakeholder meetings to discuss ways to reduce ship strikes and in 2001 formed a ship strike working group to address this urgent issue. A strategy for addressing ship strikes was developed with five major elements: Ongoing research, education and outreach, Endangered Species Act (ESA) consultations on federal actions that may affect right whales, formal agreement with Canada to protect right whales, and operational measures for commercial and recreational vessels (pers comm. Elizabeth Petras, NOAA NMFS).

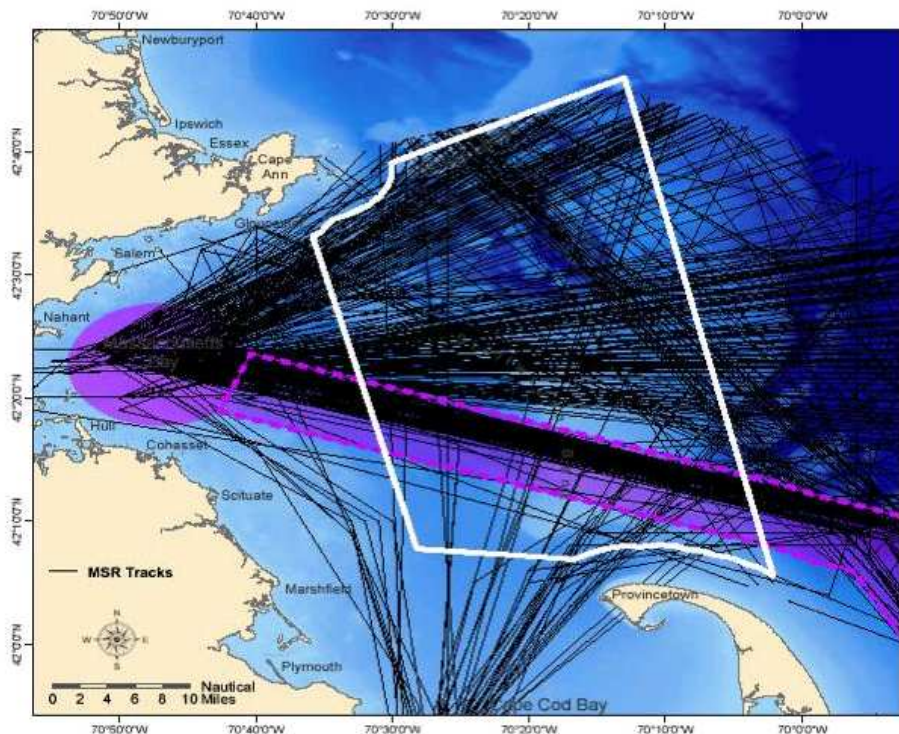
Within the Stellwagen Bank National Marine Sanctuary (SBNMS), there are three regulations that are applicable to commercial vessels. The first regulation shifts the Traffic Separation Scheme (TSS), which governs the movement of large commercial vessels. This has been negotiated with the United Nations' International Maritime Organization (IMO), the NMFS and the United States Coast Guard (USCG). This shift locates the majority of vessel traffic to a spatial area of historically low densities of right whales, and is predicted to reduce the probability of ship strike by 58%. The second regulation is a license condition implemented for Liquefied Natural Gas (LNG) carriers accessing two new ports in Massachusetts Bay which requires these vessels to slow to 10 knots or less in response to real-time acoustic detections of right whales in the TSS. The third regulation is administered by NOAA and establishes Seasonal Management Areas (SMAs) that require commercial ships to slow-down to 10 knots or less within areas on the US east coast, two of which overlap the SBNMS during the right whale feeding season. Please refer to Appendix A for a timeline of the three above-mentioned management actions.

## **Regional Context**

As early as the 11<sup>th</sup> century, the North Atlantic right whale was subject to immense whaling pressure. The particular species was preferred by whalers due to their slow swimming pace and propensity to float when dead, which lead to their common name as the "right" whale to hunt. Recovery of the species has been slowed due to their unusually low reproduction rates and high vulnerability to the human threats mentioned above. In 1970 North Atlantic right whales were listed as endangered under the Endangered Species Conservation Act (the precursor to the Endangered Species Act (ESA)). In 1973 they were listed as endangered on the ESA and depleted under the Marine Mammal

Protection Act. Ship strikes were identified as one of the factors limiting recovery and survival of this species.

North Atlantic right whales calve in the warm coastal waters off Georgia and Florida during the winter. Some fraction of the population then travels north to the waters of the SBNMS and Cape Cod Bay in the early springtime to feed and nurse the calves. Some right whales are present in sanctuary in the mid-late fall and throughout the winter months, too. In the summer, right whales can be found in Canadian Atlantic waters until early fall, when some fraction of the population migrates south. As noted above, NOAA has taken actions to protect North Atlantic right whales throughout their range, but this case study focuses mainly on activities within the SBNMS.



**Figure 1. Reported paths of inbound ships and TSS (in purple) in relation to SBNMS (Source: SBNMS)**

The SBNMS is located in Massachusetts Bay, between Cape Ann and Cape Cod, straddling the entrances to Boston Harbor, Provincetown and Gloucester. Its close proximity to these populous coastal zones gives it the designation of an “urban sanctuary” due to intense maritime commerce, fisheries and tourist activity within its boundaries.

The Stellwagen Bank is an underwater plateau composed of sand and gravel which formed during the last ice age. The bathymetry of the bank creates ideal conditions for upwelling of cold, nutrient rich water, thereby supporting an abundance of marine life. Historically, this region has been host to some of the most productive fisheries in the world, including cod, bluefin tuna, lobster and herring. In addition, these waters serve as feeding and nursery grounds for several large whale species including the endangered humpback, northern right, sei, and fin whales.

## **Management Actions - Overview**

Eleven management actions have been taken to address the threat of ship strikes, fishing gear entanglement and disturbance by whale watchers.

- 1) Research/Monitoring: Right Whale Sighting Advisory System (1997-2008)
- 2) Monitoring: Mandatory Ship Reporting Systems (1999-2008)
- 3) Research: Surveys of Human Use patterns and Baleen Whale Sightings (2001)
- 4) Research: Voluntary Whale Watching Guidelines (2003)
- 5) Monitoring: Digital Tagging (2004- Ongoing)
- 6) Monitoring: Passive Acoustic Programs (2004-Ongoing)
- 7) Regulations: Recommended Shipping Routes (2006)
- 8) Outreach/Education: Mariner Training (2007-Ongoing)
- 9) Regulations: Shifting the Boston Traffic Separation Scheme (2007)
- 10) Regulations: Real-time Passive Acoustic Detections and dynamic speed reduction by LNG Carriers (2007-Ongoing)
- 11) Regulations: Establishment of Seasonal and Dynamic Management Areas (2008)

A summary of each management action follows and a timeline associated with these actions is provided in the Appendix. The Key Contacts and References section provides links to additional information.

### **1) Right Whale Sighting Advisory System, 1997-2008**

In 1997, NOAA began conducting seasonal aerial surveys, using DeHavilland Twin Otter, Grumman Widgeon and Grumman Goose aircrafts. By 2004, over-flights were conducted year-round on a daily basis (weather permitting) and served three purposes. First, observers photographed individual right whales in order to contribute to a population database. Second, flights allowed surveys of areas farther offshore and the opportunity for systematic data gathering. Lastly, locations with right whale presence were designated “Advisory Zones” (AZs) and allowed for the creation of a “real-time” warning system for mariners. Ships were advised through email, fax, NOAA Weather Radio or USCG broadcast Notice to Mariners to either route around the AZs or to reduce speed below 12 knots (kts).

Advisories were distributed daily to ships. SBNMS and the USCG collaborated to analyze ship behavior within these AZs. The analysis included observational and Automatic Identification System data for 40 ships. Results showed one vessel re-route and two vessels reducing speed below 12 kts. The study was considered fairly inconclusive, however, as it was unclear whether ships were not receiving advisories or whether they were choosing not to respond.

The ship advisories have been terminated due to new legislation. Also, there is anecdotal information suggesting that the advisory zones were causing a lack of clarity in policy. In addition, in the busy ports along the eastern seaboard the AZ information may have been “washed out” with the huge volume of information



flowing through several communication channels. Aerial flights now focus on the monitoring program and designation of Dynamic Management Areas for commercial vessels (Pers. Comm. Tim Cole, NMFS/NEFSC Protected Species Branch Research Fish Biologist).

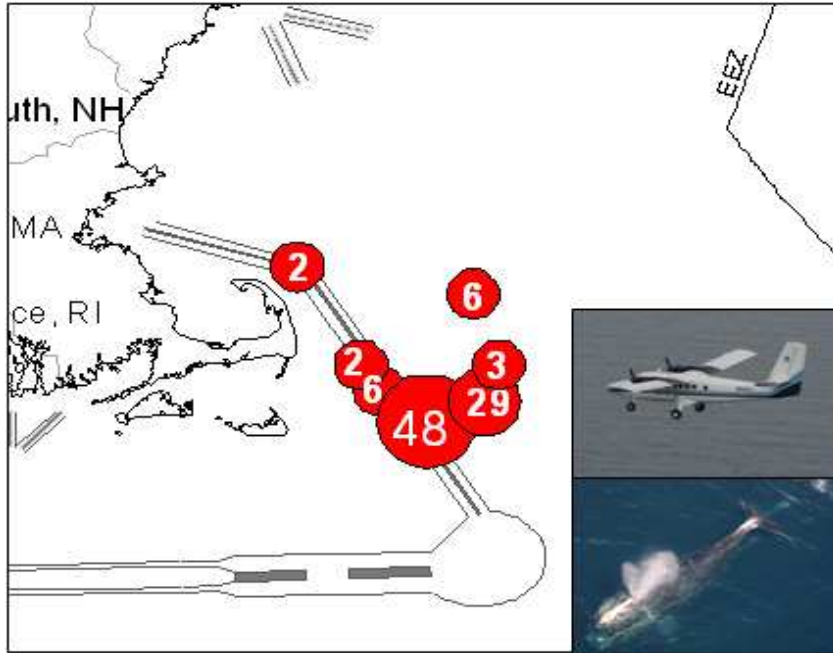


Figure 2. Right Whale Advisory Zones shown in red circles with the numbers of whales spotted from aerial surveys.

## 2) Mandatory Ship Reporting Systems, July 1, 1999-2008

Through a coordinated effort between NOAA and USCG (and adopted by the IMO), all vessels over 300 gross tons must report using INMARSAT C (a two-way satellite communications system used in the maritime industry) to a shore-based station when transiting two key right whale habitats (off Massachusetts and Florida/Georgia coast). Reporting vessels are sent a message containing information about right whales and measures that can be taken to avoid collision, as well as recent sightings in the area.

*You are entering essential habitat for North Atlantic right whales. The species is critically endangered and vulnerable to being hit by ships; whales may not avoid approaching ships. Collisions can damage sonar domes, propellers or shafts. Exercise prudent seamanship and advance planning to avoid right whales. Assume any whale sighted is a right whale. Monitor USCG Broadcast Notice to Mariners, NAVTEX, NOAA Weather Radio, Cape Cod Canal Vessel Traffic Control and Bay of Fundy Vessel Traffic Control for latest advisories and sightings. Consult NAVTEX, INMARSAT C SafetyNET, US Coast Pilots, and Notices to Mariners for ways to avoid hitting right whales and applicable regulations. Right whale critical habitats and Stellwagen Bank National Marine Sanctuary are marked on recently updated charts. Placards, videos and other material are available from shipping agents, port authorities, port pilots, and USCG. Please report all struck, dead or entangled whales immediately to USCG on VHF Channel 16. Be advised that whales may or may not remain at reported locations for extended periods. Surveys do not detect all whales and are not flown in poor weather. Whales, including other whale species, may occur at unreported locations. Whales were sighted at:  
[xxx]N, [xxxx]W @ [xxx]h, [date]  
[xxx]N, [xxxx]W @ [xxx]h, [date]*

Figure 3. Northeast Reporting Area (Sample Reply Message)



### 3) Surveys of Human Use Patterns and Baleen Whale Sightings, 2001

The SBNMS conducted a year-long survey aimed at identifying hotspots where mobile and fixed fishing gear-use co-occurs with larger densities of baleen whales. The distribution and abundance data for fishing practices and baleen whale presence was utilized to calculate an RIP (Relative Interaction Potential), with areas of high RIP indicate regions where whales might become entangled in fishing gear. This data is considered essential for small-scale management decisions within and beyond the Sanctuary.

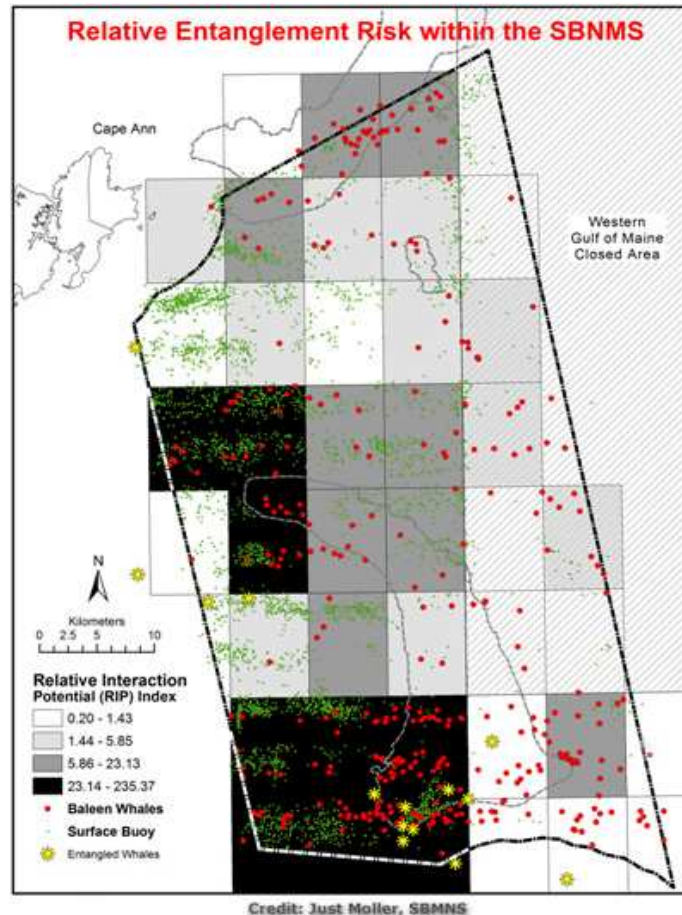


Figure 4. Relative Entanglement Risk within the SBNMS.

### 4) Voluntary Whale Watching Guidelines, 2003

SBNMS initiated a study to determine the degree of compliance to NMFS voluntary guidelines by whale watching vessels. Inconspicuous observers with hand-held GPS units were placed on various whale watching vessels from August to October of 2003. The distance and bearing from whales was determined by military grade binoculars, which allowed calculation of the geographical location. GIS software was then used to evaluate compliance to voluntary guidelines. The results indicated that whale watching vessels frequently did not comply with these guidelines. In addition, the evidence suggested that non-compliance increases as the distance from the whale increases. Essentially, vessels were accelerating at moderate distances from whales

and underestimating the safe distance for various speeds. Non-compliance rates were 63% in Zone 1 (within 300' radius of the whale), 92% in Zone 2 (within 600' radius) and 94% in Zone 3, (within 1/2 mile radius) (see below).

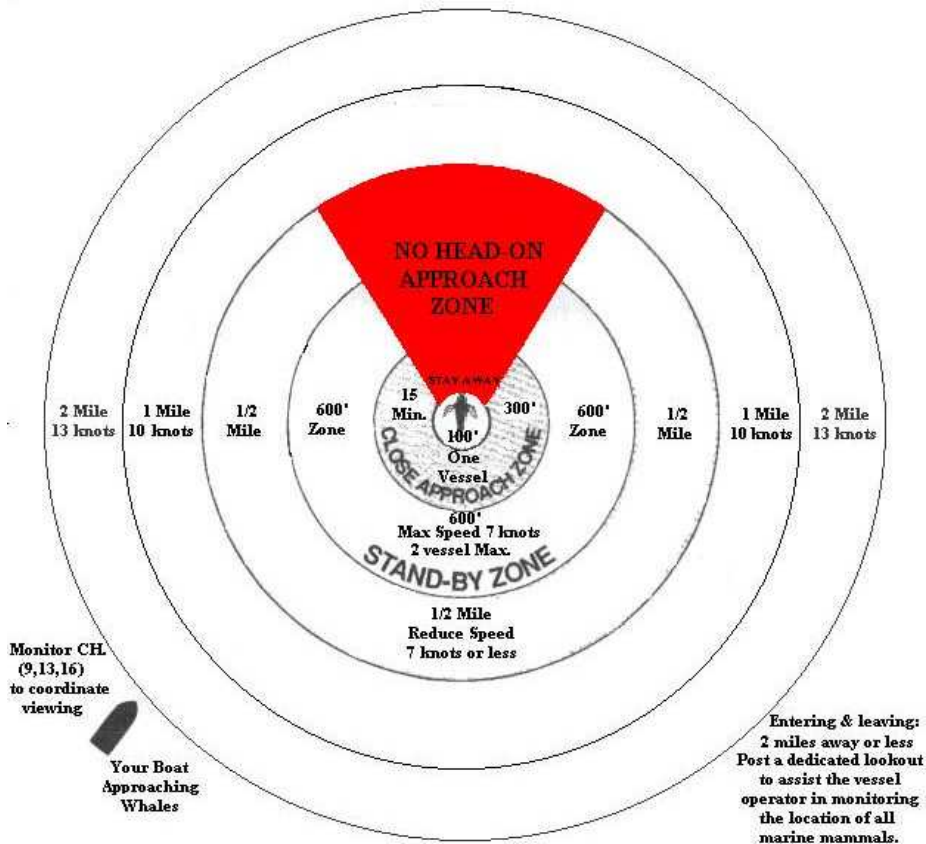


Figure 5. Whale watch vessel guidelines

**5) Digital Tagging, 2004-Ongoing**

SBNMS began a research program in 2004 using digital recording tags attached to marine mammals to increase the understanding of whale behavior and activities. The tags have provided important information about whale distribution, geographic location and depth in the water column, which, in turn, has informed management decisions.

**6) Passive Acoustic Programs, 2004-Ongoing**

Passive acoustic monitoring is also used to study the underwater “noise” of Stellwagen Bank. This includes gauging the impacts of anthropogenic noise, such as shipping, sonar and other long-term, low-level noise, in the area. Current research is a collaboration between SBNMS, the Northeast Fisheries Science Center, Cornell Laboratory of Ornithology’s Bioacoustics Research Program (BRP) and Marine Acoustics, Inc (a private marine technology company) and is funded by an award from the National Oceanographic Partnership Program (NOPP).

## 7) **Recommended Shipping Routes**, November 2006

Working with a long time series dataset of visual sighting records for baleen whales in the SBNMS, sanctuary researchers identified recommended transit routes for commercial shippers that avoided whale aggregation areas. Right whale distribution was shown to be correlated with currents that drive copepod distribution and abundance in Massachusetts and Cape Cod Bays, and other large baleen whale distributions were shown to be related to bottom types preferred by small schooling fish upon which the whales prey (pers comm. Leila Hatch, SBNMS).

With collaboration from NMFS and the USCG, these routes were further fine-tuned to ensure safe navigation and minimizing impacts on the industry. This step was the first move towards officially shifting the Traffic Separation Scheme leading into Boston Harbor (See Management Action 9).

## 8) **Mariner Training**, 2007 - Ongoing

The production and distribution of educational placards, posters and videos for mariners explain how they can avoid running into a whale. Recommended actions include:

- Maintain a vigilant watch
- Maintain a distance of 100 yards or greater from marine mammals; 500 yards or greater for northern right whales
- Reduce speed to 10 knots or less when one or more large cetaceans is observed
- If animal is in vessel path or close proximity, reduce vessel speed and shift engine to neutral

Also, SBNMS & NMFS maintain two websites specifically focused on right whale protection, and the regular update of NOAA Navigational Charts includes recent Right Whale Advisory Zones (See Management Action 6 for more information on Advisory Zones).

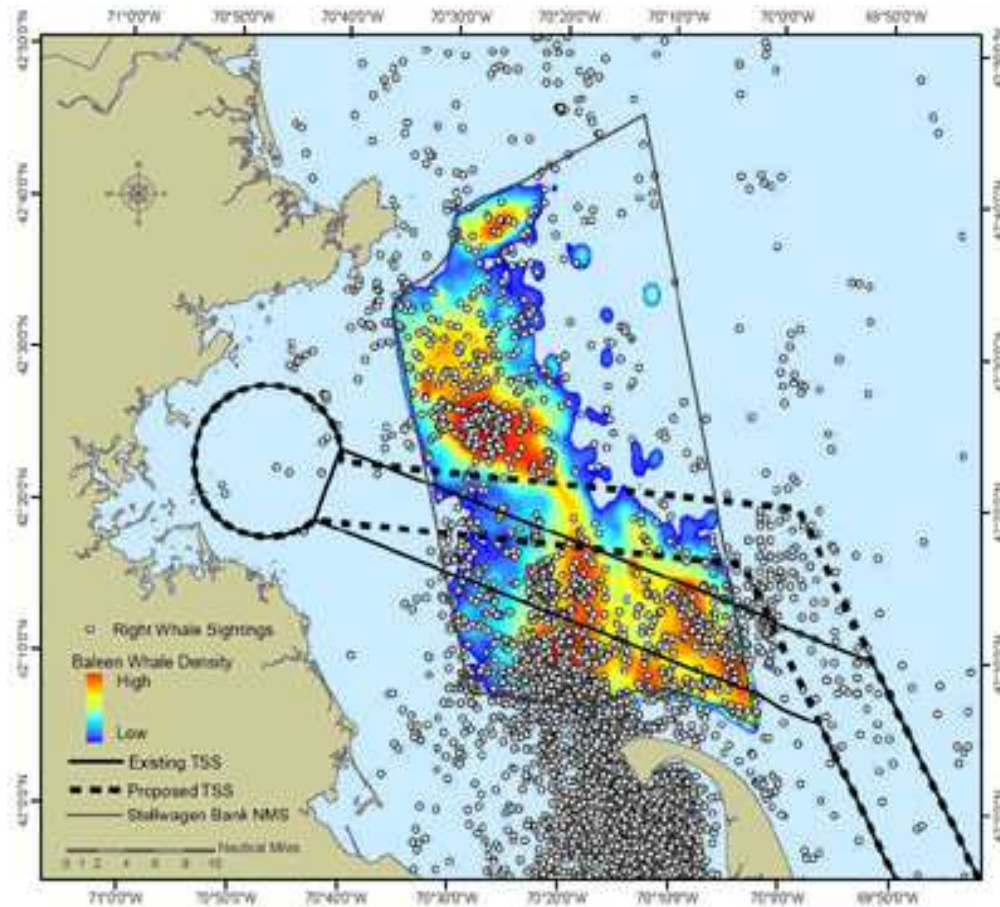
## 9) **Shifting the Boston Traffic Separation Scheme (TSS)**, July 1, 2007

Utilizing scientific data on whale density distribution near the TSS, the Sanctuary determined that rotating the scheme 12 degrees north and narrowing each lane by ½ nm each would spatially locate the TSS in an area which would reduce the likelihood of ship strikes by 81% for all baleen whales and 58% for right whale in particular.

Data Used for implementation:

- Long-term distribution of baleen whale sightings
- Habitat characterization
- Whale feeding ecology
- Characterization of large commercial vessel use of SBNMS
- Requirements for proposal to IMO

Policy process: The Office of National Marine Sanctuaries, NOAA Fisheries Office of Protected Resources, and NOAA’s General Counsel for International Law jointly proposed to the International Maritime Organization shifting the current TSS 12 degrees to the north. IMO adopted this measure. The process took roughly 7 years to accomplish due to multiple stakeholder groups involved and the data requirement for an IMO proposal.



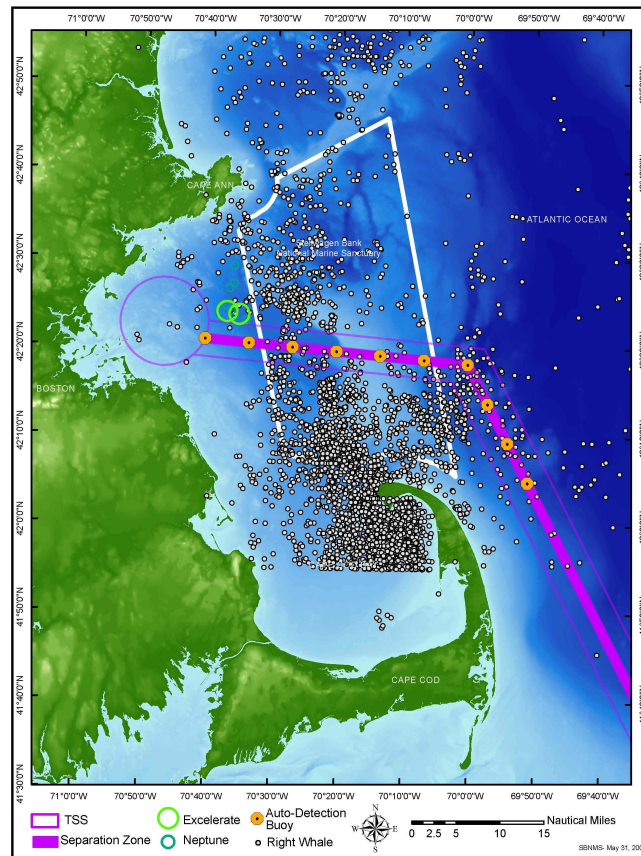
**Figure 7. Shift in the Traffic Separation Scheme to avoid high density areas of baleen whales (Figure courtesy SBNMS).**

Automatic Identification System (AIS) data shows high compliance by vessels using the new TSS. Transiting within the TSS is not required of vessels by either the USCG or IMO, though failure to follow TSS often carries liability should a collision or other incident occur. Although vessel and whale monitoring indicated that the shift in the TSS would reduce the risk of vessel-whale collisions, it is difficult to link this action, in isolation, to population-level recovery. However, acoustic monitoring data have supported the hypothesis that large baleen whales are present more often in areas outside the newly-shifted TSS than they are inside the newly-shifted TSS (pers comm. Leila Hatch, SBNMS).



# 10) Real-time Passive Acoustic Detections and Dynamic Speed Reduction by Liquefied Natural Gas Carriers, 2007-Ongoing

An array of auto-detection buoys has allowed NOAA to better detect right whale presence by digital and expert (human) recognition of their signature upcall. This research shows that in some conditions, this system can be more successful in detecting the presence of right whales than visual observations from a ship or aerial monitoring. Surface buoys are connected to hydrophones suspended in 60-120 feet of water, which listen for the right whale upcall. When one of these calls is detected by software designed to recognize the frequency, timing and several other characteristics of the upcall, the data is transmitted to the Cornell Lab of Ornithology, where analysts in the Bioacoustics Research Program confirm or decline the detection as a true upcall. Analysts issue updates to Liquefied Natural Gas (LNG) carriers transiting through or near the array. The reports are also available through the Right Whale Sighting Advisory System, operated by NOAA. These reports are available online, are sent over email to relevant distribution lists and are included in marine safety bulletins, such as Notice to Mariners.



**Figure 6. The array of real-time acoustic detection buoys and location of LNG terminals. Right whale sighting data for areas of interest was taken from the North Atlantic Right Whale Consortium Database. Figure courtesy of SBNMS.**

In order to obtain licensing for the building of two LNG offshore ports adjacent to the SBNMS’s western boundary, the licensing agencies- USCG and Maritime Administration (MARAD), require LNG carriers Neptune, LLC and Excelerate, LLC

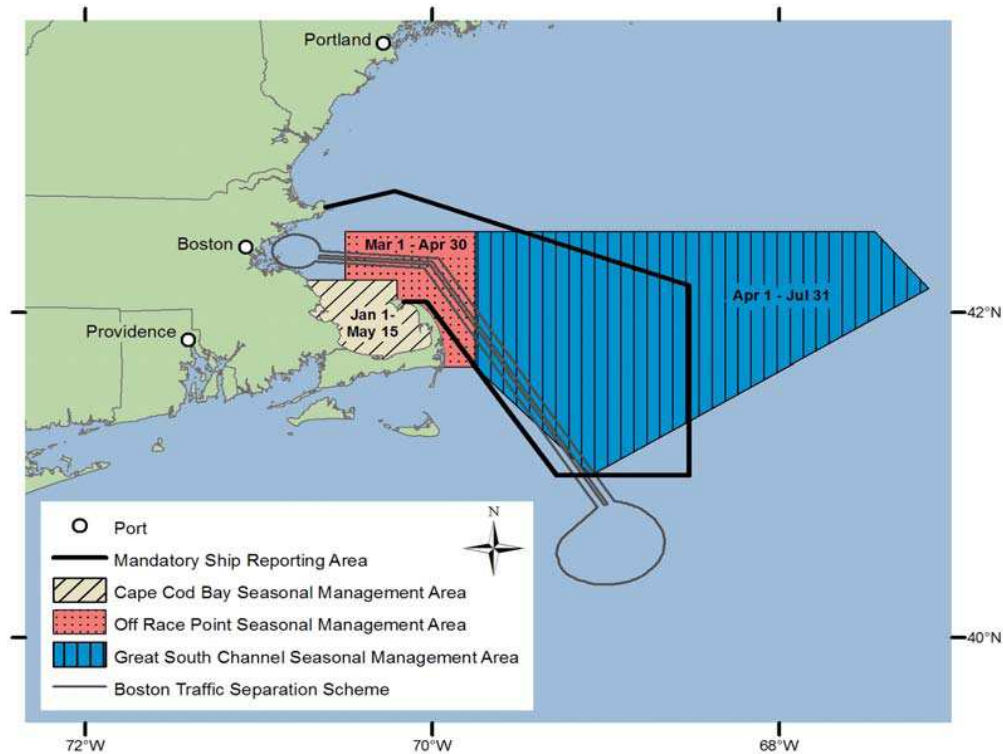
to reduce their speeds in zones where a detection buoy has indicated right whale presence within the last 24 hours, as well as comply with SMA speed zones (which had not been implemented at the time, but were being considered—see Management Action 10). The carriers are required, as a condition of licensing, to maintain the buoy network for the life of their ports (25-40 years).

To date, Automatic Identification System (AIS) data shows 100% compliance by LNG carriers to these conditions, although the small number of gas shipments to the single operational port (2 total) and short period of time since implementation (16 months) makes it difficult to assess whether the additional risk of ship strikes associated with Port activities has been successfully eliminated or reduced by this mitigation system. However, since the building of both LNG ports, there have been no ship strikes by LNG carriers (pers. comm. Leila Hatch, SBNMS). The buoy array is shown above, with each buoy indicated by an orange dot. The spatial arrangement is related to the propagation of right whale upcalls in the acoustic environment of the sanctuary and the shipping lanes.

#### **11) Establishment of Seasonal and Dynamic Management Areas, December 9, 2008**

This regulation is the culmination of roughly twelve years of work, and much of the preceding data and management actions directly contributed or led to the establishment of Seasonal and Dynamic Management areas or SMAs and DMAs by NOAA. NMFS has mandated that vessels exceeding 65 ft. must, during certain times of the year, reduce their speed below 10 kts to reduce the risk of collisions with right whales. Vessels may also re-route to avoid the SMAs or DMAs. Ships are exempt from this regulation in times of bad weather and/or poor visibility, in order to maintain safe maneuvering speeds. SMAs and DMAs exist along the entire eastern seaboard, and not solely in the SBNMS. The diagram below contains three SMAs, the Great South Channel, Cape Cod Bay and Off Race Point Management Areas. All regions have different time intervals where speed reduction or avoidance is required. DMA's move with whale presence (approximately every two to six weeks) and remain voluntary speed reduction zones (pers comm. Tim Cole, NMFS).

The SMAs lower speeds in Cape Cod Bay from January 1<sup>st</sup> to May 15<sup>th</sup>, Off Race Point from March 1<sup>st</sup> to April 30<sup>th</sup>, and in the Great South Channel from April 1<sup>st</sup> to July 31<sup>st</sup>. Both the Cape Cod Bay and the Off Race Point SMAs overlap with the SBNMS; with 8.17% of the Sanctuary contained in the Cape Cod Bay SMA and 55.02% contained in the Off Race Point SMA. Accordingly, 36.81% of the SBNMS, primarily the northwestern and northeastern corners and the western boundary of the sanctuary, is not included in speed regulations at any time of year. From March 1<sup>st</sup> to April 30<sup>th</sup> (2 months) when both Cape Cod Bay and Off Race Point SMAs are operational, 63.19% of the sanctuary is included in mandated speed reductions. Dynamic Management Areas (DMAs) can also be implemented outside of SMA time periods and areas to protect visually-sighted groups of right whales. Speed reductions within DMAs are voluntary at this time (pers. comm. Leila Hatch, SBNMS).



**Figure 8. The distribution of SMAs and DMAs with the SBNMS region. SMAs and DMAs exist throughout the eastern seaboard**

Since their implementation in January 2009, preliminary AIS monitoring by both the NMFS and SBNMS indicate that only about 50% of vessels have been complying with the speed reductions below 10 knots in SMAs. Further assessments of voluntary compliance with DMAs are ongoing. Compliance studies will continue to be important in the first years of implementation of the rule to assess the needs for further outreach and enforcement actions to promote the effectiveness of the action (pers. comm. Leila Hatch, SBNMS).

### **Analysis: Potential Application to the Santa Barbara Channel Region**

This section analyzes the extent to which the management actions on the east coast might be applied in the Santa Barbara Channel region. There are multiple lessons to be learned from the management strategies of SBNMS. Management actions that may be transferable to Santa Barbara Channel region include: education and outreach programs, improved monitoring efforts and seasonal management areas.

### **Similarities:**

- High densities of commercial shipping traffic (Both SBNMS and CINMS are located near or in international shipping lanes)
- Biodiversity hotspots (SBNMS and CINMS are located in areas with endangered species and valued ecosystems)
- Threat of ship strike to endangered species (e.g. right, fin and blue whales)

- Right whales and blue whales (as well as other large cetaceans present in Santa Barbara channel) appear in the Sanctuaries during specific time periods, which can be predicted with some degree of certainty.
- Large whale “songs”, such as those made by blue and humpback whales, can be accurately detected through acoustic monitoring, though several factors must be considered for detectability: ambient noise levels, distance, species and male vs. female use of vocalizations.
- Ship advisories requesting a voluntary speed reduction had low compliance in both regions, and it was unclear whether ships were not receiving advisories or whether they were choosing not to respond; this point is now moot on the east coast due to the new regulations.
- Research on right whales presence through visual sightings has been conducted in SBNMS and along the Atlantic coast for approximately 15 years. SAMSAP monitoring of CINMS and the Santa Barbara Channel has been conducted for over 10 years.

**Differences:**

- SBNMS ship strike mitigation actions have a single-species focus. CINMS has adopted a multi-species approach due to the several ESA-listed large whales present in Santa Barbara Channel.
- Spatial area of concern: SBNMS is 638 square nautical miles and roughly rectangular in shape, while CINMS is 1,110 square nautical miles, elongate and interspersed with islands.
- Vessel traffic density: SBNMS has 3,500 large (over 300 gross ton) commercial ships transit through their waters, whereas CINMS has approximately 6,500 large commercial ships transiting per year.
- There is a greater sense of urgency regarding the right whale population, due to their critically low population size. Estimated abundance of Northern right whales is ~350 individuals, whereas the coastal California blue whale population numbers ~2000 and the worldwide population is estimated to be over 10,000 animals.
- Ship strikes of right whales in the SBNMS has been observed over the course of many years. Ship strikes of large whales in the Santa Barbara Channel region appears to be new phenomena. It is unknown whether these differences are due to varying abilities to identify ship strike incidence in species other than right whales, or if other factors, such as shipping density may be at play.
- Acoustic monitoring has been ongoing in SBNMS for approximately 5 years. On the west coast, acoustic research is just beginning.
- Eliminating mortalities from ship strikes has been identified as a necessary action to protect North Atlantic right whales from extinction and reverse the downward trend in their population. Ship strikes have been identified as a limiting factor to the species recovery in the blue whale recovery plan, however this stock and the population globally does not have a downward population trend like right whales.



## **Opportunities and Recommendations**

Several mitigation tools could possibly be tailored to the Santa Barbara Channel region, despite the differences between the two regions. Outreach and mariner training tools continue to be an effective means for raising awareness and disseminating prevention techniques on the east coast. The CINMS Sanctuary's Education Team (SET) is currently taking action on developing mariner training products. These outreach products and strategies should target the commercial maritime industry and other ocean-users such as fisherman, whale-watching vessels and cruise ships.

The utilization of a passive acoustic monitoring display in the Santa Barbara Channel may be prohibitively costly. The difference in size and shape of the two areas (SBNMS vs. SB Channel) may make the process more complicated to implement. However, alternative monitoring techniques may exist which can predict the presence of large whales in SB Channel at a lower cost.

Lack of funding is hampering the implementation of monitoring programs for marine mammal and commercial vessel research. Without reliable data, actions such as the Mandatory Ship Reporting System, the Right Whale Advisory System, shifting of the TSS and the Final ruling establishing SMAs and DMAs would not have been possible.

Specifically, this case study suggests the following actions:

- Monitor annual distribution of krill, which can be affected by oceanographic conditions and is critical to predicting large whale spatial distribution.
- Continue and improve on monitoring efforts to track large whale distribution (spatially and temporally) within the Sanctuary and in vicinity of the shipping lanes. Ex: AIS data, acoustic monitoring, aerial monitoring, etc.)
- Improve understanding of life history, biology and behavior of large whales present in Santa Barbara Channel.
- Recruit local colleges/universities to tackle research projects related to large whales and impacts of shipping traffic in the Santa Barbara Channels and greater southern California.
- Seek out additional sources of funding to continue monitoring/research efforts in the Channel Islands

The most recent regulatory action by NMFS—the creation of DMAs along the eastern seaboard—may have some transferability to Santa Barbara Channel and CINMS. Large whale species in Santa Barbara Channel have predictable temporal behaviors (i.e. large concentrations are typically in Channel from June through September). Additionally, SAMSAP data suggests that there may be spatial areas of greater whale aggregations. The appropriateness of a DMA for the Santa Barbara Channel region needs thorough evaluation and consideration. Additionally, NOAA should continue to engage and involve the maritime industry in this process.

## **Key Contacts**

Stellwagen Bank National Marine Sanctuary- David Wiley and Leila Hatch  
USEC Deputy General Counsel Attorney Advisor General-Lindy Johnson  
Office of Protected Resources (NMFS)- Gregory Silber, PhD  
Northeast Fisheries Science Center (NMFS)- Tim Cole  
United States Coast Guard  
International Maritime Organization  
Center for Coastal Studies  
Woods Hole Oceanographic Institution  
International Wildlife Coalition  
Whale Center of New England  
Several whale watch companies

## **References**

### *North Atlantic Right Whale Population Ecology*

Fujiwara, Masami, Caswell, Hal. 2001. "Demography of endangered northern right whale". *Nature*. 414 (6863): pp. 493-4

Scott D. Kraus, et al. 2005. "North Atlantic right whales in crisis". *Science*. Vol 309, pp. 561-562

### *Monitoring programs*

NOAA Stellwagen Bank National Marine Sanctuary, Research Programs  
<http://stellwagen.noaa.gov/science/researchprograms.html>

The National Academies Press, "Ocean Noise and Marine Mammals." Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals,  
<http://www.nap.edu/openbook.php?isbn=0309085365>

University of Rhode Island, Discovery of Sound in the Sea, <http://www.dosits.org/>

### *Mariner Training*

National Marine Fishery Service  
[http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rightwhale\\_northatlantic.htm](http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rightwhale_northatlantic.htm)

"A Prudent Mariner's Guide to Right Whale Protection" Video:  
<http://www.nero.noaa.gov/shipstrike/doc/cd.html>

Placard: [http://www.nero.noaa.gov/shipstrike/doc/guidelines%20placard\\_high.pdf](http://www.nero.noaa.gov/shipstrike/doc/guidelines%20placard_high.pdf)

Merchant Mariner Education Program  
[http://www.nero.noaa.gov/shipstrike/doc/Merchant%20Mariner%20Educ%20Final%20Report%20\\_2007.pdf](http://www.nero.noaa.gov/shipstrike/doc/Merchant%20Mariner%20Educ%20Final%20Report%20_2007.pdf),

### *Mandatory Ship Reporting Systems*

NMFS, <http://www.nmfs.noaa.gov/pr/shipstrike/msr/>

International Maritime Organization, <http://www.imo.org/>

*Surveys of Human Use patterns and Baleen Whale Sightings*

SBNMS, [http://stellwagen.noaa.gov/science/standardized\\_survey.html](http://stellwagen.noaa.gov/science/standardized_survey.html)

Wiley, D. N., Moller, J. C., and Zilinskas, K. A. 2003. The distribution and density of commercial fisheries and baleen whales within the Stellwagen Bank National Marine Sanctuary: July 2001-June 2002. MTS Journal 37(1), 35-53.

*Voluntary Whale Watching Guidelines*

NOAA, Northeast Region Whale Watching Guidelines,  
[http://www.nero.noaa.gov/prot\\_res/mmv/Whale%20Watching.%20FINAL.%206.20.08.2.pdf](http://www.nero.noaa.gov/prot_res/mmv/Whale%20Watching.%20FINAL.%206.20.08.2.pdf)

*Right Whale Sighting Advisory System*

Northeast US Right Whale Sighting Advisory System,  
<http://rwhalesightings.nefsc.noaa.gov/>

Cole, Timothy, Gerrior, Patricia, Merrick, Richard. (2007) *Methodologies and Preliminary Results of the NOAA National Marine Fisheries Service Aerial Survey Program for Right Whales (Eubalaena glacialis) in the Northeast U.S., 1998-2006*. Northeast Fisheries Science Center reference Document 07-02.  
<http://rwhalesightings.nefsc.noaa.gov/2007%20NOAA%20Methodologies%20and%20Results%20Aerial%20Surveys.pdf>

*Recommended Shipping Routes*

NMFS, <http://www.nmfs.noaa.gov/pr/shipstrike/routes.htm>

*Shifting the Boston Traffic Separation Scheme*

SBNMS, <http://stellwagen.noaa.gov/science/tss.html>

*Passive Acoustic Monitoring and LNG Carriers*

<http://www.listenforwhales.org/NetCommunity/Page.aspx?pid=434>

*Establishment of Dynamic Management Areas*

Federal Register Notice, <http://www.nmfs.noaa.gov/pr/pdfs/fr/fr73-60173.pdf>

## Appendix A

**The following timeline includes management actions carried out to protect endangered North Atlantic right whales from 1970 to the present. Management actions discussed in this paper are referred to as Management Action ##.**

**1970:** North Atlantic right whales listed as endangered under the Endangered Species Conservation Act (the precursor to the Endangered Species Act (ESA)).

**1973:** North Atlantic right whales listed as endangered on the ESA and depleted on the Marine Mammal Protection Act.

**1991:** Work on protecting North Atlantic right whales began in 1991 following completion of the recovery plan. Implementation team assembled and began series of actions including ways to reduce ship strikes. There were sufficient data in 1991 to indicate the ship strikes were a threat to right whales.

**1993:** Right whale sighting network began off southeast US (breeding area)

**1997:**

- Right whale sighting network began off northeast US coast (foraging area) Whale sightings began to be broadcast through Notices to Mariners, weather service, Army Corps of Engineers, Traffic controllers, web pages and through shipping agents, pilots and port authorities. (**Management Action 1**)
- NMFS began providing regular updates to the Coast Pilot about right whales, methods to avoid them, information about mandatory reporting requirement. NOAA charts are updated with right whale advisories. In 2005, this material added the ship speed advisory of 12 knots or less.
- Right whale minimum approach regulation. Prohibited vessels, including aircraft, from all approaches within 500 yards to minimize disturbance.

**1999:**

- Mandatory ship reporting system jointly funded by USCG and NMFS, required ship 300 tons or more to report location, speed, and destination. Information was transmitted back to ship on the location of whales. Only required in the SE and NE during periods of whale aggregations. This action helped NMFS collect information on ship traffic volume, routes, and speed to assist in analysis of measures to reduce ship strikes. (**Management Action 2**)
- Throughout the 1990s NMFS was conducting research on right whales, along with the Center for Coastal Studies, Stellwagen Bank NMS, and other organizations.

- NMFS determined that the regulations were necessary because despite conservation efforts, right whale deaths from ship strikes over the ten year period continued.

**1999-2001:** Ship strike working group was established and meetings held resulting in over 100 recommended measures, regulatory and non-regulatory, to reduce ship strike and mortalities. Information used included distribution and occurrence of known ship strikes, data on right whale distribution, aggregations, and migrations along coast, vessel traffic patterns, input from stakeholder groups.

**2001:** Surveys of human use patterns and baleen whale sightings were conducted by SBNMS to determine how fishing activity impacts whales in the region. (**Management Action 3**)

**2003:** SBNMS conducts study of compliance by whale watching vessels to voluntary whale approach guidelines. (**Management Action 4**)

**2004:**

- NMFS issues an Advanced Notice of Proposed Rule Making to inform the public of the agency’s plan to issue regulations for fishing and shipping within areas occupied by right whales in order to reduce serious injuries and mortalities of whales.
- SBNMS begins monitoring right whales through tagging and passive acoustic monitoring devices. (**Management Action 5 & 6**)

**2006:** NMFS issues a proposed rule that would require vessels (larger than 65 ft) to slow to 10 knots in certain times and areas where interactions between right whales and ships are considered most likely, based upon the years of ship strike observations in the Atlantic. (**Management Action 7**)

**2007:**

- NMFS creates education/outreach products for mariner training, including “A Prudent Mariner’s Guide to Right Whale Protection.” (**Management Action 8**)
- A negotiation between NOAA, USCG and International Maritime Organization allows a shift of the Boston Traffic Separation Scheme (TSS) in order to reduce whale-vessel interactions. (**Management Action 9**)

**2007-2010:** Passive acoustic monitoring of the areas around and in SBNMS allows more accurate detection of right whale presence. LNG carriers have agreed to reduce speed in zones where the surface buoy has indicated Right Whale presence within the last 24 hours. (**Management Action 10**)

**2008:** Final rule is published (goes into effect January 2009) with mandatory vessel speeds for specific times and areas of the southeast, central, and northeast U.S. (**Management Action 11**)

# **Section III**

**Vessel Management Tools to Reduce the Risk of  
Humpback Whale Harassment, Injury and  
Mortality in Glacier Bay National Park, Alaska**



## **Table of Contents**

Introduction.....	III - 1
Regional Context .....	III - 2
Management Actions .....	III - 3
1. Research and Monitoring Programs .....	III - 3
2. Glacier Bay Special Regulations .....	III - 5
a. Whale Waters.....	III - 5
b. Vessel Operating Restrictions .....	III - 5
c. Vessel Permitting System .....	III - 7
Analysis:	
Similarities and Differences to Santa Barbara Channel .....	III - 7
Opportunities and Recommendations.....	III - 8
Key Contacts and References .....	III - 9
Appendix A: Timeline .....	III - 11
Appendix B: Whale Waters Restrictions.....	III - 12
Appendix C: Vessel Permitting Regulations.....	III - 13
Appendix D: Cruise Ship Concession Permit Application – Environmental Objectives .....	III - 16



## Introduction

The humpback whale (*Megaptera novaeangliae*) was classified as an endangered species in 1973, the same year that Congress passed the Endangered Species Act (ESA). Before being exploited by the commercial whaling industry, the Central North Pacific humpback population was estimated to number between 15,000 and 20,000 individuals (Rice 1978). When commercial whaling ended in 1966, the population size was estimated at ~1,000 animals (Rice 1978). It has since risen to just under 20,000 in 2008 (Calambokidis et al 2008). The humpback whale remains endangered under the ESA, yet has been down-listed to a species of “Least Concern” by the International Union for the Conservation of Nature (IUCN 2009). Current human threats include: vessel strikes, behavioral modification from vessel traffic, disturbance from anthropogenic underwater noise, habitat degradation, climate change and fishing gear entanglement.

The Central North Pacific stock of humpback whales migrate between winter/spring mating and calving areas in the Hawaiian Islands and summer/fall feeding areas in northern British Columbia, Southeast Alaska and Prince William Sound west to Unimak Pass (Angliss & Outlaw 2008). The number of whales that make up the Southeast Alaska feeding aggregation in 2000 was calculated using mark-recapture models as ~961 (Straley et al 2009). The most recent population estimate is approximately 3,000-5,000 as determined by the Structure of Populations, Levels of Abundance and Status of Humpback Whales in the North Pacific, or SPLASH program (Calambokidis et al 2008). Of those 3,000-5,000 humpback whales, approximately 150 are documented in Glacier Bay and Icy Strait each year (Neilson and Gabriele 2008). Approximately 90% of the humpback whales (excluding calves) documented in Glacier Bay and Icy Strait in 2008 been sighted there in previous years, indicating that many of the whales in SE Alaska show a high level of fidelity to relatively small summer feeding areas (Neilson & Gabriele 2008).

Glacier Bay National Park (the “Park” or “GLBA”) first observed the potential negative impacts of vessel traffic on humpback whales as early as 1978, when researcher Charles Jurasz documented a significant proportion of the whales he had been monitoring abruptly leave Glacier Bay in the middle of the summer. This decline coincided with a significant increase in cruise ship, recreational vessel and fishing traffic, and therefore vessel traffic was thought to be the primary deterrent to whale visitation. Since that time, the National Park Service, with consultation from the National Marine Fisheries Service (NMFS), has been working to manage vessel traffic in the Park.

Currently, vessels are managed in the Park through a thorough permitting process, which only allows a maximum of two cruise ships in Glacier Bay proper each day during the summer and caps the numbers of permitted private and commercial vessels. In addition, vessel operating restrictions such as speed limits and course restrictions are enforced in designated “whale waters”. Finally, throughout the Park, humpback whale approach regulations are intended to minimize whale disturbance and lower the risk of whale/vessel collisions (36 CFR Part 13). Regulatory actions have been fairly effective, though two fatal ship strikes have occurred, one in 2001 and one in 2004. Several non-

lethal ship strikes have occurred during this time period as well (Neilson & Gabriele 2001, 2004).

### **Regional Context**

Glacier Bay National Park contains 940 square nautical miles of marine waters surrounded by tidewater glaciers and snow-capped peaks. The Park is located in Southeast Alaska, and although near to Juneau, it has no road or year-round ferry access. Sea kayaks, cruise ships and private boats are the three main avenues for visitation, though cruise ships account for the majority of the tourism traffic.



**Figure 1: Glacier Bay National Park**

*Source: GLBA*

Humpback whales migrate seasonally to the Park to feed on small schooling fish such as sand lance, juvenile walleye pollock, capelin and Pacific herring, which thrive in the cold, nutrient-rich waters of the Park (GLBA 2008). Humpback whales were first reported as early as 1899 in the area and persisted until around 1976, when tourism began to flourish in the Park, increasing 66 percent in only 4 years (Catton 1995).

During the summers of 1978 and 1979, many of the humpback whales being monitored by Jurasz appeared to have abandoned the Park, causing great concern and controversy amongst managers, commercial operators and environmentalists in the community. The National Park Service increased their monitoring efforts and sought ways to limit vessel access. NMFS was contacted for a

Section 7 consultation under the Endangered Species Act to supply a Biological Opinion, which would justify temporary regulations limiting vessel entry and behavior.

In 1979, interim whale waters speed limits and a ¼ mile approach regulation were implemented. Temporary regulations to address vessel traffic went into effect in 1980. The cruise ship industry reacted strongly, sparking the beginning of several years of debate between the Park, the Reagan administration and the cruise ship industry (Catton 1995). In 1985, after the rendering of a second Biological Opinion by NMFS, whale waters restrictions, vessel operating procedures and the vessel quota system were all codified into the GLBA Special Regulations, CFR Title 36, Subpart N (GLBA 2003).

In May 1996, regulations were amended to establish a new vessel quota system, boat operating requirements and other risk prediction measures. The quota system allowed a 20% increase in the number of vessels. They were supported by an environmental assessment, a vessel management plan and a third NMFS Biological Opinion. These

documents declared a “Finding of No Significant Impact” (FONSI) in this increase in vessel quotas (NPS 2008).

In 1997, the National Parks and Conservation Association (NPCA) filed suit against the Park, demanding that a full EIS be prepared, rather than just an EA. After a lengthy battle, the 9<sup>th</sup> Circuit Court of Appeals determined that the regulations did indeed violate the National Environmental Policy Act (NEPA). By 2001, traffic levels returned to pre-1996 levels. A full EIS was conducted in 2003 and a revised rule allowing an increase of 10% in cruise ship permit issuance (at the Superintendent’s discretion) was codified in Final Rule Vol. 71, No. 230.

### **Management Actions**

There are four management actions currently in use by GLBA to mitigate the effects of vessel traffic on humpback whales:

- 1) Research and Monitoring Programs
- 2) Glacier Bay Special Regulations:
  - Whale Waters Restrictions
  - Vessel Operating Procedures
  - Vessel Permitting System

A summary of each management action follows. The Key Contacts and Reference section provides links to additional information.

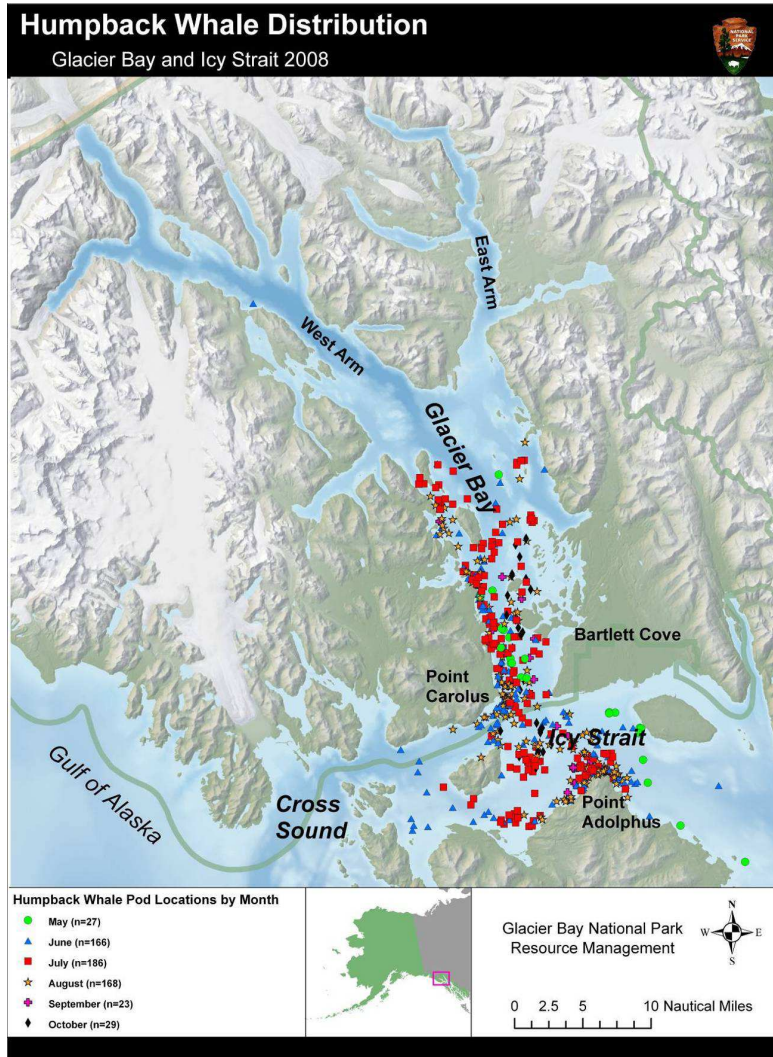
#### **1. Research & Monitoring Programs, 1981-Ongoing**

The NPS allocated \$275,000 for research in fiscal year 1981, and \$350,000 the following year. These first research contracts were awarded through the National Marine Mammal Laboratory of the NMFS. They were completed in 1983, and marked the beginning of significant resources going into humpback whale monitoring and research. Park-sponsored research in the early 1980s focused on prey species abundance, underwater acoustic monitoring and whale-vessel interactions (Catton 1995).

One of the most definitive studies showing humpback whale behavioral changes in relation to vessel proximity is Baker and Herman (1989). The study showed: “Changes in the whales’ respiratory behavior and orientation were the most sensitive indicators of vessel disturbance. Whales responded to the close proximity of vessels by decreasing blow intervals, increasing dive times, and moving away from the vessels’ path....Overall, whales exhibit a considerable degree of short-term changes in their behavior in response to vessel traffic (Baker & Herman 1989)”. This research is still the guiding science behind current policy for whale-vessel interactions within the park.

GLBA began systematically (as opposed to opportunistically) monitoring humpback whales in Glacier Bay and the adjacent waters of Icy Strait in 1985 and the program has continued every year since then using the same basic methods. Photographs are taken of the underside of each whale’s flukes to identify and document individuals, as well as their residence times, spatial and temporal distribution, feeding behavior and reproductive

parameters. The data from this program are also used to inform whale waters vessel restriction decisions (See Management Action 2: Whale Waters Restrictions).



**Figure 2: Study area in Glacier Bay and Icy Strait showing distribution of humpback whale pods in 2008. Each symbol represents a pod containing one or more whales. Source: GLBA**

These data show that whales tend to stay within ½ mile of shore in the Park and that many individuals return to the area over multiple seasons. Humpback whales are primarily concentrated in the lower and middle parts of Glacier Bay, which is also where vessel traffic heading up and down bay is concentrated (by the natural bottleneck of the fjord system (See Figure 2). The whale visitation rates from 1985-2008 have varied, with an overall increasing trend. The maximum number of whales seen in Glacier Bay over that 13 year time period was 111 in 2004, with the 1985 initial count at 15 individuals. The maximum number of whales in Icy Strait was 136, seen in 2008, with the 1985 initial count at 30 individuals (Neilson & Gabriele 2008).

## **2. Glacier Bay Special Regulations**

### **a. Whale Waters Restrictions, 1979-Ongoing**

Whale waters areas are subject to vessel speed and course restrictions for the purpose of reducing impacts on feeding humpback whales. These restrictions were created in 1979 and remain similar in structure to current Park management, though the number of designated whale waters areas and the dates the restrictions are in effect have changed over time (GLBA 2003). Whale waters are any area of Glacier Bay with a high probability of whale presence, as determined by past patterns of occurrence, or recent sightings. Permanent whale waters come into effect every summer season (see Appendix B for exact dates) and are located in lower Glacier Bay (See Figure 3), while temporary whale waters can be designated by the Superintendent, requiring vessel slow-down to 10 knots or less. Additionally, vessels 18 feet (5.5 meters) or larger must maintain a distance of at least 1 nautical mile from shore in whale waters and in narrow areas, must remain in mid-channel. (36 CFR Subpart N, 13.1174). See Appendix B for the GLBA Special Regulations regarding Whale Waters Restrictions.

### **b. Vessel Operating Restrictions, 1985-Ongoing**

As specified in the Vessel Operating Restrictions of GLBA, Code of Federal Regulations Title 36, Subpart N, 13.1170:

- (a) Operating a vessel within 1/4 nautical mile of a [humpback] whale is prohibited, except for a commercial fishing vessel authorized under this subpart that is actively trolling, setting, or pulling long lines, or setting or pulling crab pots.
- (b) The operator of a vessel inadvertently positioned within 1/4 nautical mile of a [humpback] whale must immediately slow the vessel to ten knots or less, without shifting into reverse unless impact is likely. The operator must direct or maintain the vessel on as steady a course as possible away from the whale until at least 1/4 nautical mile of separation is established. Failure to take such action is prohibited.
- (c) The operator of a vessel or seaplane positioned within 1/2 nautical mile of a [humpback] whale is prohibited from altering course or speed in a manner that results in decreasing the distance between the whale and the vessel or seaplane.



# Boating Guide

Glacier Bay National Park and Preserve  
National Park Service  
U. S. Department of the Interior



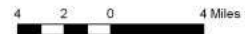
- Non-motorized waters: 5/1 to 9/15 except as noted.
- Critical wildlife areas; year round closure except as noted. Approach no closer than 100 yards except as noted.
- Noise restrictions: 10:00 pm to 6:00 am from 6/1 to 8/31.
- Overnight camping closures: 5/1 to 8/15 due to high bear concentrations.
- Park waters

### Whale Waters

Vessel route and speed restrictions apply:  
 May 15 - Sept. 30

### Glacier Bay National Park and Preserve

Please contact the Visitor Information Station for more information on boating in Glacier Bay.  
<http://www.nps.gov/glba>  
907-697-2627



Nov. 2007

**Figure 3: Whale Waters** Source: Glacier Bay National Park and Preserve, [http://www.nps.gov/glba/planyourvisit/upload/boating\\_guide\\_2008\\_c\\_p1600.jpg](http://www.nps.gov/glba/planyourvisit/upload/boating_guide_2008_c_p1600.jpg)

### **c. Vessel Permitting System, 1981-Ongoing**

A vessel permit system was first introduced to GLBA in 1981 by the Superintendent in response to increasing vessel traffic and demands for whale protection by the community and environmental groups (Catton 1995). The permit system established a quota of no more than 89 cruise ships over the season (June, July, August) and a maximum of 2 cruise ships per day (Catton 1995). See Appendix C for the GLBA Special Regulations for vessel permitting.

Today, the Park's permitting process is designed to protect not only marine mammals, but also to reduce air, water and noise pollution from cruise ships within GLBA boundaries. Cruise ships must have a Concession Contract, Permit, or Commercial Use Authorization (CUA) in order to enter GLBA (GLBA 2008). A cruise ship, according to 36 CFR 13.1102, is any motor vessel of at least 100 tons gross (domestic) or 2,000 tons gross (International Convention System) certified to carry more than 12 passengers for hire.

New vessel regulations were created in 2007 based on the 2003 EIS. The new regulations divide quota periods into two separate sessions (a prime and shoulder season) and increase the quota for both periods by 10%. Beginning in 2007, the prime season (June, July, August) quota increased from 139 to 153 entries or "use days." Shoulder season entries are at 92 use days. "These seasonal quotas are reviewed annually by the Superintendent and may be reduced or increased (to a maximum of two per day, every day) as needed to protect park values and purposes (36 CFR 13.1160)."

There are also daily limits to the amount of cruise ships allowed in Glacier Bay at any one time. Currently, no more than 2 cruise ships per day are permitted to be inside Glacier Bay proper (GLBA 2008). In addition, the permit system requires that all vessel operators attend an orientation with park rangers that elaborates on the need to protect whales from disturbance (Janet Neilson pers comm). All cruise ships applying for a permit must also address underwater noise reduction, as well as vessel emissions. See Appendix D for relevant sections of the Cruise Ship Concession Permit Application.

### **Analysis: Similarities and Differences to Santa Barbara Channel and CINMS**

This section analyzes the extent to which the management actions in GLBA can be applied to the Santa Barbara Channel. There are multiple lessons to be learned from the management strategies of GLBA. Management actions transferable to Santa Barbara Channel region include seasonal management areas and regulatory action controlling vessel behavior within Park boundaries.

#### **Similarities**

- Biodiversity hotspots (both GLBA and CINMS are located in areas with endangered species and valued ecosystems)
- Humpback whales and blue whales (as well as other ESA-listed large cetaceans in Santa Barbara Channel) appear in the regions during specific time periods, which can be predicted with some degree of certainty.

- Thriving tourism and whale watching in both locations, (though traditional whale watching is prohibited in GLBA by the park's strict humpback whale approach regulations).
- All federal agencies have a mandate to protect species and habitat within their boundaries under the ESA
- Seasonal overlap in vessel traffic with whale feeding areas

#### **Differences:**

- GLBA ship strike mitigation actions have a single-species focus. CINMS has adopted a multi-species approach due to the several ESA-listed large whales present in Santa Barbara Channel.
- GLBA has jurisdiction over its marine waters, which allows the Park to control access and vessel behavior within the Park. NMFS has the authority to control access and vessel behavior within Santa Barbara Channel
- GLBA is not subject to commercial shipping traffic
- Spatial area of concern: Both locations are roughly equivalent areas (CINMS is 1,110 nm<sup>2</sup> and GLBA is 940 nm<sup>2</sup>). However, access is extremely limited to GLBA, whereas the Santa Barbara Channel is the most heavily trafficked marine highway in the nation.
- Humpback whales tend to stay within ½ nm of shore when within GLBA. Other ESA-listed large whales have varying behaviors that are species and season dependent.

#### **Opportunities and Recommendations**

Some mitigation tools utilized by GLBA could possibly be tailored to the Santa Barbara Channel region, despite the differences between the two locations. As in the Stellwagen Bank Case Study, spatial and temporal management of vessel behavior may be appropriate for Santa Barbara Channel. ESA-listed species present in Santa Barbara Channel do not have regular fine-scaled spatial predictability, though they do have predictable temporal behaviors (i.e. blues are in SB Channel from May through October).

Cruise ships are the greatest threat to whales in GLBA, whereas commercial shipping constitutes the bulk of the vessel traffic in the Santa Barbara Channel. The regulation of international commercial traffic in federal waters is more complex than the regulation of cruise ships within GLBA waters. Cruise ships entering GLBA must meet all the requirements of the permit applications, which are handled solely by the Park service. Glacier Bay proper has no outlet and only one entry point, making for simplified regulation and enforcement. Also, the geography of the area excludes it from functioning as a transit route. It therefore has no Traffic Separation Scheme (TSS) in its waters.

Based on this case study, the following actions and monitoring programs may advance the goals of the Ship Strike Subcommittee and CINMS:

- Continue and improve on systematic monitoring efforts to track vessel and ESA-listed large whale distribution (spatially and temporally) within the Sanctuary and



- in vicinity of the shipping lanes. Ex: AIS data, acoustic monitoring, aerial monitoring, etc)
- Seek out additional sources of funding to continue monitoring/research efforts in the Channel Islands
  - Create education and outreach products for maritime industry, as well involve industry in policy formation
  - Investigate regulatory actions such as the Whale Waters Restrictions for required seasonal slow-downs in specific areas of the Santa Barbara Channel

### **Key Contacts**

Glacier Bay National Park- Janet Neilson  
National Marine Fisheries Service- Kaja Brix, Director of the Protected Resources,  
Alaska Region, Juneau  
Cascadia Research Collective- John Calambokidis

### **References**

- Angliss, RP, Outlaw, RB. 2005. Humpback whale (*Megaptera novaeangliae*): Central North Pacific Stock. *Alaska Marine Mammal Stock Assessments*. NOAA-TM-AFSC-161 Pp 169-181.
- Baker, Scott; Louis Herman. (1989) Behavioral responses of summering humpback whales to vessel traffic: experimental and opportunistic observations. *Final Report to the National Park Service*. Alaska Regional Office. NPS-NR-TRS-89-01.
- Baker, C.S, A. Perry and L.M. Herman. (1987) Reproductive histories of female humpback whales *Megaptera novaeangliae* in the North Pacific. *Marine Ecology Progress Series*. 41:103-117.
- Calambokidis, John, Gretchen H. Steiger (2001) Movements and population structure of humpback whales in the North Pacific. *Marine Mammal Science* 17(4): 769-794.
- Catton, T. (1995). Land reborn: a history of administration and visitor use in Glacier Bay National Park and Preserve. Seattle, WA, University of Washington. 517 pp.
- Glacier Bay National Park and Preserve (cited as GLBA 2008) <http://www.nps.gov/glba>
- Glacier Bay National Park and Preserve. (cited as GLBA 2003) Vessel Quotas and Operating Requirement Environmental Impact Statement. The National Park Service.
- IUCN 2009. IUCN Red List of Threatened Species. Version 2009.1. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on 11 June 2009
- Neilson, Janet L., Christine M. Gabriele. (2008) Results of Humpback Whale Monitoring in Glacier Bay and Adjacent Waters. Annual Progress Report. Glacier Bay National Park and Preserve. Division of Resource Management.
- Rice, DW. 1978. The humpback whale in the North Pacific: distribution, exploitation and numbers. PP 29-44 KS Norris and RR Reeves, eds. Report on a workshop in problems related to humpback whales (*Megaptera novaeangliae*) in Hawaii. US Department of Commerce. NTIS PB 280 794.

Straley, J.M., T.J. Quinn II and C.M. Gabriele. 2009. Assessment of mark-recapture models to estimate the abundance of a humpback whale feeding aggregation in Southeast Alaska. *Journal of Biogeography* 36:427-438.

## **Appendix A: Timeline**

### **1973:**

- Congress passes Endangered Species Act
- North Pacific Humpback Whale classified as endangered

### **1979:**

- Whale Management Report (Charles and Virginia Jurasz and Gregory P. Streveler)
- Humpback Whales in Glacier Bay National Monument, Alaska: Report on the Interagency Review Meeting, Seattle, Washington, on 12-13 October, 1979 (Marine Mammal Commission)
- First biological opinion rendered by NMFS (Letter, Jerry T. Leitzell to John F. Chapman, December 3)
- First interim whale management plan created for GLBA. Included a permitting system and “whale waters” policies

**1983:** Second biological opinion rendered by NMFS

### **1985:**

- GLBA Special Regulations Codified: 36 CFR 13.65
- GLBA begins systematically monitoring humpback whale population

**1987:** Humpback Whales in Glacier Bay, Alaska: A long-term history of habitat use (Gary M. Vequist and C. Scott Baker)

**1996:** GLBA Special Regulations Amended- Regulations passed to increase quota system based on an Environmental Assessment

**1997:** NPCA files suit against NPS

**2001:** Quota returns to 1996 levels

**2003:** Full EIS conducted

**2004:** GLBA Special Regulations most recent re-authorization

**2007:** Revised rule enacted to increase cruise ship quota in GLBA by 10%

**Appendix B: Title 36 Code of Federal Regulations, Subpart N § 13.1174 Whale water restrictions**

(a) May 15 through September 30, the following waters are designated as whale waters.

(1) Waters north of a line drawn from Point Carolus to Point Gustavus; and south of a line drawn from the northernmost point of Lars Island across the northernmost point of Strawberry Island to the point where it intersects the line that defines the Beardslee Island group, as described in §13.1180(a)(4), and following that line south and west to the Bartlett Cove shore (so as to include the Beardslee Entrance and Bartlett Cove); and

(2) Other waters designated by the superintendent as temporary whale waters.

(b) The public will be notified of other waters designated as temporary whale waters in accordance with §1.7 of this chapter.

(c) Violation of a whale water restriction is prohibited. The following restrictions apply in whale waters unless otherwise provided by the superintendent in the designation:

(1) Operating a motor vessel less than one nautical mile from shore (where the width of the water permits), or in narrower areas navigating outside of mid-channel is prohibited. This restriction does not apply to motor vessels less than 18 feet in length, or vessels actively engaged in fishing activities or operating solely under sail.

(2) Unless other restrictions apply, operators may perpendicularly approach or land on shore (*i.e.*, by the most direct line to shore) through designated whale waters, but they may not transit along the shore.

(3) Operators must follow motor vessel speed limits in §13.1176(a).

**§ 13.1176 Speed restrictions.**

(a) From May 15 through September 30, in designated whale waters the following are prohibited:

(1) Operating a motor vessel at more than 20 knots speed through the water; or

(2) Operating a motor vessel at more than 13 knots speed through the water, when the superintendent has designated a maximum speed of 13 knots, or at a maximum speed designated by the superintendent based on NOAA guidelines or new scientific information.

(b) From July 1 through August 31, operating a motor vessel on Johns Hopkins Inlet waters south of 58°54.2' N latitude (a line running due west from Jaw Point) at more than 10 knots speed through the water is prohibited.

## **Appendix C:**

### **§ 13.1150 Is a permit required for a vessel in Glacier Bay?**

A permit from the superintendent is required for motor vessels in accordance with this subpart and applicable regulations in this part.

### **§ 13.1152 Private vessel permits and conditions**

In Glacier Bay from June 1 through August 31 an individual must have a permit from the NPS issued for a specific vessel for a specific period of time.

(a) From June 1 through August 31, when the operator of a private vessel enters Glacier Bay for the first time that calendar year, the operator must go directly to the Bartlett Cove Ranger Station for orientation.

(b) From May 1 through September 30, the operator of a private vessel must immediately notify the Bartlett Cove Ranger Station of the vessel's entry to or exit from Glacier Bay.

### **§ 13.1154 Commercial vessel permits and conditions**

Each commercially operated motor vessel must have a permit to operate in Glacier Bay National Park and Preserve in accordance with §5.3 of this chapter.

(a) A cruise ship must have a concession contract to operate in Glacier Bay.

(b) A tour vessel, charter vessel, and passenger ferry must have a commercial authorization to operate in Glacier Bay.

(c) The operator of a cruise ship, tour vessel, charter vessel, and passenger ferry must notify the Bartlett Cove Ranger Station of the vessel's entry into Glacier Bay within 48 hours in advance of entering Glacier Bay or immediately upon entry.

(d) Cruise ships and tour vessels are prohibited from operating in the Beardslee Entrance and at the entrance to Adams Inlet, as defined as waters within the Wilderness boundaries in those respective areas.

(e) Off-boat activity from a cruise ship, tour vessel, or charter vessel is prohibited, unless authorized by the superintendent.

(f) Off-boat activity from a passenger ferry is prohibited, except for passenger access at the Bartlett Cove docks.

(g) A passenger ferry must travel a direct course between the mouth of Glacier Bay and Bartlett Cove, except when the vessel is granted safe harbor by the Superintendent as stated in §13.1156(e).

**§ 13.1156 Exceptions from vessel permit requirement**

A vessel permit is not required in Glacier Bay when:

- (a) A motor vessel is engaged in official, non-commercial business of the State or Federal Government;
- (b) A motor vessel is operating in Bartlett Cove waters east of a line extending from the long axis of the fuel dock to the wilderness boundary of Lester Island;
- (c) One motor vessel is launched from a motor vessel that has a permit and only while the authorized motor vessel remains at anchor or operated in accordance with a concession agreement from a permitted motor vessel while that vessel is not underway;
- (d) A commercial fishing vessel authorized under this subpart is actually engaged in commercial fishing; or
- (e) A vessel is granted safe harbor by the superintendent.

**§ 13.1158 Prohibitions.**

- (a) Operating a motor vessel in Glacier Bay without a required permit is prohibited.
- (b) Violating a term or condition of a permit or an operating condition or restriction issued or imposed pursuant to this chapter is prohibited.
- (c) The superintendent may immediately suspend or revoke a permit or deny a future permit request as a result of a violation of a provision of this chapter.

**§ 13.1160 Restrictions on vessel entry.**

The superintendent will allow vessel entry in accordance with the following table:

Type of vessel	Daily vessel quotas (DVQ)	Period covered by DVQ	Seasonal vessel quota (SVQ)	Period covered by SVQ
Cruise ship	2	Year-round	Up to 184	June 1–August 31.
			Up to 122	May and September.
Tour vessel	3	Year-round	N/A	N/A.

Charter vessel	6	Jun 1–Aug 31	N/A	N/A.
Private vessel	25	Jun 1–Aug 31	N/A	N/A.
Passenger ferry	1	Year-round	N/A	N/A.

Note: Cruise ships and tour vessels are limited to the daily vessel quota year-round. Charter and private vessels are not subject to quotas from September through May.

(a) The Director will reduce the vessel quota levels for any or all categories of vessels in this subpart as required to protect the values and purposes of Glacier Bay National Park and Preserve. The director will make these reductions based on the controlling biological opinion issued by the National Oceanic and Atmospheric Administration Fisheries Service under section 7 of the Endangered Species Act, applicable authority, and any other relevant information.

(b) The superintendent will annually determine the cruise ship quota. This determination will be based upon applicable authorities, appropriate public comment and available scientific and other information. The number will be subject to the maximum daily vessel quota of two vessels.

(c) From June 1 through August 31, the superintendent will designate one private vessel permit from the daily quota of 25 as a transit permit. This transit permit may be used only to directly exit Glacier Bay from Bartlett Cove and return directly to Bartlett Cove. The superintendent may establish application procedures and operating conditions. Violating operating conditions is prohibited. This paragraph will cease to have effect on November 30, 2011.

(d) Nothing in this section will be construed to prevent the superintendent from taking any action at any time to protect the values and purposes of Glacier Bay National Park and Preserve.

## Appendix D: GLBA Cruise Ship Concession Permit: Environmental Objectives

**Note to Offeror:** This selection factor is concerned with environmental objectives that relate specifically to protection of particular resources of the park area. Environmental objectives that promote the natural environment *in general* (waste reduction, fuel efficiency, recycling, etc.) are addressed under *secondary selection factor 1*. Please avoid overlap between the response here and the response to *secondary selection factor 1*. A primary objective of the National Park Service is the protection of park resources. Some potential environmental issues related to cruise ship services include:

- Air quality impacts due to stack emissions;
- Water quality issues due to discharge of waste, toxicity of anti-fouling systems and petroleum spills; and
- Impacts due to ship generated noise.

### Subfactor 1a. Air Quality

- 1) Describe the equipment and technology for controlling or minimizing air pollution emissions to be utilized by each vessel you propose to operate in the park.
- 2) Describe operational methods which would be employed to minimize air pollution emissions for each vessel you propose to operate in the park including engine, generator, and incinerator operations.
- 3) Describe the opacity monitoring mechanisms in place for each vessel you propose to operate in the park. Please specify how opacity data is recorded, if an opacity alarm is in place, the alarm level and the standard operating procedures for responding to the alarm.
- 4) Will you provide the park with the opacity monitoring data? If so, describe the format you will use (electronic, paper printouts, etc.) and how long the information will be available. A better proposal may commit to retaining this information for at least a year and making it available to the NPS on request...
- 5) Provide the information indicated on the following Propulsion Engine Data form for each propulsion engine you propose for service in Glacier Bay. For propulsion systems based on technology other than compression ignition diesel engines (e.g. gas turbine, steam, solar, sail, etc.), specify the specific emissions standards (if any) met by the alternative propulsion system or provide certified emissions levels for (1) THC+NOX g/kW-hr.; (2) CO g/kW-hr.; and (3) PM g/kW-hr. if available. A better proposal may utilize propulsion systems which minimize emissions of these and other pollutants. For diesel engine, please refer to 40 CFR Part 94 Sec. 8.

Ship Name:

Engine Make:

Engine Model:

No. of Engines Installed:

EPA Engine Category:

EPA Emissions Rating:



Engine Power Rating:  
Glacier Bay Usage (%):

### **Subfactor 1b. Water Quality**

1) Will operations involve any discharge into the waters of Glacier Bay National Park (not just the bay proper), including, but not limited to, wastewater, treated and untreated sewage, grey water, ballast water, bilge water, hazardous and solid wastes? If so, describe the nature of the discharge(s) in detail including location(s), composition, toxicity, quantity, rate and frequency. A better proposal may commit to eliminating vessel discharge in all Glacier Bay National Park waters.

2) Will your operations involve any discharge into the waters adjacent to Glacier Bay National Park from Cross Sound to the entrance to Glacier Bay, including, but not limited to, wastewater, treated and untreated sewage, grey water, ballast water, bilge water, hazardous wastes and solid wastes? If so, describe the nature of the discharge(s) in detail including location(s), composition, toxicity, quantity, rate and frequency. A better proposal may commit to eliminating vessel discharge in the adjacent waters described above.

3) If the proposed operation involves any wastewater discharge into park waters, identify any wastewater treatment you will use which exceeds state or federal requirements. A better proposal (though likely not better than a commitment to eliminate discharge) may employ an advanced wastewater treatment system designed to remove the highest proportion of pathogens, pollutants, metals and organics.

4) Identify the hull anti-fouling system(s) for each of the vessels you propose for use. You must disclose whether you have applied organotin compounds to the hull of any of the vessels proposed for operation in Glacier Bay and, if so, whether you have applied a barrier coat (please describe the barrier coat used).

5) Describe on-board hazardous material spill response capability for each vessel proposed to operate in the park. Describe the type and size (length/height) of spill retention boom, quantity of absorbent material, etc. A better proposal may include appropriate training and supplies to enable ship staff to quickly and capably respond to small spills and to facilitate first response in the event of a major spill.

### **Subfactor 1c. Underwater Noise**

1) Describe the equipment, technology or other physical plant features designed to minimize underwater noise for each vessel you propose to operate in the park.

2) Describe operational methods you will employ to minimize underwater noise for each vessel you propose to operate in the park.

3) Will you complete underwater “sound signatures” for any of the ships proposed to operate in Glacier Bay within two years of contract award and provide the NPS with a copy of any reports within sixty days of report completion? If so, provide details including ships to be tested, type of testing, specific ships systems to be tested and the testing entity, facility and location. A better proposal may include a comprehensive testing program for all ships at an established facility.

# **Section IV**

**Protecting Humpback Whales by Reducing the  
Risk of Mortality by Ship Strike in Hawaiian  
Island Humpback Whale National Marine  
Sanctuary**



[http://fascinatingly.com/home/images/stories/humpback\\_whale.jpg](http://fascinatingly.com/home/images/stories/humpback_whale.jpg)

## **Protecting Humpback Whales by Reducing the Risk of Mortality by Ship Strike in Hawaiian Island Humpback Whale National Marine Sanctuary**



*Source: [www.gcaptain.com](http://www.gcaptain.com)*

Primary author: Elizabeth Petras  
NOAA National Marine Fisheries Service  
Contributing author: Leslie Abramson  
Channel Islands National Marine Sanctuary

## **Table of Contents**

Introduction.....	IV - 1
Regional Context .....	IV - 2
Management Actions .....	IV - 2
Monitoring Programs.....	IV - 2
Mariner Training.....	IV - 2
Regulations .....	IV - 3
Vessel Collision Avoidance Workshop.....	IV - 3
Superferry .....	IV - 3
Legal Issues.....	IV - 4
Analysis: Potential Application to the Santa Barbara Channel Region .....	IV - 5
Key Contacts and References .....	IV - 6
Appendix A – Timeline .....	IV - 7

## Introduction

The Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) was established in 1992 with the express purpose of protecting humpback whales and their habitat. The HIHWNMS is located around the islands of Maui, Moloka'i, Lana'i, and includes Penguin Banks and the Pailolo Channel. The Sanctuary begins at the high water mark and extends out to the 600 ft depth contour line.

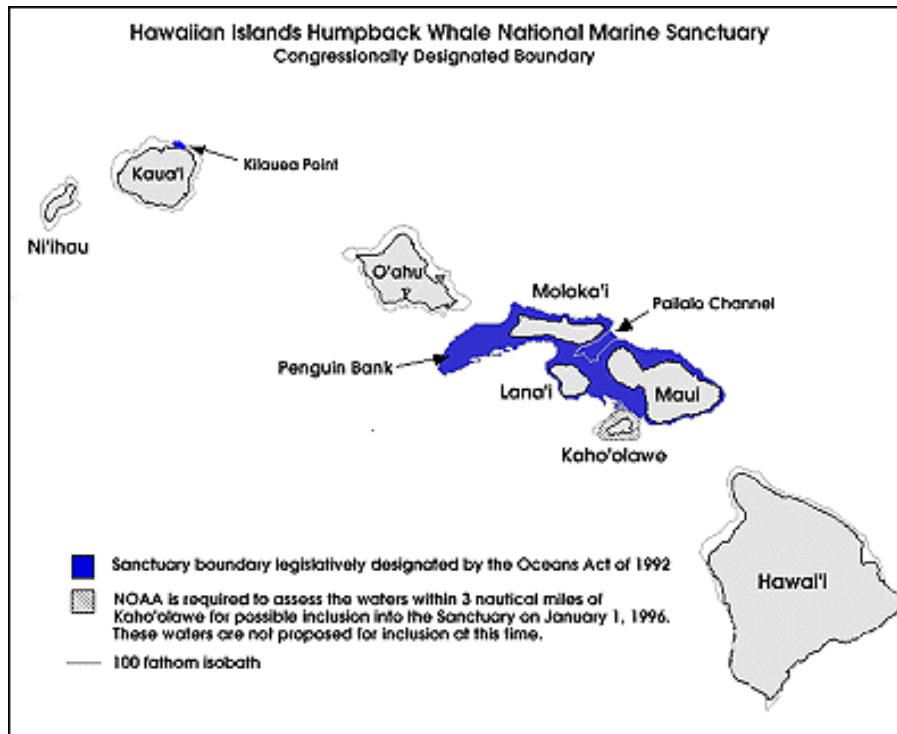


Figure 1: HIHWNMS Source: [www.coralreefnetwork.com](http://www.coralreefnetwork.com)

HIHWNMS has been aware of the threat posed by vessel traffic to humpbacks since the creation of the marine protected area. Current protection efforts are primarily upheld through State laws and mariner education programs. Additionally, the Sanctuary held a Vessel Collision Avoidance Workshop in 2003 in order to discuss the issue and make recommendations for possible policy action.

In the early 2000's, plans for a Hawaii Superferry were initiated. The Superferry was planned to have two vessels operating during the day and night with routes among the islands including occasional travel through HIHWNMS. In August 2007, the Superferry began operation but there were numerous legal challenges. Ultimately, a Hawaii State Supreme Court's decision pushed the Superferry to discontinue operations in Hawaii.

There are significant differences between the events surrounding the Hawaii Superferry and the issue of ship strikes in the Santa Barbara Channel, but both do include collaboration between NMFS and the Sanctuary to help protect impacted marine species.

## **Regional Context**

Every winter, as many as 10,000 humpback whales may inhabit the waters of HIHWNMS. Humpbacks come to the warm, shallow waters of Hawaii to mate, calve and raise their young. Mothers and calves are generally found in the shallow waters around the islands (waters shallower than 100 fathoms) although whale can be found anywhere around the islands and have been seen in the fall and into the spring. It is thought that the high visibility, calm water and lack of predators in Hawaii make it an attractive nursery ground for humpbacks. The species is famous for their frequent vocalizations, and much acoustic work has been conducted, both in Hawaii and other waters (HIHWNMS 2008).

There is a large fishing community throughout the Hawaiian Islands, with fishing gear entanglement being one of the primary threats to marine mammals in the region. There is also a thriving whale-watching industry, with the increasing number of vessels, as well as the proximity of vessels to humpback whales becoming a Sanctuary concern. There have been on average six ship strikes per year of humpback whales, but the majority of these are from commercial whale watch boats. Commercial traffic remains a factor in the HIHWNMS, with most of the traffic being inter-island movement (HIHWNMS 2008).

Beginning in the early 2000s, there has been much controversy and concern over the Hawaii Superferry, a 350 ft high-speed passenger vessel which served the islands of Oahu and Maui. The Superferry transited at speeds of up to 35 knots and often passed through Sanctuary waters when weather conditions are poor. Much of Hawaii's focus regarding whale ship strikes revolves around the operation of the Superferry.

The ESA and MMPA prohibit approaching humpbacks within 100 yards or flying less than 1,000 feet over the whales to avoid takes or harassment of whales. These apply both within and outside of sanctuary waters.

## **Management Actions**

### **1) Monitoring Programs, Ongoing**

Large scale studies of humpback whale population dynamics were conducted from 2002-2006, through the SPLASH (Structures of Populations, Levels of Abundance and Status of Humpback Whales) project. This research is focused on entire populations, migratory patterns and anthropogenic impacts on humpbacks throughout the entire North Pacific Ocean. Sanctuary scale impacts were not an aspect of SPLASH.

Passive acoustic monitoring has begun in order to better determine the response abundance of humpback whales in the Sanctuary.

### **2) Mariner Training, Ongoing**

The Sanctuary has developed guidelines for vessel behavior in areas where humpback whales are present. The guidelines integrate both recommendations and federal requirements for whale viewing. They include: safe speed, minimum distance specifications, keeping a sharp lookout, warning other vessels of whale presence,

staying at the helm at all times and other prudent mariner behaviors. For a complete listing of HIHWNMS Guidelines and Regulations for Whale Protection and Safety, please see: [http://hawaiihumpbackwhale.noaa.gov/explore/whale\\_guidelines.html](http://hawaiihumpbackwhale.noaa.gov/explore/whale_guidelines.html)

### **3) Regulations- Federal and State**

#### **Hawaii Wildlife Law**

State Law prohibits the possession, injury or killing of any indigenous or endangered animals in Hawaii. Essentially, it extends endangered species protections to native species within the State.

#### **Hawaiian Islands Humpback Whale National Marine Sanctuary Act**

The HIHWNMS Act prohibits vessels from pursuing or approaching humpback whales closer than 100 yards.

### **4) Vessel Collision Avoidance Workshop, Sept 3-5, 2003**

The HIHWNMS Advisory Council Vessel Strike Working Group hosted a workshop of scientists, managers, stakeholders and maritime industries. The workshop included summaries of recent research and a series of breakout groups who analyzed management issues particular to three vessel classes. Vessel categories were:

- Large Commercial Vessels
- Commercial passenger and support vessels operating on a daily basis in nearshore waters of Hawaii
- Private recreation vessels

The result of the Workshop was to create a list of research questions and needs, as well as to align participants understanding of the issues and possible next steps. For a summary of the workshop proceedings, please see:

[http://hawaiihumpbackwhale.noaa.gov/documents/pdfs\\_workshops/vessel\\_whale\\_report.pdf](http://hawaiihumpbackwhale.noaa.gov/documents/pdfs_workshops/vessel_whale_report.pdf)

### **5) Whale Avoidance Policy: Superferry**

Prior to beginning operations in Hawaii, the Superferry developed a whale avoidance policy with measures to minimize the likelihood of hitting and injuring or killing humpback whales. Key vessel actions in the plan included:

#### Avoidance

- Avoiding whales and never approaching them
- Avoid traveling in waters less than 100 fathoms
- When within Sanctuary waters or waters less than 100 fathoms, operate at a maximum of 25 knots.
- Specific guidance on maneuvers to track and avoid whales.
- Ships were routed so that they would generally not travel through the Sanctuary in order to limit interactions between humpbacks and the Superferry.



#### Observers

- Two active officers and an additional two dedicated look-outs should be stationed on the bridge to watch for whales. These look-outs to be trained in whale sightings, behavior, and detection.
- Recommendations were provided for observation equipment.
- These included forward-looking collision avoidance sonar (although systems are not currently commercially available). X-band radar also recommended along with specific equipment for night time operations.

#### Log keeping and reporting procedures

- Specific requirements for logging avoidance maneuvers, approaches closer than 100 yards, or any whale strikes.

In addition, in 2008, the Superferry installed thermal image system to detect whales at night. This tool was not considered a reasonably certain way to detect whales at night by scientists at the SWC.

In 2005, the HIHWNMS SAC voted to endorse the whale avoidance policy, although Sanctuary staff did not provide their endorsement.

While the whale avoidance policy was considered a good start, NMFS did not consider it sufficient to avoid take of ESA listed humpback whales during Superferry operations. Take under the ESA is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. NMFS and HIHWNMS staff began collaborating on advice to the Superferry on ways to mitigate impacts to humpbacks.

#### **Legal Issues**

In 2005, NMFS recommended that the Superferry pursue an incidental take permit (ITP), issued under section 10 of the ESA, to permit the incidental take of humpbacks. A section 10 permit is required of non-federal actions that take ESA listed species. The ITP process is complex, requiring a habitat conservation plan, National Environmental Procedures Act (NEPA) analysis, and a section 7 consultation (on the issuance of the federal ITP). This process generally takes over a year and may take numerous years to complete.

On October 31, 2007, the Hawaii State legislature passed a bill allowing the Superferry to continue if they applied for an ITP and requested NOAA observers on the vessel when it traveled through HIHWNMS waters. The Governor of Hawaii issued an Executive Order allowing the ferry to continue to operate while the analyses for the ITP were being completed.

Following passage of a state bill and executive order, the Superferry resumed operations in late 2007 and 2008 while analyses of its environmental impacts were written.

In March 2009, the Hawaii State Supreme Court ruled that the law allowing operations of the Superferry was unconstitutional due in part to its limited application (applied to only one vessel) and that operations must be suspended until all environmental analyses and permits were issued. In March 2009, the Superferry decided to end operations in Hawaii following the ruling.

During limited operations in 2007 and through 2008, there were no strikes by the Superferry, although there were some “near misses” during the 2008 humpback season.

## **Analysis: Similarities and Differences to Santa Barbara Channel**

### **Similarities**

- Transits by vessels include Sanctuary waters, but much travel is done outside the Sanctuary.
- Humpback whales and blue whales are listed as endangered on the ESA and are thus protected under the ESA and MMPA from take and harassment.

### **Differences**

- Most ship strikes of whales in HIIWNMS are from whale watching vessels, while in CINMS, it appears to be commercial shipping.
- The type, speed, and operation of the Superferry is very different from vessels in the Santa Barbara Channel
- The vessel traffic in the Santa Barbara Channel is much more complex than one Superferry operating in Hawaii. This leads to challenges related to communication, outreach and education, voluntary compliance with recommendations, enforcement, among other issues.
- There is a much smaller economic impact of regulating one Superferry than the impacts to the shipping industry and other vessels using SBC.
- The distribution of humpback whales is well known and predictable in time and space. Blue whale distribution in the summer is largely determined by prey distribution and abundance and difficult to predict.
- It is much easier to model the impact of the Superferry on humpback whales than the impact of vessels on blue whales and other species in the SBC. The Superferry traveled along set routes and schedules and there was only one boat. Also, the distribution and behavior of humpback whales is well known due to long-term studies. The shipping and other vessel traffic in the SBC is much more complex and there are no long-term studies of blue whale distribution and behavior. As noted above, blues and other whales are distributed based upon prey availability and this can change annually or inter-annually.
- Humpback whales are calving and mating in HI, blues and other ESA listed whales are generally feeding in water off CA in the summer. Calves are generally more vulnerable to ship strikes due to their need to breathe more often than adults and also because they are more difficult to sight (a newborn humpback may be 12 feet long versus an adult blue whale averages 75 feet long).

In conclusion, the events of the Hawaii Superferry's operation were largely driven by legal issues, the state legislature and the court, which is not the case in Santa Barbara Channel. While there are substantial differences, both situations, Hawaii and SBC, highlight the need for collaboration between NMFS and NOS and the need to look broadly at the issues.

### **Key Contacts**

Hawaiian Islands Humpback Whale NMS: Naomi Campbell, Superintendent  
Pacific Islands Regional Fishery Office, NOAA NMFS: Lisa Van Atta, Assistant  
Regional Administrator, Protected Resources, [Alecia.vanatta@noaa.gov](mailto:Alecia.vanatta@noaa.gov)  
Chris Yates former Assistant Regional Assistant for Pacific Resources Division in the  
Pacific Islands Regional Office, currently Office Director of the Southwest Region,  
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Department of Life and Natural Resources  
Department of Aquatic Resources  
US Coast Guard

### **References**

Calambokidis, John, Erin A. Falcone, Terrance J. Quinn, Alexander M. Burdin, Phillip J. Clapham, John K.B. Ford, Christine M. Gabriele, Richard LeDuc, David Mattila, Lorenzo Rojas-Bracho, Janice M. Straley, Barbara L. Taylor, Jorge Urbán R., David Weller, Briana H. Witteveen, Manami Yamaguchi, Andrea Bendlin, Dominique Camacho, Kiirsten Flynn, Andrea Havron, Jessica Huggins, and Nora Maloney (2008) *SPLASH: Structure of Populations, Levels of Abundance and Status of Humpback Whales in the North Pacific*. Cascadia Research. Access online at <http://cascadiaresearch.org/SPLASH/SPLASH-contract-Report-May08.pdf>

Hawaiian Island Humpback Whale National Marine Sanctuary (2009) Accessed online at <http://www.hawaiihumpbackwhale.noaa.gov/>

National Oceanic and Atmospheric Administration (NOAA) and the Department of Land and Natural Resources State of Hawaii (DAR) (2007-2008) Hawaii's marine protected species: A handbook for ocean users about Hawaii's whales, dolphins, sea turtles, and monk seals and the laws that protect them. Accessed online at [http://www.hawaiihumpbackwhale.noaa.gov/documents/pdfs\\_ocean\\_users/HawaiiOceanUsersGuide.pdf](http://www.hawaiihumpbackwhale.noaa.gov/documents/pdfs_ocean_users/HawaiiOceanUsersGuide.pdf)

Vessel Collision Workshop Report (2003) *Workshop Report on Management Needs to Minimize Vessel Collisions with Whales in the Hawaiian Islands Humpback Whale National Marine Sanctuary and other National Marine Sanctuaries*. NOAA, National Marine Sanctuaries Program.

[www.honoluluAdvertiser.com](http://www.honoluluAdvertiser.com), March 17, 2009

<http://www.hawaiiinterislandsuperferry.com/hawaiisuperferrynews.html>

Press release from the Hawaiian Islands Humpback Whale NMS dated July 28, 2005 (SAC support of the Superferry's Whale Avoidance Policy).

## **Appendix A: Timeline**

**1992:** HIHWNMS created

**2005:**

- HIHWNMS SAC endorses Superferry whale avoidance policy, Sanctuary staff did not endorse the policy
- NMFS recommends that Superferry apply for incidental take permit (ITP)

**2007:**

- Superferry commences operations
- Hawaii State legislature passes bill allowing Superferry to continue if they applied for an ITP and requested NOAA observers on the vessel when it traveled through HIHWNMS waters.

**2009:** Hawaii State Supreme Court ruled that the law allowing operations of the Superferry was unconstitutional