

CHANNEL ISLANDS NATIONAL MARINE SANCTUARY ADVISORY COUNCIL

*Marine Shipping Working Group*

**Final Report**

For Review by the Channel Islands National Marine Sanctuary Advisory Council

*Prepared by Marine Shipping Working Group Support Staff*

PREFACE .....	3
FACILITATORS' NOTE.....	4
EXECUTIVE SUMMARY .....	7
INTRODUCTION.....	14
BACKGROUND.....	15
MARINE SHIPPING WORKING GROUP PROCESS.....	18
ADVICE PACKAGE .....	28
RECOMMENDED NEXT STEPS .....	59
GLOSSARY OF TERMS.....	60
REFERENCES.....	61
APPENDICES .....	63

### List of Acronyms

AIS	Automatic Identification System
CINMS or Sanctuary	NOAA's Channel Islands National Marine Sanctuary
CWG	Conservation Working Group
DMA	Dynamic Management Area
DoD	United States Department of Defense
EDC	Environmental Defense Center
ESA	Endangered Species Act
IFAW	International Fund for Animal Welfare
IMO	International Maritime Organization
LA/LB	Los Angeles and Long Beach
MMPA	Marine Mammal Protection Act
MSWG	Marine Shipping Working Group
Mx SoCal	Marine Exchange of Southern California
NCCOS	NOAA's National Centers for Coastal Ocean Sciences
NMFS or NOAA Fisheries	NOAA's National Marine Fisheries Service
NMSA	National Marine Sanctuaries Act
NOAA	National Oceanic and Atmospheric Administration
NRDC	Natural Resources Defense Council
PMSA	Pacific Merchant Shipping Association
SAC	Channel Islands National Marine Sanctuary Advisory Council
SB TSS	Santa Barbara Channel Traffic Separation Scheme
SBCAPCD	Santa Barbara County Air Pollution Control District
SMA	Seasonal Management Area
SWFSC	NOAA Fisheries Service's Southwest Fisheries Science Center
TSS	Traffic Separation Scheme
USCG	United States Coast Guard
VCAPCD	Ventura County Air Pollution Control District
VSR	Vessel Speed Reduction

## **PREFACE**

The purpose of this report is to capture the deliberations of the Marine Shipping Working Group (MSWG) and to provide the Channel Islands National Marine Sanctuary Advisory Council with information and advice regarding regional marine shipping issues including: ship strikes on endangered whales, air pollution and greenhouse gas emissions, navigational safety concerns, and conflicts among ocean users. This report contains background information, a description of the MSWG process, the advice package developed by the working group, and a summary of anticipated next steps. The MSWG, from their respective views, detailed the benefits and drawbacks of each component of this advice package in order to inform subsequent decision-making about resource management both in the study area and across other relevant regions. Once reviewed by the Sanctuary Advisory Council, this report and supporting information generated during the MSWG process may be forwarded to the Channel Islands National Marine Sanctuary Superintendent for consideration.

## FACILITATORS' NOTE

### Kearns & West Facilitators' Note

Kearns & West (Eric Poncelet and Janet Thomson) served as the third-party neutral facilitators in the Marine Shipping Working Group (MSWG) process. At the request of the MSWG Co-Chairs, we have prepared this “facilitators’ note” to reflect on key elements of the process and provide context for the working group report.

This facilitators’ note covers three topics:

1. Key outcomes from the MSWG
2. Reflections on the MSWG process
3. Preparation of the final report

#### 1. Key Outcomes from the MSWG

From Kearns & West’s perspective, MSWG members deliberated in good faith and made significant efforts to represent their organizational perspectives and interests. They exchanged knowledge and shared their views on each other’s ideas, and at times sought to build on each other’s ideas to help garner broader support from the entire group. Some MSWG members engaged more than others, both in their participation in meetings and in their use of the SeaSketch decision support tool; such uneven participation is not uncommon in collaborative stakeholder processes.

Over the 12 months, MSWG members increased their knowledge of the focal issues, gained appreciation for the complexities involved, and improved their understanding of the different perspectives, interests, and positions involved. In some cases, members built relationships that will likely endure beyond the MSWG process. Significantly, this process enabled further studies of shipping and ship strike risk analysis south of the Channel Islands and motivated a NOAA study of the socioeconomic impacts of the MSWG’s approaches.

As part their deliberations, MSWG members devoted much of their time to developing two different approaches – one technology based, and the other spatial-management based – as part of their efforts to address their charge. Both approaches received partial support from MSWG members, although components exist within the approaches that are broadly supported and as such deserve attention.

From our perspective, the MSWG successfully advanced the policy dialogue around the broader ship-whale strike issue in Southern California and helped articulate the many issues and challenges that remain to be resolved. MSWG members will continue to be an important resource to the Sanctuary Advisory Council (SAC) and NOAA in the future.

#### 2. Reflections on the MSWG process

MSWG members varied greatly in their support for the different ideas shared during their deliberations. In the end, the MSWG developed a package of measures or actions to forward to the Sanctuary Advisory Council rather than a single proposal. There are multiple reasons the working group did not come to full

agreement on a single suite of measures. From our perspective, key contributing factors include the following:

- **Many MSWG members entered the process with long held views and strongly held positions regarding how best to address the issues on the table.** The initial stakeholder assessment interviews conducted by Kristi Birney (EDC, SAC member, and MSWG Co-Chair) revealed these strong views, although participants also expressed willingness to come to the table and discuss ideas and the latest scientific information. All of them expressed a desire to reduce the risk of ship-whale strikes; but there was a range of ideas about how best to do this. As such, the negotiation process was characterized by a relatively small "window of agreement" in terms of the kinds of ideas to which participants were open. For example, some members were resistant to spatial-based measures from the start, while others preferred them.
- **The MSWG had a limited amount of time together.** Working within budget limitations, support staff designed the MSWG process to balance face-to-face collaboration with the use of SeaSketch as a forum for online, between-meeting engagement and information exchange. It was more difficult than anticipated getting MSWG members to learn, use, and collaborate via SeaSketch. Participants ended up using SeaSketch more for getting individual ideas on the table and less as a method for building cross-interest proposals. We found the MSWG to engage productively in their in-person meetings, and more interactive meeting time may have resulted in increased relationship building and additional invention and exploration of proposal ideas (although more time together may not have greatly changed the final outcomes).
- **Lack of strong incentives to come to agreement.** Complicating the above two factors, the process, in our view, also lacked strong incentives for the MSWG members to deviate greatly from their initial positions. Coming to full agreement was not a requirement of the MSWG charge (although MSWG members were invited to seek as much agreement as possible). Additionally, there was no explicit or strongly-perceived regulatory or statutory driver dictating that if the MSWG members were not able to come to agreement on a single proposal, outside decision-makers would act independently in a near term timeframe. In other words, some of the participants may have believed that they had better alternatives than coming to a negotiated agreement.<sup>1</sup>

### 3. Preparation of the Final Report

After the MSWG's final in-person meeting in early January 2016, MSWG support staff took the lead in preparing this final report, which aims to accurately capture the work accomplished by the MSWG and the contents and levels of support around the two main approaches that were the primary focus of MSWG deliberations. At their final meeting, MSWG members provided guidance on report structure and content.

---

<sup>1</sup> From the perspective of Negotiation Theory, we would say that these participants believed they had strong BATNAs (i.e., best alternative to a negotiated agreement).

MSWG members were provided with an opportunity to review the final report and were asked in particular to confirm their levels of support for the concepts described in the document. Support staff received comments from nine MSWG members; these varied greatly. Some were text edits meant to clarify language in the document. Others were comments intended to enhance the accuracy of the report. Still others were broader reflections on the content that continued and in some cases even broadened the discussions that took place in the MSWG meetings.

From our perspective, this current version of the report reflects good faith efforts by support staff to accurately reflect the discussions of the MSWG, incorporate comments from the review process, and expand the description of MSWG members' levels of support for the different approaches and approach sub-components. Comments received during the review process that expanded significantly on what the MSWG discussed in their meetings and that therefore require additional MSWG review and discussion are appropriately, in our view, not included in the main body of the report; these ideas, however, may help inform future deliberations on ship-whale strike issues. MSWG members have been invited to share any outstanding concerns or reflections in official letters from their organizations; these will be shared with the SAC as separate documents.

## EXECUTIVE SUMMARY

### Background

The Santa Barbara Channel region is heavily transited by large commercial vessels traveling into and out of the ports of Los Angeles and Long Beach (LA/LB), two of the nation's busiest ports. Thousands of cargo ships transit through the region each year, either through an internationally approved Traffic Separation Scheme within the Santa Barbara Channel (SB TSS) or around the south side (backside) of the northern Channel Islands (Figure 1). The presence of vessels and changes in traffic patterns in the Channel region present four distinct, local management challenges including: ship strikes on endangered whales, air pollution and greenhouse gas emissions, navigational safety concerns, and conflicts with other ocean uses, such as Department of Defense (DoD) operations.

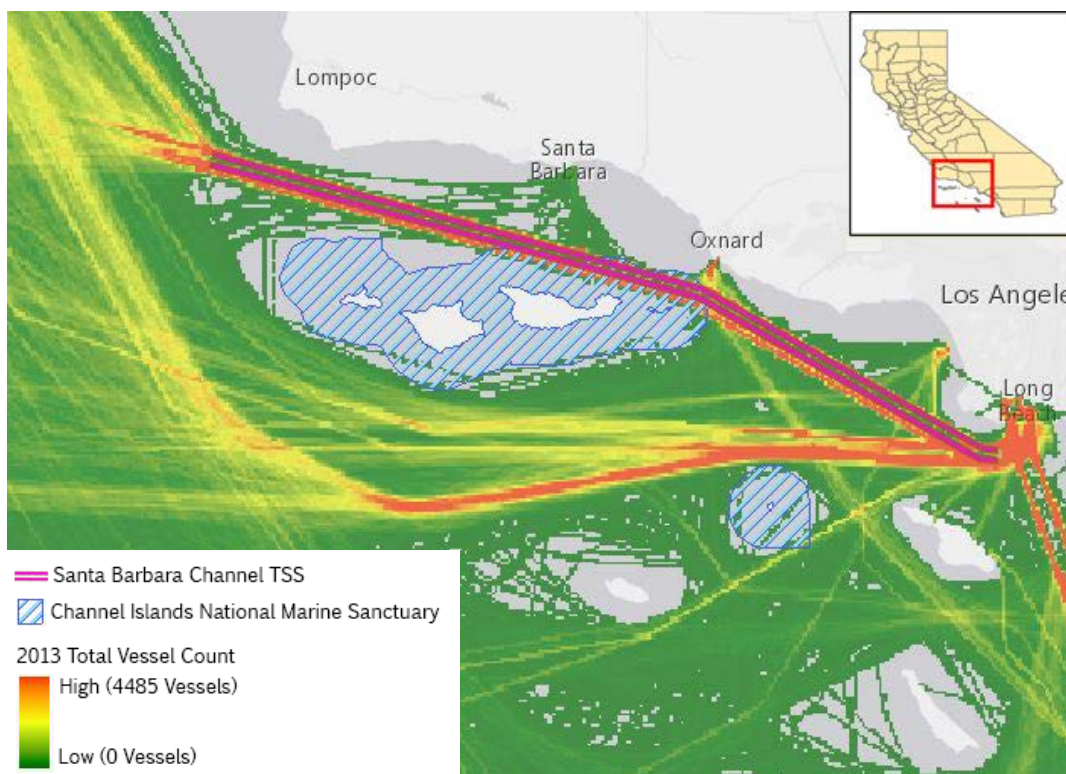


Figure 1: Total vessel count in the Santa Barbara Channel region in 2013. Vessels going to and from the Ports of LA/LB either use the Santa Barbara Channel TSS (pictured in pink), or transit south of the northern Channel Islands. Source: USCG AIS data, processed by NMFS.

### Marine Shipping Working Group Process

During September of 2007, the National Oceanic and Atmospheric Administration (NOAA) received reports of five blue whale carcasses between Santa Cruz Island and San Diego. NOAA's National Marine Fisheries Service (NMFS) designated the blue whale mortalities as an "Unusual Mortality Event" (Hogarth 2007). In response to that event, Channel Islands National Marine Sanctuary (CINMS or sanctuary) has collaborated with the shipping industry, governmental agencies, non-profit organizations, and other key stakeholders to reduce the risk of ship strikes on endangered whales. For more than six years, the CINMS Advisory Council (SAC) has been the local forum for community and stakeholder

conversations on shipping issues. The SAC formed the Marine Shipping Working Group (MSWG or working group) in 2014 to develop recommendations to address regional shipping-related concerns. The working group consisted of a diverse group of stakeholders, including representatives from the DoD, US Coast Guard (USCG), Channel Islands National Park, NMFS, Marine Exchange of Southern California (Mx SoCal), shipping industry, Santa Barbara County Air Pollution Control District (SBCAPCD), and the tourism, research, and conservation communities.

The charge of the working group was to develop a suite of management, education, outreach, and research recommendations that build on the sanctuary and SAC's previous work, and address the following goals:

1. Reduce the risk of ship strikes on endangered whales
2. Decrease air pollution and greenhouse gas emissions
3. Improve navigational safety and promote efficient maritime shipping throughout the region
4. Manage ship traffic to minimize naval operation interruptions and reduce conflicts with other ocean users (e.g. fishing and whale watching concessionaires)

The SAC will then review these recommendations made by the working group and decide what advice to pass along to the Sanctuary Superintendent and more broadly to NOAA and/or other appropriate entities for consideration.

From February 2015 to January 2016, the MSWG convened four times in person, eight times via webinar, and utilized SeaSketch ([www.seasketch.org](http://www.seasketch.org)), an interactive web based mapping program, to facilitate online collaboration. The early stages of the process focused on assembling relevant data and information sharing so that working group members could begin to understand each other's perspectives. In addition to sharing information and data, working group members were asked to develop and discuss management, education, outreach, and research ideas. These ideas were proposed throughout the process by MSWG members via homework assignments, SeaSketch forums, webinars, and in-person meetings. Some of these ideas were proposed as components of a multifaceted approach, while others were put forth as independent ideas.

By the fifth and final in-person meeting in January 2016, the group had moved forward two approaches with multiple components: a technology-based approach and a spatial approach. Two additional independent ideas were also proposed: a vessel speed reduction incentive trial and passive acoustic monitoring. The charge to the MSWG did not require reaching unanimity or consensus on a single approach or idea but rather to determine the level of support from individual members or the group as a whole. In describing the levels of support, this document uses the following terms and meanings:

- **Unanimous:** No members stated opposition for the approach.
- **Broad:** A strong majority of members stated support for this approach, with a few members stating opposition or unresolved concerns.
- **Mixed:** The group had a wide variety of opinions about the approach. In some cases, there were strong views on opposing sides.



At the conclusion of the process, some key benefits were achieved. First, the MSWG process fostered a greater mutual understanding of the issues and constraints affecting the ability to manage and address shipping-related concerns and, specifically, ship and whale interactions in the study region. Second, the group achieved unanimous agreement on a handful of relevant management, education, outreach, and research options, including: using a centralized whale data repository, employing Automatic Identification System (AIS) text messaging to inform ships of whale sightings, and holding a second vessel speed reduction incentive trial. Third, the group identified potential funding sources for aerial whale surveys, infrared whale detection development, and a second vessel speed reduction incentive trial. Finally, three studies, all underway at the time of writing, were spurred by the working group process and their results will serve to inform future actions in CINMS and elsewhere.

## Advice Package

The current MSWG advice package is organized into three main sections: topics explored (emerging technologies, whale data, real-time response, and spatial measures); approaches (technology-based and spatial); and other options (that don't fall into one of the two approaches).

### Topics Explored

This section includes a comprehensive list of all topics that were explored and moved forward by the working group through the end of the process. The purpose of this section is to provide the SAC with an overview of these topics, even though many of them arose in the context of one of the approaches described in the section below.

---

#### Explore emerging technologies to assist with detecting whales

---

- 1 Conduct a pilot study to test **real-time infrared whale detection** aboard ships
  - 2 Explore **passive acoustic monitoring** in the region
- 

#### Expand and improve collection and management of whale data

---

- 3 Conduct more **aerial whale surveys**, specifically on the south side of the Channel Islands
  - 4 Expand the use of vessels of opportunity to **collect whale sightings from mariners**
  - 5 Create a **centralized whale data repository** and integrate all existing whale data in California
- 

#### Develop a system for real-time and near-real-time response to avoid ship strikes

---

- 6 Use **AIS text messaging** to inform ships of whale sightings
  - 7 Develop a **vessel warning system** that notifies ships of whales and triggers action
  - 8 Develop **best management practices** for mariners to reduce the risk of ship strikes
- 

#### Implement spatial management measures such as routing measures and VSR zones

---

- 9 **Extend the Santa Barbara Traffic Separation Scheme** to the northwest
  - 10 **Expand the Area to Be Avoided** around CINMS
  - 11 Design and implement a **new western route** south of the Channel Islands
  - 12 Implement an incentivized or mandatory **seasonal VSR zone** in the region
  - 13 Designate the region as a **Particularly Sensitive Sea Area**
  - 14 Implement a **second VSR incentive trial**
-

## Technology-Based Approach

The technology-based approach was developed in an iterative process. The original proposal was submitted by the DoD with input from Mx SoCal and Pacific Merchant Shipping Association (PMSA). This proposal focused primarily on reducing the risk of ship strikes on whales, with the premise that effective risk reduction is ultimately dependent upon immediate knowledge of whale locations in relation to ships, and keeping whales and ships apart. This approach focuses on monitoring the abundance and distribution of different whale species around the Channel Islands combined with a real-time shipboard detection system, and a network of centralized data collection, interpretation, and dissemination to inform mariners of whale locations, with the goal of real-time ship responses to avoid strikes.

There was **mixed** support from the group on this approach as a whole. Thus, this document also captures the working group's level of support for each of the seven individual components of the approach. Specifically, this approach recommended the following:

### *1. Real-time infrared whale detection*

Conduct a pilot study to test the use of infrared cameras on ships to automatically detect whale blows. The use of infrared cameras could assist mariners in detecting both whales to avoid ship strikes and small vessels to improve navigation. The data gathered could also be used to inform new and existing modeling of whale densities in the Santa Barbara region. This measure aims to address working group goals of reducing whale strikes and improving navigational safety by potential avoidance of small vessels. The Navy is seeking up to \$120,000 to support this idea in fiscal year 2016. There was **broad** support for this idea.

### *2. Aerial whale surveys*

Collect fine-scale whale sightings via systematic aerial surveys, specifically focusing on the south side of the Channel Islands. The proponents argued that fine-scale whale location information around the Channel Islands is needed to inform spatial management decisions and trigger best management practices. The Navy has committed \$60,000 for fiscal year 2016 to increase aerial surveys in the region, and hopes to do so again in fiscal year 2017. There was **broad** support for this idea.

### *3. Collect whale sightings data from mariners*

Utilize vessels as platforms of opportunity to collect opportunistic whale sightings data in the region. When appropriate, expand the user base of the mobile apps Spotter Pro and Whale Alert for reporting sightings. Consider developing a more user-friendly way for mariners to report sightings. There was **broad** support for this idea.

### *4. Centralized whale data repository*

Make use of NOAA server technology (or other appropriate location with USCG and stakeholder support) to be the center point to capture all real-time whale sightings and historical whale data in the region. Standardize and integrate all existing whale data. There was **unanimous** support for this idea.

### **5. AIS text messaging**

NOAA and the DoD could partner with Mx SoCal to disseminate important information on the locations of whale sightings and naval operations, respectively. Mx SoCal has agreed to transmit text messages to ships via AIS using terrestrial-based AIS technology. AIS text messages may be transmitted to an individual ship or to all ships but are limited to 156 characters. All large commercial vessels are required to have class A AIS, which includes AIS text messaging capabilities. Currently, only the federal government can use AIS to transmit text messages, so Mx SoCal (a non-profit organization) would need permission from the Federal Communications Commission to transmit messages via AIS to ships. This idea aims to address the goals of improving navigational safety, reducing the threat of ship strikes, and reducing conflicts among oceans users. There was **unanimous** support for this idea.

### **6. Best management practices**

Using input from the shipping industry and ship operators, design and implement procedures that mariners should follow to minimize ship strikes (e.g. route changes, speed adjustment, others) if a whale is in proximity of a ship. This idea aims to address the goal of reducing ship strikes. There was **mixed** support for this idea.

### **7. Vessel warning system**

Integrate the above components of this approach into a vessel warning system to help mariners avoid or minimize the risk of ship strikes. In this system, near real-time whale location information is collected and aggregated in a centralized whale data repository by NOAA or another appropriate entity. Then, Mx SoCal forwards the aggregated information from the repository to the shipping industry via email, radio, and AIS text messaging. In addition, if infrared technology proves successful, it could be used to notify a ship of a whale in its proximity. Then, ships would be triggered to implement best management practices to reduce the risk of ship strikes. There was **broad** support for this idea.

## **Spatial Approach**

The spatial approach was developed in an iterative process, utilizing recommendations from proposals put forth by the Environmental Defense Center (EDC) and Natural Resources Defense Council (NRDC), and in consideration of a ship strike risk analysis conducted by Jessica Redfern and Thomas J. Moore, NMFS, and John Calambokidis, Cascadia Research. The components that make up this approach were developed in SeaSketch and discussed in several forums, designed to focus on management ideas that would address the MSWG's four stated goals. This approach has multiple components that the contributors feel have merit as standalone measures and also work together to have the most effective impact with respect to the four goals. The proponents of this combined approach believe it will reduce the risk of ship strikes and improve air quality, without exacerbating the safety of ship navigation or conflicts with other ocean users, such as the DoD.

There was **mixed** support from the group on this approach as a whole. Thus, this document also captures the working group's level of support for each of the five individual components of the approach. Specifically, this approach recommended the following:

## **1. Vessel routing**

The first part of the spatial approach is the use of vessel routing systems. The proponents believe routing can be used to achieve multiple MSWG goals, including decreasing the risk of ship strikes, improving or at least not exacerbating navigational safety, and reducing user conflicts. The proposed vessel routing scheme includes three components: SB TSS extension, a new Western Route, and Area to Be Avoided (ATBA) expansion. A description of each measure follows.

### **1a. Santa Barbara Channel Traffic Separation Scheme extension**

An extension of the current SB TSS is proposed to organize traffic beyond the current western terminus to reduce the likelihood of ship strikes on whales over the shelf break. The western terminus of the current SB TSS is within an area of high predicted blue whale density. The extension of the current SB TSS to the northwest is expected to reduce ship strike risk by organizing vessel traffic to reduce its overall footprint in an area with predicted high whale densities. This is preferable to the current traffic pattern that fans out at the current west terminus of the TSS. There was **broad** support for this idea.

### **1b. Western route south of the Channel Islands**

Create a new routing measure to the south of the northern Channel Islands for a western route into the Ports of Los Angeles and Long Beach in order to minimize impacts to whales. This route could be a TSS, a recommended track, or a recommended route. This measure aims to address two goals of the working group: decrease ship strikes to whales and increase navigational safety. The proposed Western Route reduces the overall risk of a ship strike, as compared to three other routes analyzed in the risk analysis done by NMFS and Cascadia Research. There was **mixed** support for this idea.

### **1c. Expansion of the Area to be Avoided**

Expand the current ATBA to encompass more whale habitat, including a northward expansion to the edge of the SB TSS, to the south to meet the proposed Western Route south of the Channel Islands, and to the west to encompass an area of high predicted whale densities. There was **broad** support for this idea.

## **2. Vessel Speed Reduction**

VSR is a recommended speed in a defined area, which could be managed seasonally and/or dynamically. In this spatial approach, VSR would be used for ships transiting a specified zone, with a speed reduction to 12 knots, approximately April 1-November 15 to overlap with whale visitation and ozone season. This date could be modified by NOAA to start before or end after those dates, depending on observed whale densities. VSR would be incentive-based or required through regulation. There was **mixed** support for this idea.

## **3. Particularly Sensitive Sea Area**

A Particularly Sensitive Sea Area (PSSA) is a broad International Maritime Organization (IMO) designation that acknowledges special ecological, socio-economic, and/or scientific features of a region, and offers flexibility in the associated protective measures that are implemented. A PSSA

itself does not impose any management measures or restrictions but, in order for a PSSA to be brought to the IMO, there needs to be associated protective measures to prevent, reduce, or eliminate the identified vulnerability of the area. The existing ATBA and TSS in the region could be cited as the associated protective measures, or new measures could be brought to the IMO with the PSSA, such as a region-wide VSR recommendation or requirement. There was **broad** support for this idea.

## Other Options Not Explicitly Included in Approaches

### *1. Vessel Speed Reduction Incentive Trial*

Conduct a new VSR incentive trial that would build on the first VSR incentive trial conducted in the Santa Barbara Channel in 2014. A second VSR trial could address some additional questions not included in the first trial, such as the willingness of ships transiting south of the islands to participate. This would inform any programmatic VSR that may be implemented in the future. There was **unanimous** support for this idea.

### *2. Passive Acoustic Monitoring*

Conduct a pilot study to assess the utility of passive acoustic monitoring to locate whales in the region and inform dynamic management. There was **mixed** support for this idea.

## Next Steps

It is expected that the SAC will receive all information and advice that came out of the MSWG process during the March 2016 meeting. At that time, the SAC will consider what the review process and timeline will be for preparing advice for the Sanctuary Superintendent.

In addition, at the time of writing, three relevant studies were in progress:

1. *Socioeconomic Evaluation of Alternatives to Manage Shipping and Other Uses of the CINMS Region* – NOAA's National Centers for Coastal Ocean Science (NCCOS)
2. *Second Ship Strike Risk Analysis* – NMFS
3. *Vessel Speed Reduction, Air Pollution, and Whale Strike Tradeoffs* – Bren School of Environmental Science & Management at the University of California, Santa Barbara

The results of these analyses are forthcoming and will also inform the SAC's deliberations.

## INTRODUCTION

The Channel Islands National Marine Sanctuary (CINMS or sanctuary) Advisory Council (SAC) formed the Marine Shipping Working Group (MSWG or working group) in 2014 to develop recommendations to address shipping-related concerns in and around CINMS, including the potential for: ship strikes on endangered whales, air pollution and greenhouse gas emissions, navigational safety concerns, and conflicts with ocean uses such as naval operations.

The working group consisted of a diverse group of stakeholders, including representatives from the US Department of Defense (DoD), US Coast Guard (USCG), Channel Islands National Park, National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS), Marine Exchange of Southern California (Mx SoCal), shipping industry, Santa Barbara County Air Pollution Control District (SBCAPCD), and the tourism, research, and conservation communities. From February 2015 to January 2016 the MSWG convened four times in person, eight times via webinar, and utilized SeaSketch, an interactive web based mapping program that facilitated online collaboration. They developed the following advice package that includes options for management, education, outreach, and research to address shipping issues in the working group's study region (Figure 2).

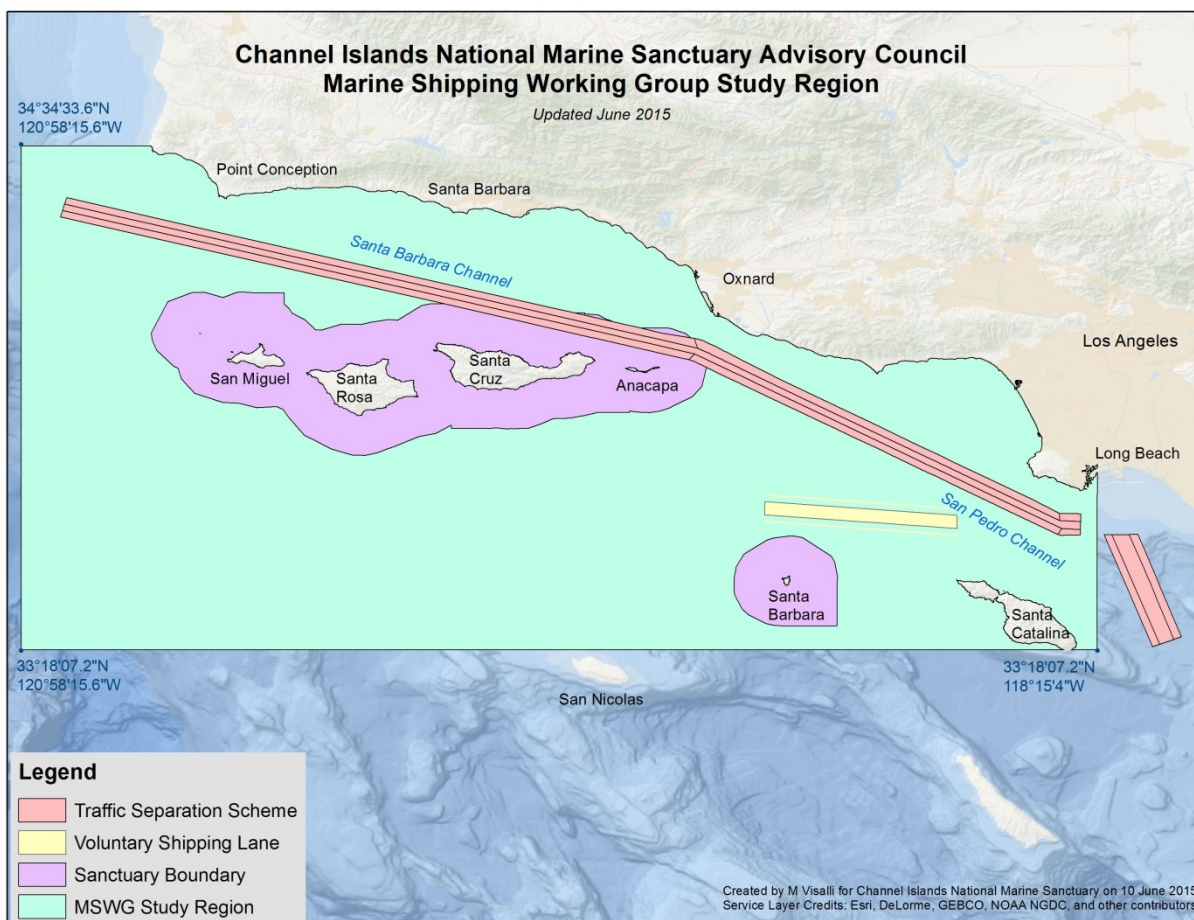


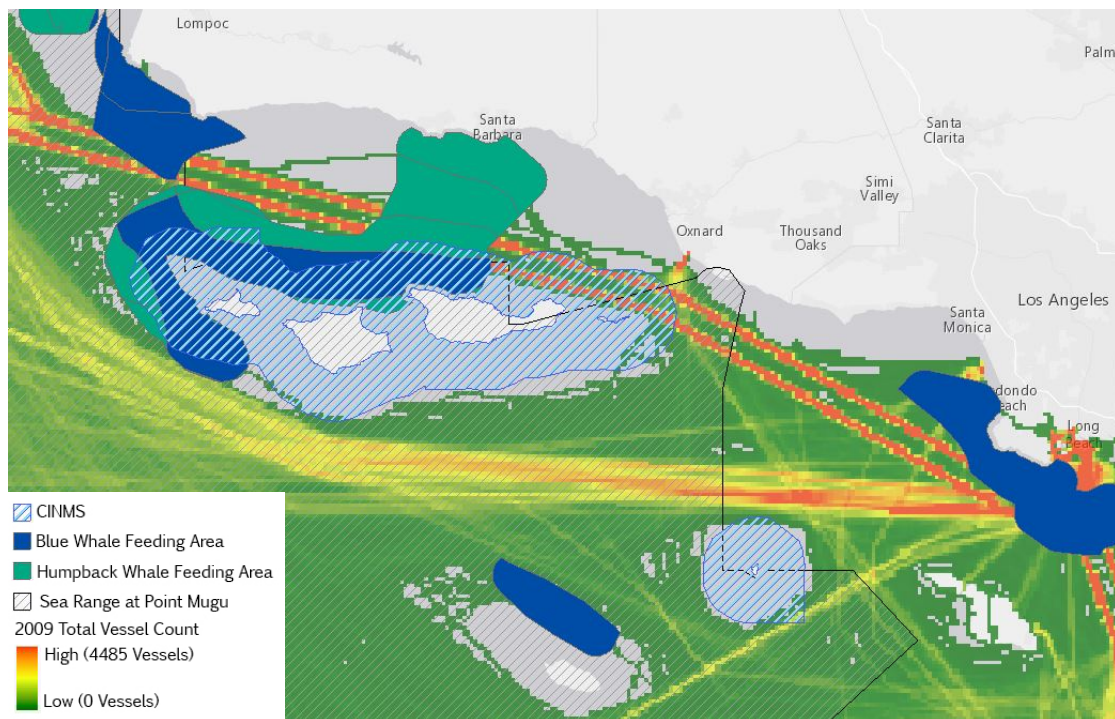
Figure 2: Marine Shipping Working Group study region.

## BACKGROUND

### Problem Statement

The marine shipping industry is a major contributor to the national economy and provides transportation for goods around the world. The Santa Barbara Channel region is heavily transited by large commercial vessels traveling into and out of the ports of Los Angeles and Long Beach (LA/LB), two of the nation's busiest ports. Thousands of cargo ships transit through the region each year, either through an internationally approved Traffic Separation Scheme within the Santa Barbara Channel (SB TSS) or around the south side (backside) of the northern Channel Islands. This region is also home to seasonal feeding grounds and aggregation hotspots for three species of endangered whales, blue, humpback, and fin whales (Redfern et al. 2013). Also overlapping this area is the Point Mugu Sea Range, DoD's largest and most extensively instrumented over-water missile testing range. Vessel traffic patterns in the region have shifted significantly in the past, largely in response to new fuel regulations aimed at improving air quality that were implemented in 2009 and 2015. It is likely that vessel traffic patterns will continue to change in the future.

The presence of large commercial vessels and changes in traffic patterns in the Channel region present four distinct, local management challenges including: ship strikes on endangered whales, air pollution and greenhouse gas emissions, navigational safety concerns, and conflicts with other ocean uses, such as naval operations (Figure 3). For additional information on the impetus for the MSWG, please see the working group proposal (Appendix A).



**Figure 3: Marine Shipping Working Group area of interest with five data layers overlaid: CINMS boundary; blue and humpback whale biologically important feeding areas (Calambokidis et al. 2015); Point Mugu Sea Range; and total vessel count in 2009, from USCG AIS data that was processed by NMFS.**

## Previous Work

During September of 2007, NOAA received reports of five blue whale carcasses between Santa Cruz Island and San Diego. NMFS designated the blue whale mortalities as an “Unusual Mortality Event” (Hogarth 2007). In response to that event, CINMS has collaborated with the shipping industry, governmental agencies, non-profits, and other key stakeholders to reduce the risk of ship strikes on endangered whales. In addition, the maritime industry engaged, and proactively sought solutions, such as sponsoring and distributing whale posters to vessels, funding aerial surveys over the channel, supporting whale research, and participating in forums. For more than six years, the SAC has been the local forum for community and stakeholder conversations about how to meet the needs of the shipping industry while also protecting human health, natural resources, and sensitive marine species such as endangered whales. Below is a summary of relevant work that CINMS and partners have carried out prior to the MSWG process.

### Voluntary Seasonal Vessel Speed Reduction (Ongoing Since 2007)

Since 2007, NOAA has annually provided a seasonal speed reduction recommendation for large commercial vessels when a whale aggregation in the shipping lanes triggers an elevated concern of ship strikes. These voluntary speed recommendations are communicated to mariners via the Local Notice to Mariners (LNM) and a Whale Advisory email list. As noted by McKenna et al. (2012), these requests to make voluntary changes to speed have been ineffective, with zero ships fully cooperating with the voluntary seasonal speed recommendation in any of the three years studied (2007-2009). However, according to Mx SoCal, the total number of vessel transits and average vessel speed has declined since 2007.

### Education and Outreach (Ongoing Since 2007)

CINMS and partners have conducted a wide range of relevant education and outreach activities, including developing web resources, co-producing a whale information poster with the shipping industry, giving presentations, maintaining a whale advisory listserv, and publishing in the LNM. A full list of relevant education and outreach activities as of September 2015 is found in (Appendix B)

### Research and Monitoring (Ongoing Since 2007)

CINMS and partners have conducted a wide range of relevant research and monitoring activities, such as collecting opportunistic marine mammal sightings since 1996, employing electronic data collection applications and analyzing Automatic Identification System (AIS) ship data. A full list of relevant research and monitoring activities as of September 2015 is found in (Appendix C).

### Sanctuary Advisory Council Ship Strike Recommendations (2009)

In 2009, the SAC adopted recommendations to address and reduce the threat ship strikes pose to endangered whales in the Santa Barbara Channel Region. Members of the CINMS Ship Strike Subcommittee outlined their recommendations in a report, titled “Reducing the Threat of Ship Strikes on Large Cetaceans in the Santa Barbara Channel Region and Channel Islands National Marine Sanctuary” (Abramson et al. 2009). Exploring case studies from other national parks, national marine sanctuaries, and the Ports of LA/LB, the report determined which case study strategies were transferable to the Santa Barbara Channel. Science-based policy recommendations covered the



following categories: research and monitoring, alteration of vessel behavior, alteration to TSSs, education and outreach, incentive and mandated Vessel Speed Reductions (VSRs), and adaptive management.

### **Modifications to the Santa Barbara Traffic Separation Scheme (2013)**

The 2009 SAC ship strike report recommended that NOAA explore changes to the SB TSS to reduce the risk of ship strikes (Abramson et al. 2009). On June 1, 2013, the SB TSS was narrowed to shift commercial shipping traffic away from historically high concentrations of whales.

### **Conservation Working Group Review of 2009 Recommendations (2013)**

In 2013, the SAC's Conservation Working Group (CWG) conducted a review of the 2009 SAC ship strike recommendations. At the September 20, 2013 SAC meeting, SAC conservation seat and CWG chair Kristi Birney summarized progress that had been made and work that remained for each of the seven major recommendation areas within the 2009 report. Overall, the 2013 CWG review characterized most of the 2009 recommendations as not yet achieved. From July through November 2013, Kristi Birney also carried out over 15 stakeholder interviews to determine the level of interest in using a new SAC Working Group as the forum for discussing the outstanding issues and challenges that marine shipping presents in the Santa Barbara Channel region. In these interviews, stakeholders expressed support for forming such a group.

### **Vessel Speed Reduction Incentive Trial (2014)**

Based on the 2009 SAC recommendations, in summer of 2014, CINMS, Santa Barbara County Air Pollution Control District (SBCAPCD), Ventura County Air Pollution Control District (VCAPCD), Environmental Defense Center (EDC) and the National Marine Sanctuary Foundation implemented a VSR Incentive Trial. The goal was to conduct a pilot study to evaluate the feasibility of using monetary incentives and positive public relations to slow ships down in the Santa Barbara Channel to reduce air pollution and protect endangered whales. Seven shipping companies participated and slowed 27 cargo ship transits to 12 knots or less (from typical speeds of 14-18 knots) for an incentive of \$2,500 per trip. It is estimated that, "the program achieved more than 16 tons of ozone-forming nitrogen oxides (NOx) emissions reductions from participating ships, a more than 50 percent reduction from baseline emissions; also, the program achieved approximately 500 metric tons of regional greenhouse gas emission reductions, a more than 50 percent reduction" (Birney et al. 2015). In addition, slower speeds also greatly reduce the chance that a ship strike on a whale will be fatal (Vanderlaan and Taggart 2007).

## MARINE SHIPPING WORKING GROUP PROCESS

### Marine Shipping Working Group Formation and Planning (2014)

#### MSWG Formation

In January 2014, the SAC received a proposal (Appendix A) from the CWG to form a new working group that would build upon previous SAC work and take an integrative, collaborative approach to address multiple marine shipping issues in the Santa Barbara Channel region. The SAC discussed the proposal at their meeting on January 24, 2014, and the council unanimously voted to approve formation of the MSWG. At each of the following five SAC meetings in 2014, the council received an update on the planning phase of the MSWG process, which included securing financial support, finalizing working group membership, and confirming contracts with SeaSketch and the Kearns & West professional facilitation team.

#### Goals and Charge

As defined in the working group proposal, the purpose of the group was to form recommendations that address the following goals:

1. Reduce the risk of ship strikes on endangered whales
2. Decrease air pollution and greenhouse gas emissions
3. Improve navigational safety and promote efficient maritime shipping throughout the region
4. Manage ship traffic to minimize Naval operation interruptions and reduce conflicts with other ocean users (e.g. fishing and whale watching concessionaires)

To forward these goals, the MSWG would explore, discuss, and evaluate options using a multi-stakeholder collaborative process and the scientific ocean planning tool, SeaSketch, to address competing human uses (e.g. military activities and commercial shipping) and impacts to the region and the marine environment (e.g. air pollution and ship strikes on whales). Taking into consideration the perspectives of multiple stakeholders, the working group would explore solutions that evaluate ship routing options, incentives, and/or regulatory options to reduce ship speed. The working group would aim to find win-win solutions that offer the most logical approach for protecting whales, addressing human health issues, and fostering robust maritime commerce off Santa Barbara's coast in a more sustainable manner.

MSWG members were specifically charged with crafting advice in the form of management, education, outreach, and research recommendations or proposals that address each of the four goals to the greatest extent possible and build on previous work to date. MSWG members were asked to converge as much as possible in their recommendations and to share their levels of support for different proposals but consensus in the form of unanimous agreement was not required.

#### Funding and Support

Over the course of 2014, financial support for the MSWG process was pursued by CINMS and EDC. Funding was necessary to cover the following expenses:

- Meeting support (meeting venue, food, travel stipends)
- SeaSketch (integration of existing data, development of analytics, staff support for utilizing tool)
- California Sea Grant Fellow (hosted by CINMS)
- Facilitation

A total of \$217,900 was secured from the following sources:

- \$165,000: Santa Barbara Foundation
- \$40,000: Bower Foundation
- \$10,000: International Fund for Animal Welfare
- \$2,900: UCSB Coastal Fund

EDC was the fiscal sponsor, in charge of contracting the professional services and meeting support, generally administering the grant funding, and reporting back to the funders on progress and outcome of the MSWG process.

### Participants

During the assessment interviews conducted in 2013, SAC conservation seat and CWG chair Kristi Birney identified an initial list of potential working group participants. CINMS and the SAC formalized participation in the MSWG by inviting each identified participant at the onset of the process. Over the course of the working group process, there were some changes to the list of working group participants (see notes section below). Notably, in May 2015, International Fund for Animal Welfare (IFAW) left the MSWG due to internal funding constraints, and in June 2015, Natural Resources Defense Council (NRDC) joined the MSWG. MSWG membership is shown in the table below.

Organization	Representative(s)	Notes
California Coastal Commission	Cassidy Teufel, Senior Environmental Scientist	SAC Member
Cascadia Research	John Calambokidis, President and Angela Szesciorka (Alternate), Research Biologist	10/15 Szesciorka joined
Chamber of Shipping of America	Kathy Metcalf, Director of Maritime Affairs and Sean Kline (Alternate), Maritime Affairs	
Channel Islands National Park Service	Stephen Whitaker, Marine Resource Manager	SAC Member
Environmental Defense Center (EDC)	Kristi Birney (MSWG Co-Chair), Marine Conservation Analyst	SAC Member
International Fund for Animal Welfare (IFAW)	Margaret Cooney, Whale Campaign Lead and April Wobst (Alternate), Whale Program Officer	05/15 IFAW left
Island Packers	Andrea Mills, Education Coordinator	SAC Member
Maersk Line North America	Jeremy McConnell, Asst. Manager Environment & Sustainability and Lee Kindberg (Alternate), Director Environment & Sustainability	12/15 McConnell left; Maersk not represented at last meeting; did not review final report

<b>Marine Exchange of Southern California</b>	<b>Kip Louttit</b> , Captain and Executive Director	<i>SAC Member</i>
<b>National Marine Fisheries Service, Protected Resources Division</b>	<b>Elizabeth Petras</b> , Natural Resources Management Specialist	<i>05/15 SAC member Petras left region, Penny Ruvelas represented at last MSWG meeting</i>
<b>National Marine Fisheries Service, Southwest Fisheries Science Center</b>	<b>Jessica Redfern</b> , Marine Mammal Spatial Habitat and Risk Program Leader	
<b>National Park Service</b>	<b>Megan McKenna</b> , Bioacoustic Biologist, Natural Sounds and Night Skies Division	
<b>Natural Resources Defense Council (NRDC)</b>	<b>Zak Smith</b> , Attorney and <b>Taryn Kiekow</b> (Alternate), Senior Policy Analyst, Marine Mammal Protection Project	<i>06/15 NRDC joined</i>
<b>Pacific Merchant Shipping Association (PMSA)</b>	<b>TL Garrett</b> , Vice President and <b>John Berge</b> (Alternate), Vice President	<i>05/15 Berge joined</i>
<b>Santa Barbara County Air Pollution Control District (SBCAPCD)</b>	<b>Mary Byrd</b> , Community Programs Supervisor and <b>Joseph Petrini</b> (Alternate), Emission Inventory/Planning Specialist III	
<b>US Coast Guard, Sector Los Angeles and Long Beach Waterways Management Division</b>	<b>LT Jevon James</b> and <b>LCDR Brandon Link</b> (Alternate)	<i>SAC Membership</i>
<b>US Department of Defense</b>	<b>John Ugoretz</b> , Manager Naval Air Warfare Center, US Navy and <b>Walt Schobel</b> (Alternate), US Air Force	<i>SAC Members</i>
<b>University of Southern California Sea Grant</b>	<b>Phyllis Grifman*</b> (MSWG Co-Chair), Associate Director and <b>James Fawcett</b> (Alternate), Marine Transportation/Seaport Specialist	<i>*SAC Member</i>

### SeaSketch

SeaSketch is a web-based mapping platform for science-based stakeholder-driven marine spatial planning. It provides an online space for working group members to access authoritative data sets and associated metadata being considered in the process. SeaSketch also provides accessible GIS tools in order to allow anyone involved to sketch out and analyze their spatial plan ideas, which could then be shared with the rest of the group in map-based discussion forums, supporting remote collaboration between in-person meetings. SeaSketch was contracted to support the MSWG process, and a SeaSketch project ([safepassage.seasketch.org](http://safepassage.seasketch.org)) was created to house relevant spatial data for the region (Appendix D).

### Support Staff

The MSWG was supported by a professional facilitation team, SeaSketch staff, and Sanctuary staff including a California Sea Grant fellow. Support staff included:

- **Facilitation Team:** Eric Poncelet and Janet Thomson, Kearns & West
- **SeaSketch Support:** Will McClintock and Grace Goldberg, SeaSketch, University of California Santa Barbara
- **Sanctuary Staff:** Superintendent Chris Mobley, Deputy Superintendent Michael Murray, Resource Protection Coordinator Sean Hastings, and California Sea Grant Fellow Morgan Visalli

## Marine Shipping Working Group Meetings (2015-2016)

The MSWG was a task-specific working group with an end date rather than a permanent, standing working group of the SAC. Thus, over the course of a year, the working group was scheduled to have five formal meetings, with webinars and subgroups as needed for additional discussions. From February 2015 – January 2016, the Marine Shipping Working Group convened in person four times (including one two-day meeting) and held eight webinars. MSWG meeting materials are available online:

[http://channelislands.noaa.gov/sac/group\\_meetings\\_archives.html](http://channelislands.noaa.gov/sac/group_meetings_archives.html).

Event	Type	Date
<b>Meeting #1</b>	In Person (All)	February 25, 2015
<b>SeaSketch Training</b>	Webinar (All)	April 7 & 8, 2015
<b>Meeting #2 (Part 1)</b>	Webinar (All)	April 20, 2015
<b>Meeting #2 (Part 2)</b>	Webinar (All)	May 5, 2015
<b>Data Subgroup</b>	Webinar (Subgroup)	June 9, 2015
<b>Meeting #3</b>	In Person (All)	June 29, 2015
<b>Outreach/Education and Research Review</b>	Webinar (All)	September 21, 2015
<b>Grading Subcommittee</b>	Webinar (Subgroup)	August 11, 2015
<b>Meeting #4 (Day 1)</b>	In Person (All)	October 7, 2015
<b>Meeting #4 (Day 2)</b>	In Person (All)	October 8, 2015
<b>Spatial Management Options Subgroup</b>	Webinar (Subgroup)	November 13, 2015
<b>Technology Based Approach Subgroup</b>	Webinar (Subgroup)	November 13, 2015
<b>Meeting #5</b>	In Person (All)	January 7, 2016

### Meeting #1

The MSWG held its first meeting on February 25, 2015 in Santa Barbara. During this introductory meeting, working group members reviewed project objectives and background information.

Presentations at the first meeting included updates on the 2014 VSR trial, a discussion of existing data, and an introduction to SeaSketch. At the conclusion of the first meeting, next steps for MSWG members included: continue to read background materials; participate in a SeaSketch training webinar; and, if interested, participate in a data subgroup webinar to delve further into the working group’s data needs. Following the first meeting, on April 23, 2015, MSWG co-chairs and support staff sent a policy memo (Appendix E) to the MSWG that addressed some questions that arose during the first meeting, and

provided additional guidance on the working group's charge, geographic scope, and other miscellaneous process items.

### Meeting #2

Due to scheduling challenges and travel constraints for several of the working group members, the second MSWG meeting was held over the course of two, three-hour webinars on April 20 and May 5, 2015. The primary goal of these webinars was to have key presenters share background material that would inform future MSWG deliberations. Presentations included:

- *Experiences and lessons learned from Gulf of Farallones and Cordell Bank Joint Working Group process* – Michael Carver, Cordell Bank National Marine Sanctuary
- *Experiences and lessons learned from the East Coast/Stellwagen Bank National Marine Sanctuary* – Elizabeth Petras, NMFS
- *Experiences from CINMS* – Sean Hastings, CINMS
- *Information from the International Maritime Organization* – Stephanie Altman, NOAA General Counsel
- *Demonstration: management options in SeaSketch* – Grace Goldberg, SeaSketch
- *Introduction to Shipping* – Jeromy McConnell, Maersk Line
- *Shipping Patterns* – Kip Louttit, Mx SoCal
- *Air Quality Data* – Mary Byrd, SBCAPCD
- *Economic Data and Potential Analyses* – Theresa Goedeke, NOAA's National Centers for Coastal Ocean Sciences (NCCOS)
- *Whale Data* – Jessica Redfern, NMFS

### Meeting #3

Between the second and third meetings, there were three notable MSWG activities:

1. On June 9, 2015, the Data Subgroup (John Berge, TL Garrett, Kip Louttit, Walt Schobel, Jessica Redfern, Kristi Birney, and John Calambokidis) convened via webinar to explore existing data and discuss remaining data needs.
2. On June 17, 2015, MSWG co-chairs and support staff sent a second policy memo (Appendix F) to the MSWG proposing modifications to the MSWG study region based on concerns of the Data Subgroup that the previous study region was too small to capture the nature of shipping and whales in the region.
3. Prior to the third meeting, MSWG members were asked to design a "preliminary management option idea" (an early-stage proposal for a management action that would address the four MSWG goals) and submit it to support staff via SeaSketch. These preliminary management option ideas were then shared with the full MSWG in an anonymous fashion (i.e., not tied to the name or affiliation of the contributor), to serve as a basis for discussions at the third meeting.

The MSWG then convened for the third time on June 29, 2015 in Oxnard. The group received three informational presentations in the morning:

- *Updates on Analytics in SeaSketch* – Grace Goldberg, SeaSketch
- *Ship Routing and Scheduling Drivers* – Kip Louttit, Mx SoCal and Jeromy McConnell, Maersk Line
- *The Science of Ship Strikes* – Greg Silber, NMFS

Eric Poncelet and Janet Thomson, Kearns & West facilitators, initiated a discussion of the six preliminary management option ideas that MSWG members submitted through SeaSketch prior to the meeting. Details of these discussions can be found in the third meeting key outcomes (<http://channelislands.noaa.gov/sac/pdfs/mswg-outcomes06292015.pdf>). Members acknowledged that all address, at some level, one or more of the goals established for the working group's deliberations. In order to gain an overall perspective of how well different management options perform with regard to the four goals of the MSWG, members agreed that a grading system should be developed for these proposals to facilitate further discussion toward the ultimate goal of providing working group recommendations. The MSWG delegated a small ad hoc grading subcommittee composed of working group members and NOAA staff to develop and explore the use of an appropriate grading system.

#### Meeting #4

Between the third and fourth meeting, two webinars occurred:

1. On August 11, 2015, the grading subcommittee convened via webinar to review the grades received for each preliminary management option idea.
2. On September 21, 2015, the entire MSWG convened via webinar to discuss outreach, education, and research needs. Sanctuary staff provided a summary of education, outreach and research work that was in progress or had already been completed (Appendices B and C). The goal of this webinar was to ensure that new recommendations created by the MSWG built upon existing work to date and took into account previous lessons learned. MSWG members also participated in a SeaSketch survey where they indicated if they thought each existing education, outreach, or research activity should be continued, discontinued, or modified in some way (Appendix G).

Then, prior to the fourth MSWG meeting, MSWG members were given an assignment: develop a new round of management options, as well as research needs and outreach and education ideas. MSWG members could also carry forward any of the preliminary management option ideas, if a working group member felt that a preliminary idea was worth refining and resubmitting for consideration. MSWG members were also asked to participate in new SeaSketch online discussion forums. The forum threads reflected topics identified by the grading subcommittee as requiring further discussion.

From this assignment, four proposals and one risk analysis (Appendix H) were submitted in SeaSketch (<http://channelislands.noaa.gov/sac/pdfs/mswg-proposals10052015.pdf>):

- *Technology Based Approach for Risk Minimization for Whale Strikes* – Prepared by representatives from the DoD, Mx SoCal, and PMSA
- *Preliminary Management Option Idea to reduce the risk of ship strikes on protected whales in the Channel Island National Marine Sanctuary* – Prepared by representatives from NRDC
- *Environmental Defense Center Proposal* – Prepared by representatives from EDC

- *Speed restrictions based on acoustic (or other) whale detections* – Prepared by Greg Silber, NMFS.
- *Ship-strike risk in the Southern California Bight* – Prepared by representatives from NMFS and Cascadia Research.

In addition, working group members identified a suite of research needs and outreach and education ideas and submitted them via SeaSketch forums. These proposals, risk analysis, research needs, and outreach/education ideas served as the basis for in-depth discussion at the fourth meeting. At the meeting in Santa Barbara on October 7-8, 2015, the group addressed each of the proposals above by further articulating a description, rationale, pros, cons, and considerations for each.

The first day of the fourth meeting focused primarily on discussing these research, outreach, and education ideas and developing pros and cons of the following general management options: seasonal management areas, dynamic management areas, VSR, recommended tracks, TSSs, recommended routes, and routing south of the Channel Islands. At the conclusion of the first day, the group had reached a high level of agreement on these ideas and their pros and cons. In future iterations of the advice package, most of these research, outreach, and education ideas and general management options pros and cons were integrated into the two approaches for clarity.

The second day of the fourth meeting focused primarily on discussing the risk analysis and four proposals. Jessica Redfern, NMFS representative, presented the results of a ship strike risk analysis conducted by NMFS and Cascadia Research (Appendix H). In this analysis, four ship tracks south of the northern Channel Islands were analyzed to determine the overall risk of ship strikes for blue, humpback and fin whales (Figure 4). NMFS concluded that the central track (later referred to as the Western Route in this document) is the optimal track south of the northern Channel Islands, compared to the other tracks analyzed (North Central, South Central, and South) (Redfern et al. 2015). NMFS and Cascadia Research representatives put the central track forth as a proposed route for consideration by the MSWG. In the discussion following the presentation, working group members expressed interest in analyzing risk of dispersed traffic (no route) south of the northern Channel Islands versus concentrated traffic in the “central track.” This follow up study was in progress at the time of writing, and the results are forthcoming.



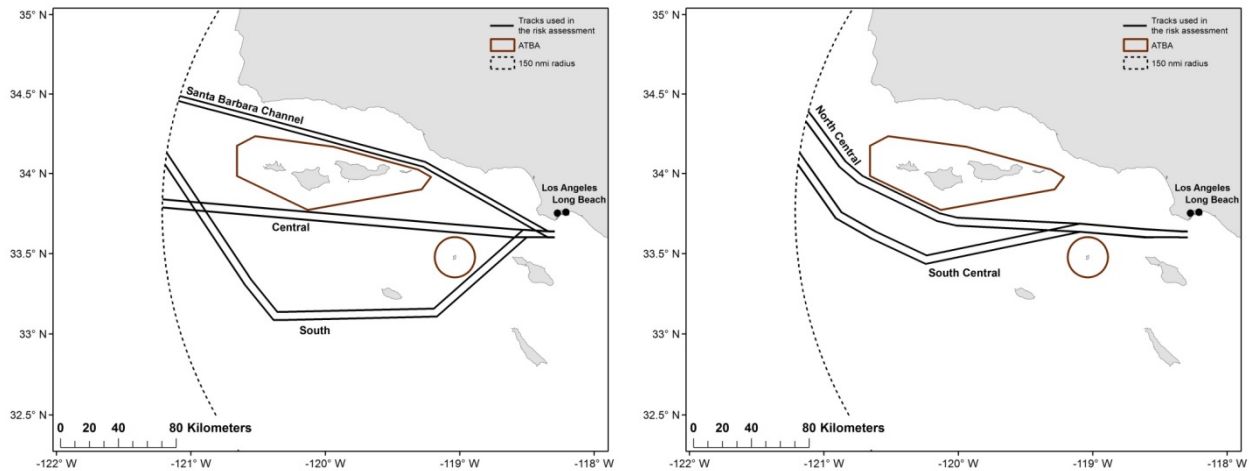


Figure 4: Five ship tracks that were analyzed in the ship strike risk analysis.

Following the discussion of the ship strike risk analysis, the group discussed the four proposals. Working group members approached the development of the different proposals during meetings 4 and 5 from a variety of perspectives. Some members crafted their proposals in counter distinction to other proposals and generally viewed the different proposals as mutually exclusive. Other members did not view the technology-based and spatially-focused proposals to be mutually exclusive and saw potential benefits from implementing more than one.

At the conclusion of the meeting on October 8, 2015, the group decided to bundle the existing spatial proposals (EDC and NRDC proposals) and the results from the risk analysis into one proposal moving forward. A subgroup was formed to refine this proposal and would meet via webinar prior to the fifth meeting. A second subgroup was also formed to refine the technology-based proposal, and specifically design best management practices for minimizing the risk of ship strikes prior to the next meeting as well.

Several members of the group also agreed that the proposal *Speed restrictions based on acoustic (or other) whale detections* should become a passive acoustic monitoring pilot study because not enough successful acoustic monitoring has been done in this region to inform speed restrictions or other management measures. Other members suggested acoustic monitoring may not be very effective because Blue, Humpback, Fin, and Gray whales exhibit very different calling patterns from the North Atlantic Right whale, and previous studies suggest that calling from these species is not linked to abundance (Oleson et al. 2007).

### Meeting #5

Prior to the fifth meeting, both subgroups convened separately via webinar to refine their respective proposals. The proposals were then revised in an iterative process via SeaSketch online discussion forums.

MSWG support staff then pulled together a draft advice package containing the following elements:

- Research, outreach, and education advice compiled from MSWG Meeting #4 and previous MSWG discussions on SeaSketch forums.
- General advice on management measures compiled from MSWG Meeting #4 and previous MSWG discussions on SeaSketch forums.
- Advice on two MSWG management proposals compiled from MSWG Meeting #4, subsequent MSWG webinars, and discussions on the SeaSketch forums:
  - Technology-based approach
  - Spatial management-focused approach

At the fifth meeting on January 7, 2016, working group members addressed some outstanding questions and voiced their levels of support for various components of the advice package. They also discussed how to restructure the final advice package to reduce repetition and improve clarity. The working group then formulated a plan for drafting and editing the final advice package that is expected to be forwarded to the SAC at the March 2016 council meeting.

### Overview of Current Advice Package

As explained above, over the course of the MSWG process, a suite of management, outreach/education and research ideas were proposed by MSWG members via homework assignments, SeaSketch forums, webinars, and in-person meetings. Some of these ideas were presented within the context of a proposal with multiple connected components, while others were put forth as independent ideas.

The current MSWG advice package is organized into three main sections:

1. **Topics Explored:** This section includes a comprehensive list of all topics that were explored and moved forward by the working group through the end of the process, including all components of the proposals. For clarity, these are organized into four themes: emerging technologies, whale data, real-time response, and spatial measures. The purpose of this section is to provide the SAC with an overview of the topics explored by the MSWG, even though many of them arose in the context of proposal development, as noted above.
2. **Approaches:** The topics explored are then discussed in-depth within the context of two approaches. These two approaches are a reframing of the two proposals to include the research, outreach, and education ideas when appropriate. Within the approaches, each component has its own “level of support” section, so that MSWG members could express their support for an individual component without having to support the approach as a whole. These approaches highlight ways to strategically combine some of the ideas listed in the previous section “topics explored.”
3. **Other Options Not Explicitly Included in Approaches:** If an outreach/education or research topic did not fit within an approach, it is discussed independently in this section.

The original proposals from SeaSketch are available online:

<http://channelislands.noaa.gov/sac/pdfs/mswg-proposals10052015.pdf>.

### Level of Support Description

During the fifth meeting, MSWG members voiced their support and/or concern for the various ideas set forth below. Many members were only willing to state their support of approaches with the caveat that support does not necessarily reflect preference. For example, some members felt that some of the approaches may further research, monitoring and outreach goals but do not constitute management. Other members felt that those same approaches do constitute management, as they are part of a longer term solution. Regardless, the MSWG members made it clear that the levels of support in this document are not meant to show preference of one idea over another. Unanimous support of one idea does not mean that the group puts more weight behind that idea than one with mixed support. Rather, there is wide agreement that the idea is supported in concept and there was no reason to oppose it.

Members of the working group also varied in regards to the hierarchy of goals that they wish to address. For example, the SBCAPCD voiced its support for ideas that help achieve all goals of the working group but noted that few of those ideas address their highest priority goal, which is to improve air quality. This caveat was echoed by other members.

In describing the levels of support, this document uses the following terms and meanings:

- **Unanimous:** No members stated opposition for the approach.
- **Broad:** A strong majority of members stated support for this approach, with a few members stating opposition or unresolved concerns.
- **Mixed:** The group had a wide variety of opinions about the approach. In some cases, there were strong views on opposing sides.

## ADVICE PACKAGE

### Topics Explored

The following topics were explored and moved forward by the MSWG through the conclusion of the process.

---

#### Explore emerging technologies to assist with detecting whales

---

- 1 Conduct a pilot study to test **real-time infrared whale detection** aboard ships
  - 2 Explore **passive acoustic monitoring** in the region
- 

#### Expand and improve collection and management of whale data

---

- 3 Conduct more **aerial whale surveys**, specifically on the south side of the Channel Islands
  - 4 Expand the use of vessels of opportunity to **collect whale sightings from mariners**
  - 5 Create a **centralized whale data repository** and integrate all existing whale data in California
- 

#### Develop a system for real-time and near-real-time response to avoid ship strikes

---

- 6 Use **AIS text messaging** to inform ships of whale sightings
  - 7 Develop a **vessel warning system** that notifies ships of whales and triggers action
  - 8 Develop **best management practices** for mariners to reduce the risk of ship strikes
- 

#### Implement spatial management measures such as routing measures and VSR zones

---

- 9 **Extend the Santa Barbara Traffic Separation Scheme** to the northwest
  - 10 **Expand the Area to Be Avoided** around CINMS
  - 11 Design and implement a **new western route** south of the Channel Islands
  - 12 Implement an incentivized or mandatory **seasonal VSR zone** in the region
  - 13 Designate the region as a **Particularly Sensitive Sea Area**
  - 14 Implement a **second VSR incentive trial**
-

## Approaches

### Technology-Based Approach

The technology-based approach was developed in an iterative process. The original proposal was submitted by the DoD, with input from Mx SoCal and PMSA. This approach contains many of the research and outreach/education ideas that were considered by the group over the course of the process. Many members contributed to discussion in these forums and, thus, in the development of these measures.

#### Introduction

This proposal focused primarily on the goal to reduce the risk of ship strikes on whales with the premise that effective risk reduction is ultimately dependent upon immediate knowledge of whale locations in relation to ships, and keeping whales and ships apart. An effective communication network between NOAA, the commercial shipping industry, Mx SoCal, and USCG to collect, interpret, and disseminate information on the locations of whales is critical for success. The use of AIS text messaging could greatly improve this communication network but approval by the Federal Communications Commission (FCC) is required. Additionally, the ability of vessels to use emerging technology to detect whales in their proximity could enable the vessel crew to devise the best strategy to avoid strikes. This approach focuses on monitoring the abundance and distribution of different whale species around the Channel Islands combined with a centralized data collection, interpretation, and dissemination network to inform mariners of whale locations, with the goal of real-time ship responses to avoid strikes.

This approach is founded on an assumption that, to be effective, the shipping industry must support and implement best management practices to reduce the risk of ship strikes. Historically the shipping industry has demonstrated a willingness to work with the DoD on schedule and path adjustments based on navy operations. The authors of this proposal believe this approach would have the least amount of impact to the shipping industry, and no negative impact to DoD operations.

This proposal differs from other approaches that focus on new shipping routes. This proposal relies on real-time whale avoidance, rather than modeled whale occurrence patterns. Modeled whale occurrence patterns are based on existing best available data collection. However, the DoD and shipping industry assert that existing data are limited for determining the presence of whales in the area where new shipping routes are being proposed and that the variability in whale aggregations in our region makes a single shipping lane problematic. Thus, this proposal seeks to increase the data on whale presence by actively supporting new surveys and technologies.

#### Level of Support for Technology Based Approach

There was **mixed** support for this approach as a whole with strong support coming from shipping and DoD representatives and some concerns being expressed by other members, including representatives from conservation organizations. Some MSWG members believe this approach has the best chance of keeping ships away from whales and of garnering support from the shipping industry. They also feel that this approach will fill some existing data gaps in the region.

Others expressed concern about the near-term effectiveness of this approach in terms of achieving the goals of reducing the risk of ship strikes to whales, because many components of the approach are primarily research and outreach focused. They noted that this approach will take years to implement because it contains longer-term actions that require significant research and development; thus, it will be important to implement more near-term management options in the interim. Some MSWG members explained that they would support components of the approach as ongoing research and outreach activities but, given limited funding and resources, they would not prioritize this approach over the spatial approach, which is described in the next section.

## Components of Technology-Based Approach

### 1. Real-time infrared whale detection

#### Description

Conduct a pilot study to test the use of infrared cameras on ships to automatically detect whale blows. The use of infrared cameras could assist mariners in detecting both whales, to avoid ship strikes and small vessels, and to improve navigation. The data gathered could also be used to inform new and existing modeling of whale densities in the Santa Barbara region.

#### Goals Addressed

This measure aims to address working group goals of reducing whale strikes and improving navigational safety by potential avoidance of small vessels.

#### Discussion

Using infrared technology for real-time whale detection is still in the research and development stage; therefore, the Navy is pursuing a pilot study of this nature in 2016 and estimates a cost of \$100,000 - \$200,000. PMSA is also pursuing a pilot study and is cooperating with the Navy on mutual goals for this trial. PMSA's goal is to have the ability to detect whales between 1 km and 2 km to allow the vessel enough time to evaluate the situation and determine the safest and most effective response. Infrared was discussed mostly in respect to a system onboard vessels, but aerial infrared was also discussed as a potential other use of the technology. There is debate within the working group as to how far infrared cameras can detect whales, ranging from 1 km to 8 km, depending on the sea state. Zitterbart et al. 2013 and Sullivan et al. 2015 have demonstrated the ability of infrared systems to detect whale blows out to 8 km in good sea state conditions.

#### Benefits

Infrared technology has the potential to detect whales ahead of a moving ship and hopefully alert the captain in time to take action. This technology can be used to collect real-time whale location information, which addresses the inherent variability of whale distribution. Infrared technology has the benefit of functioning at all times, including at night, which is an existing data gap in whale observations. An additional benefit of infrared systems is that they can be tuned to "over-estimate" whale presence (i.e. provide more false positives to further reduce the risk of ship strikes).

A shore-based system of infrared cameras has already been developed and tested by the Toyon Research Corporation, located in Goleta, CA. Toyon has shown these cameras to be comparable to visual surveys, reducing the need for marine mammal observers. They have also developed automatic detection software, which can determine the direction that a whale is traveling (Sullivan et al. 2015). Zitterbart et al. 2013 demonstrated the effectiveness of more complex 360-degree ship-based infrared systems to detect large whales in polar and subpolar oceans.

Infrared cameras are portable, so it may be possible to offset large costs associated with this technology by sharing cameras between ships. One idea was to test out sharing the technology with ships transiting between the Port of Oakland and the Ports of Los Angeles/Long Beach so the equipment stays on the west coast and does not travel internationally.

### Drawbacks

Infrared technology is limited by ocean conditions; it can only perform well in Beaufort 3-4 or better sea states and in fog-free conditions. However, infrared technology will work 24 hours a day, as opposed to visual surveys, which only work in the daytime and are similarly limited by sea state and fog. Concern was voiced regarding the expensive and fragile nature of this technology. One camera at the price of \$20,000 gives an 18-degree field of view. To adequately survey for whales, multiple cameras would have to be installed, though it was agreed that a full 360-degree field of view was not necessary. Dependent on the size of the ship, there may also be need for stabilization technology, adding considerable costs. Economic incentives were mentioned to possibly promote the development and implementation of this technology throughout the shipping industry. Infrared technology is not currently ready for widespread adoption aboard ships but can be seen as a long-term option.

### Level of Support

There was **broad** support for this as a research idea, although some within the working group questioned the actual cost, timeline, and willingness of the shipping industry to implement this technology on a wide scale. Some MSWG members, including NRDC, EDC, and Cascadia Research, recognized that this technology will take time to develop and other management measures should be implemented in the interim. The shipping community has requested the assistance of the federal wildlife agencies in developing a research program that would hold-harmless study participants. NRDC, with agreement from EDC and other members in the conservation community, voiced that they do not support any waiver of citizen's obligations under the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and National Marine Sanctuary Act (NMSA) that are not already built into the laws for incidental harm. PMSA also does not support waiving citizen's obligations under the ESA, MMPA, or NMSA, but wants to reduce obstacles to the needed research.

## 2. Aerial whale surveys

### Description

Collect fine-scale whale sightings via systematic aerial surveys, specifically focusing on the south side of the Channel Islands. Fine-scale whale location information around the Channel Islands would further inform spatial management decisions and trigger best management practices. Navy will fund increased aerial surveys in the region for at least the next two years; \$60,000 has been committed for FY 2016.

## Goals Addressed

This measure aims to address the working group goal of reducing whale strikes.

## Discussion

The Navy has committed funding in 2016 to conduct finer-scale aerial surveys between the northern Channel Islands and San Nicolas Island to aid in understanding whale presence and absence in that specific region, and is planning on a similar commitment in 2017. The working group discussed how to use these survey results to best inform policy. Aerial surveys need to be systematic. Survey methods should be designed in such a way that aerial survey data can be integrated with boat-based survey data and effort data needs to be collected in conjunction with sightings. This data collected should then be input to the centralized whale data repository. A tiered approach for aerial surveys could be developed if funding is limited, where surveys are focused on locations where ships are (e.g. shipping lanes) at first, and then expand to a broader region if funding becomes available. Some members questioned how to ensure that the resources put towards the surveys actually result in positive management actions that will reduce ship strikes. Aerial surveys in small planes are limited to 100 miles offshore yet members felt that this would not affect the Santa Barbara study area as it lies now.

## Benefits

Through aerial monitoring, a large area can be surveyed in a short amount of time, relative to boat-based surveys. This would potentially fill a data gap identified by the MSWG, which is the lack of fine-scale whale location information farther offshore, specifically south of the Channel Islands.

## Drawbacks

Aerial surveys are expensive. In addition, there have been a number of fatal crashes during marine mammal aerial surveys, thus Cascadia and Southwest Fisheries Science Center (SWFSC) only conduct them in very limited situations. The Navy continues to conduct aerial surveys, and CINMS does on occasion when funding is available. Also, inclement weather can impede aerial surveys. Currently, aerial surveys are limited in scope and do not cover the entire region.

## Level of Support

There was **broad** support for this idea, with some working group members stating that they do support it as a research idea but not as a management tool.

## 3. Collect whale sightings from mariners

### Description

Utilize vessels as platforms of opportunity to collect opportunistic whale sightings data in the region. When appropriate, expand the use of the mobile apps Spotter Pro and Whale Alert for reporting sightings. Consider developing a more user-friendly way for mariners to report sightings, such as through AIS.

### Goals Addressed

This idea aims to address the goal of reducing ship strikes.



## Discussion

Potential vessels of opportunity include: commercial shipping, National Park Service, USCG, California Department of Fish and Wildlife, oil industry service, Navy service, research, and whale watching vessels that do not have a Channel Islands Naturalist Corps member on board (vessels that do have Naturalist Corps members are collecting data). Efforts should focus on commercial shipping industry since they are transiting in the areas of interest.

The MSWG discussed what would be the best tool for the commercial shipping industry to report sightings. The same method of reporting whale sightings may not work for every ship, so it is necessary to promote multiple ways of reporting and integrate those data streams into one database (see section on centralized whale data repository). The existing methods for mariners to report whale sightings are: phone, email, radio, and the mobile applications Spotter Pro and Whale Alert. To date, these methods for reporting have not been widely adopted by the commercial shipping industry.

Thus, the MSWG discussed other ways for mariners to report sightings, such as through AIS. However, at this time, it does not seem feasible for ships to report whale sightings via AIS text messaging because if ships reported every individual whale sighting via an AIS text message, it would likely overwhelm the AIS system, causing system failure. It may also dilute the ability to use AIS for its primary purpose of collision avoidance. Regardless, some members felt the lack of reported sightings by mariners may be an adoption issue rather than a technology issue. Identifying the barriers to mariners reporting sightings seems to be an important outstanding question that needs to be answered (via survey, focus group, etc.) prior to additional resource investment.

Using existing technology (not AIS), this idea could be implemented as soon as possible with on-going, annual training and refresher training required. Whale Alert can be used by anyone with a smartphone or tablet device with minimal training required. Spotter Pro requires an iOS device, which may require hardware purchases and training. The funding required depends on number of users and hardware required. Sanctuary staff can conduct trainings in the region. NOAA staff (CINMS and NMFS) is in discussions with Point Blue, and Whale Alert and Spotter Pro developers on the training requirements, costs and timeline to implement a program to engage the broader maritime community.

In order to incentivize ships to report whale sightings, mariners need to also receive information back about the sightings that they and others have recorded. Also, it is important to ensure that multiple sightings of the same whale do not skew the data.

## Benefits

Engaging mariners in reporting whale sightings has the potential to increase the quantity and geographic scope of data that is entered into a centralized repository. It may also be an effective outreach tool to increase awareness of whale habitat and the threat of ship strikes. An observation program from ships would also serve to educate and build support among ship crews.

Commercial ships are valuable platforms of opportunity for data collection because they regularly transit in the areas of interest where existing real-time data is limited, specifically south of the Channel

Islands. Currently, most of the effort to collect real-time opportunistic whale sightings is by whale watch operators in the Santa Barbara Channel near Santa Barbara, Ventura, and Channel Islands Harbors.

A pilot effort conducting observations on ships transiting between US ports was surprisingly effective with whale sightings obtained on every survey leg conducted (Flynn and Calambokidis, 2015).

### Drawbacks

Engaging the commercial shipping industry in reporting whale sightings has proved challenging in the past. The sanctuary and PMSA produced a poster for the bridge of ships encouraging mariners to report sightings via email and phone. However, some working group members noted that the lack of response may be due to the design of the poster, specifically that it emphasizes reporting dead or entangled whales, rather than live sightings. Whale Alert is also currently available as a way for mariners to report sightings. These tools for reporting sightings have not been widely adopted by the shipping industry.

Success depends on the willingness and ability of individual mariners, which varies considerably. When ships are coming in to port, it is the busiest time on the bridge, so mariners on commercial shipping vessels will likely not be reporting whales during that time. Ship bridge watches are staffed to navigate the ship safely and avoid collisions, allisions, and groundings, so very careful consideration would need to be given to adding the workload of reporting whales to bridge watches. Additionally, it is difficult to see a whale from a large commercial ship. As noted in Captain Kip Louttit's Shipping Information Brief from June 29, 2015, "Even the most vigilant lookout will have trouble seeing a whale, and if seen, determining direction the whale is swimming, so evasive action can be taken." It is also not possible to collect visual sightings at night.

The working group questioned if it is feasible for mariners to collect whale data. There are a number of considerations and challenges that may make this type of data collection not as feasible as other types of monitoring and so there might be a more effective way to use resources if feasibility is low. Additionally, this would only provide data in areas of vessel transit but would not inform whale presence in other areas.

### Level of Support

There was **broad** support for this idea, with some working group members stating that they do support it as an outreach or research idea, but not as a management tool. Mx SoCal supports, with the strong caveat that reporting whales must not distract the bridge watch from safe navigation of the vessel.

## 4. Centralized whale data repository

### Description

Make use of NOAA server technology (or other appropriate location with USCG and stakeholder support) to be the center point to capture all real-time whale sightings and historical whale data in the region. Standardize and integrate all existing whale data.

### Goals Addressed

This idea aims to address the goal of reducing ship strikes.

## Discussion

For this to be useful, someone would need to actively manage the repository and keep it up to date, so that new whale data streams are added as they become available. In addition, someone must be in charge of transmitting aggregated whale location information from the database to mariners.

A near real-time whale sighting map for the Channel Islands region is already available here: <http://geo.pointblue.org/whale-map/index.php?nms=ci>. When Channel Islands Naturalist Corps volunteers record sightings with the mobile app Spotter Pro, or the public records sightings via Whale Alert, these data are automatically uploaded to an online database that is displayed on this map. This map also shows historical whale sighting data from multiple sources. This map is managed by Point Blue Conservation Science, and it is available through West Coast Whale Alert. It may be possible to modify this map to meet the MSWG's needs rather than starting from scratch. One of the needs identified by the MSWG is to standardize existing data (e.g. Naturalist Corps observation records) for survey effort and integrate them into fine-scale habitat-density models for the region. Discussions are ongoing among NOAA staff, Point Blue, and Whale Alert and Spotter Pro developers on the necessary time and funding to support a centralized whale database.

It may be possible to integrate this repository with existing data repositories such as the Southern California Coastal Ocean Observing System (SCCOOS) and NOAA's CetSound.

There were ongoing discussions within the group around the geographic extent that this data repository would cover as well as the minimum turnaround time required from the initial whale sighting to data being made available to mariners for dynamic management to avoid ship strikes.

## Benefits

A centralized clearinghouse for data and a streamlined data flow could decrease the turnaround time from when a sighting is recorded to when best management practices or dynamic management actions are implemented. This would allow all interested parties (mariners, researchers, students, etc.) to easily access whale data for the region. This repository would promote the aggregation and integration of existing datasets, which the MSWG has identified as a priority. It is also consistent with the Gulf of the Farallones and Cordell Bank 2012 Joint Working Group recommendations.

## Drawbacks

Some MSWG members questioned the utility of the data that would be stored in this repository. Current whale sighting information is very limited and primarily comes from a few limited areas where whale watching occurs so such a database would only be of modest use for dynamic management. In addition, it is likely that the data gathered from citizen scientists and mariners would not be specific enough to be used in models; mariners are not likely to gather the type of information researchers need, such as species type. Also, this repository would require dedicated staff time and funding from NOAA or elsewhere to manage the database.

## Level of Support

There was **unanimous** support for this idea. USCG is willing to continue working with all interested stakeholders on identifying best practices for centralizing data, whether through NOAA server technology or other available sources.

## 5. AIS text messaging

### Description

Mx SoCal would transmit text messages to ships via AIS using terrestrial-based AIS technology. NOAA and the DoD could partner with Mx SoCal to disseminate important information on the locations of both naval operations and whale sightings. AIS text messages may be transmitted to an individual ship or to all ships (like a group text) but are limited to 156 characters. All large commercial vessels are required to have class A AIS, which includes AIS text messaging capabilities.

### Goals Addressed

This idea aims to address the goals of improving navigational safety, reducing the threat of ship strikes, and reducing conflicts among oceans users.

### Discussion

Currently, only the federal government can use AIS to transmit text messages, so Mx SoCal (a non-profit organization) would need permission from the FCC to transmit messages via AIS to ships. The MSWG should recommend a letter be drafted to petition the FCC to allow Mx SoCal to transmit AIS text messages. Mx SoCal and the shipping industry suggest that the USCG, NOAA, and DoD write to the FCC in support.

Mx SoCal already informally disseminates whale location information to mariners via email and radio, and has agreed to continue doing so at no additional cost. Mx SoCal has also agreed to transmit information via AIS text messaging using their three existing AIS stations at no additional cost, pending approval from the FCC. If Mx SoCal takes on any responsibilities related to managing or aggregating whale data, additional staff and funding would be required.

Group members discussed implementing a protocol for aggregating and disseminating whale location information via AIS, so that the process is streamlined and the system is not overwhelmed with messages. These options included defining a trigger for disseminating whale sighting based on number of whales (e.g. aggregations of 3-5 whales), species, or behavior and having messages only transmitted at certain time periods. The MSWG agreed that messages need to be simple and quick to not compromise functionality for safety of navigation. Relaying information to ships even before they start their voyage could be important. Members discussed the need to consider when the right time is to convey this information and how best to package it. For reference, there is a Canadian resource called MEOPAR that is working to improve whale detection and notify mariners via AIS text messaging.

In 2016, NOAA, USCG, US Navy, US Air Force, PMSA, and Mx SoCal should work together to petition the FCC to allow Mx SoCal to transmit messages to ships via AIS text messaging. Also in 2016 NOAA and Mx

SoCal should collaborate with the USCG to develop a formal protocol for disseminating whale location information to ships.

### Benefits

Disseminating whale location information via AIS text messaging would harness existing technology and equipment to greatly improve real-time communication with ships entering and leaving the Ports of La/LB. All ships of interest to the MSWG have and use AIS technology and Mx SoCal already owns three AIS units with transmit capabilities in San Pedro, Santa Barbara, and San Luis Obispo. The Navy already works with Mx SoCal to effectively transmit real-time information via radio, so it would be relatively easy for Mx SoCal to take the lead on this and start transmitting information via AIS.

### Drawbacks

The primary purpose of AIS is ship tracking and navigational safety. Texting is an ancillary tool. The texting system could potentially be overused and dilute the ability to use AIS for collision avoidance. Too many messages could result in mariners ignoring the system.

Language barriers could create an issue as ships could be coming in from anywhere in the world. However, AIS text messaging may offer improvements over traditional radio communication. For example, if a whale warning is read on the radio, a non-English speaking bridge watchstander would likely be unable to translate it. However, if an AIS text message containing the same message comes in, the thought is that the non-English-speaking watchstander is more likely to get someone who can read English to translate.

It is also noteworthy that AIS text messaging does not reach traffic outside a certain radius, which may include areas south of the Channel Islands. Mx SoCal routinely reaches 50-100 miles offshore with their existing units.

Current whale sighting information is very limited and primarily comes from a few limited areas where whale watching occurs, so such a system would be of limited value or would provide very biased information at present. If available real-time or nearly real-time data on whale locations is limited or patchy, a ship may reroute to avoid an area that has or is expected to have whales and inadvertently move into a different area where whales are present. For this approach to contribute to effective adaptive management there would need to be data on whale locations available for the entire area. However, this could change once there is an effective real-time data gathering system. If the ships themselves are reporting whales, then the information is extremely pertinent and directly related to where ships are actually traveling. This could also become a burden for MX SoCal should the operation become too complicated.

### Level of Support

There was **unanimous** support for this idea. If clear, appropriate guidance is put in place for the Mx SoCal's use of AIS in this manner, the USCG would be willing to work with the FCC and other involved agencies to determine the possibility of allowing a non-profit organization such as Mx SoCal to utilize AIS in this manner.

## 6. Best management practices

### Description

Using input from the shipping industry and ship operators, design and implement procedures that mariners should follow to minimize ship strikes (e.g. route changes, speed adjustment, others) if a whale is in proximity of a ship.

### Goals Addressed

This idea aims to address the goal of reducing ship strikes while achieving continued navigational safety.

### Discussion

The discussion of best management practices centered around how best to develop them and what was the expected timeline. Some examples of best management practices are: evasive action, slowing down, increasing vigilance of lookout. Best management practices should be a living document that continues to be developed over time. Shipping industry will be the lead on developing a draft of best management practices. The key to success is getting buy-in from the commercial shipping industry. Whale information needs to be aggregated before it is disseminated so messages are not too frequent and lose the intended affect to get the mariner's attention and appropriate response.

Sanctuary staff recommends that shipping industry and ship operators convene within the next year to develop proposed best management practices with USCG and NOAA invited to attend.

### Benefits

If adopted, best management practices could standardize how mariners respond to whale sightings to minimize ship strikes. With best management practices, the vessel master has discretion to respond to a whale sighting in the most appropriate manner, given the vessel's specific situation.

### Drawbacks

It may be infeasible to reroute and/or slow down depending on distance between the vessel and the whale and time needed to reroute or slow down to avoid a collision. It may be difficult for ships to take immediate action to avoid a ship strike.

There is uncertainty in some areas about whether new whale data collection initiatives will bring in sufficient information to inform mariners of when to implement best management practices. Some MSWG members noted that there is no empirical evidence that technology paired with best management practices actually reduces the risk of ship strikes.

This proposal depends on voluntary action by the vessel Captain to avoid whales. Since voluntary compliance for vessel speed reduction has not been successful, it is unknown if ships will take dynamic management actions to avoid whales.

### Level of Support

There was **mixed** support for this idea. Some MSWG members opted to withhold final judgment until they could review a draft list of best management practices. Mx SoCal supports the development of best management practices, stating that with regard to uncertainty of effectiveness, anything is better

than nothing. In addition, Mx SoCal notes that from their perspective as professional mariners, a vessel would not intentionally hit a whale for efficiency.

## 7. Vessel warning system

### Description

Integrate the above components of this approach into a vessel warning system to help mariners avoid or minimize the risk of ship strikes. In this system, near real-time whale location information is collected and aggregated in a centralized whale data repository. Then, Mx SoCal forwards the information from the repository to the shipping industry via email, radio, and AIS text messaging. Alternatively, if infrared technology proves successful, it could be used to notify a ship of a whale in its proximity. Then, ships would be triggered to implement best management practices to reduce the risk of ship strikes.

### Goals Addressed

This idea aims to address the goal of reducing ship strikes.

### Discussion

Group members discussed implementing a protocol for aggregating and disseminating whale location information, so that the process is streamlined and the system is not overwhelmed with messages. These options included defining a trigger for disseminating whale sighting based on number of whales (e.g. aggregations of 3-5 whales), species, or behavior and having messages only transmitted at certain time periods. It was agreed that messages need to be simple and quick to not compromise functionality for safety of navigation. Questions were brought up as to how can aggregated whale information be effectively communicated to ship voyage planners so that it can be incorporated in to ship's voyage plans ahead of time.

Mx SoCal already informally disseminates whale location information to mariners via email and radio, and has agreed to continue doing so at no additional cost. Mx SoCal has also agreed to transmit information via AIS text messaging using their three existing AIS stations at no additional cost, pending approval from the FCC. If Mx SoCal takes on any responsibilities related to managing or aggregating whale data, additional staff and funding would be required.

In 2016, NOAA and Mx SoCal should collaborate with the USCG to develop a formal protocol for disseminating whale location information to ships.

### Benefits

Receiving real-time whale location information can aid in implementing best practices for reducing risk of ship strikes. Real-time whale location information emphasizes the point that there are actually whales in the area and that ship-whale collisions are a real threat. This could increase awareness of ship strikes for mariners in multiple sectors, including fishing, shipping, etc. Also, receiving whale location information may encourage mariners to report whale sightings, creating a feedback loop. Real-time location information is also more likely to allow ships to avoid whale that may congregate in the areas proposed for new lanes.

### Drawbacks

Too many messages about whale locations could result in mariners ignoring the vessel warning system. Current whale sighting information is very limited and primarily comes from a few limited areas where whale watching occurs so such a system would be of limited value or would provide very biased information at present. If available real-time or nearly real-time data on whale locations is limited or patchy, a ship may reroute to avoid an area that has or is expected to have whales and inadvertently move into a different area where whales are present. Thus, for this to contribute to effective adaptive management it would be preferable to have data on whale distributions for the entire area and alternative route options. If the ships themselves are reporting whales, then the information is extremely pertinent and directly related to where ships are actually traveling.

### Level of Support

There was **broad** support for this idea.

### Recommended Follow Up

MSWG members recommended several activities to continue exploration of the technology-based approach. These included:

#### Track Development of New Technologies

Track development of other new technologies in the future, including satellite technology and unmanned systems to assist with monitoring.

#### Monitor Ships' Behavior Changes

Once the vessel warning system has been established, start tracking ships for cooperation and continue tracking the number and location of ship strikes (if detected). Revisit the program annually to make changes if needed. Monitor ship behavior to see if ships slow or take evasive action when warnings are issued.

#### Formal Agreement for Funding

The components of this approach involve multiple agencies and stakeholders, so a formal agreement for funding should be developed between multiple parties.



## Spatial Approach

The spatial approach, described below, was developed in an iterative process, utilizing recommendations from proposals put forth by the EDC and NRDC, and in consideration of a risk analysis conducted by NMFS and Cascadia Research (Redfern et al. 2015). The components that make up this approach were developed in SeaSketch and discussed in several forums, and were designed to focus on management ideas that would address the MSWG's four stated goals.

### Introduction

This approach has multiple components that the contributors feel have merit as standalone measures but were designed to work together to have the most effective impact to the group's goals. This combined approach is intended to provide information regarding ways to reduce the risk of ship strike, as well as to improve air quality, without exacerbating the safety of ship navigation or conflict with other ocean users, such as the DoD. In combination, these components aim to reduce risk to whales and improve air quality. The following components are included in the Spatial Approach:

- Vessel Routing
  - Santa Barbara TSS Extension
  - Western Route south of the Channel Islands
  - ATBA expansion
- Vessel Speed Reduction
- Particularly Sensitive Sea Area

The three vessel routing measures (SB TSS extension, Western Route, and ATBA expansion) have been designed to work together. While each of these ideas in the abstract has potential to forward the goals of the working group, the contributing members used SeaSketch to specifically propose how to implement each measure with the goal of maximizing their combined impact while also avoiding negative, unintended consequences of only implementing one management idea. For example, it may appear that the goals of this approach could be achieved by simply creating the suggested ATBA. However, this does not address two important issues: 1) the "fanning" of ships through high density whale habitat to enter the SB TSS; and 2) vessel transits through areas of predicted high density of fin whales to the south of the recommended Western Route.

Each of the components is explained below with a discussion of the MSWG goals addressed, benefits, and drawbacks. MSWG members discussed their level of support for each of the measures included in the approach, and thus this is included in each section as opposed to the entire approach.

### Level of Support for Spatial Approach

There was **mixed** support for this approach as a whole with strong support coming from the conservation and research communities and SBCAPCD, and strong opposition being expressed by shipping and DoD representatives. Shipping and DoD representatives felt that there was not sufficient data to inform the design of these spatial management measures. Others stated that this approach was based on the best available science.

PMSA was concerned by the lack of stated commitment to monitor and report on the effectiveness of the measures contained in the spatial approach to reduce the risk of ship strikes.

Some MSWG members were concerned about the amount of time to implement these measures. Before submittal to the IMO, the US Delegation of federal agencies need time to collaborate and decide if and what proposal(s) to submit to the IMO. Proposals are generally submitted to the IMO in February, and it takes 9-12 months to move through the IMO process. The US Delegation to the IMO includes NOAA, USCG, Navy, Environmental Protection Agency and Department of State, likely led by NOAA and/or USCG.

Shipping industry representatives stated that if any of the components of the spatial approach are implemented by the IMO, the shipping industry will comply with all requirements.

## Components of Spatial Approach

### 1. Vessel Routing

The first part of the spatial approach is the use of vessel routing systems. Routing can be used to achieve multiple MSWG goals, including decreasing the risk of ship strikes, improving navigational safety, and reducing user conflicts. Figure 5 is an image taken from SeaSketch, which depicts the location of the proposed SB TSS extension, Western Route, and ATBA expansion. A description of each measure follows.

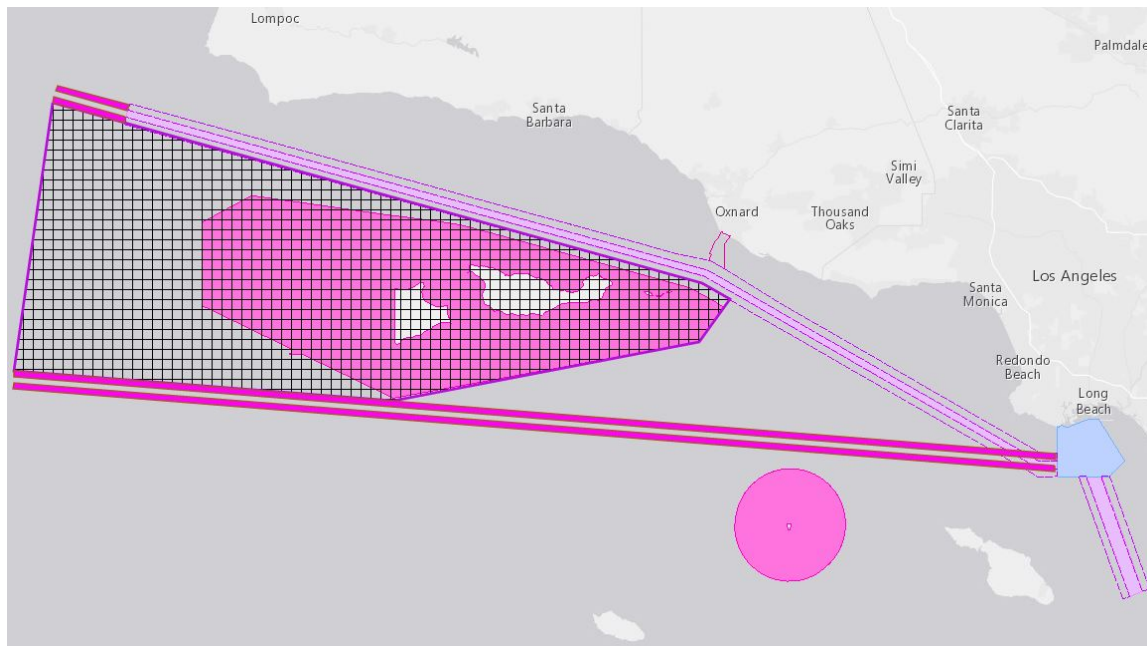


Figure 5: Extension of current Santa Barbara Traffic Separation Scheme; Western Route south of the Channel Islands; Expanded ATBA

## 1a. Santa Barbara Channel TSS Extension

### Description

An extension of the current TSS within the Santa Barbara Channel is proposed to organize traffic along the western terminus and reduce likelihood of ship strikes (Figure 6).

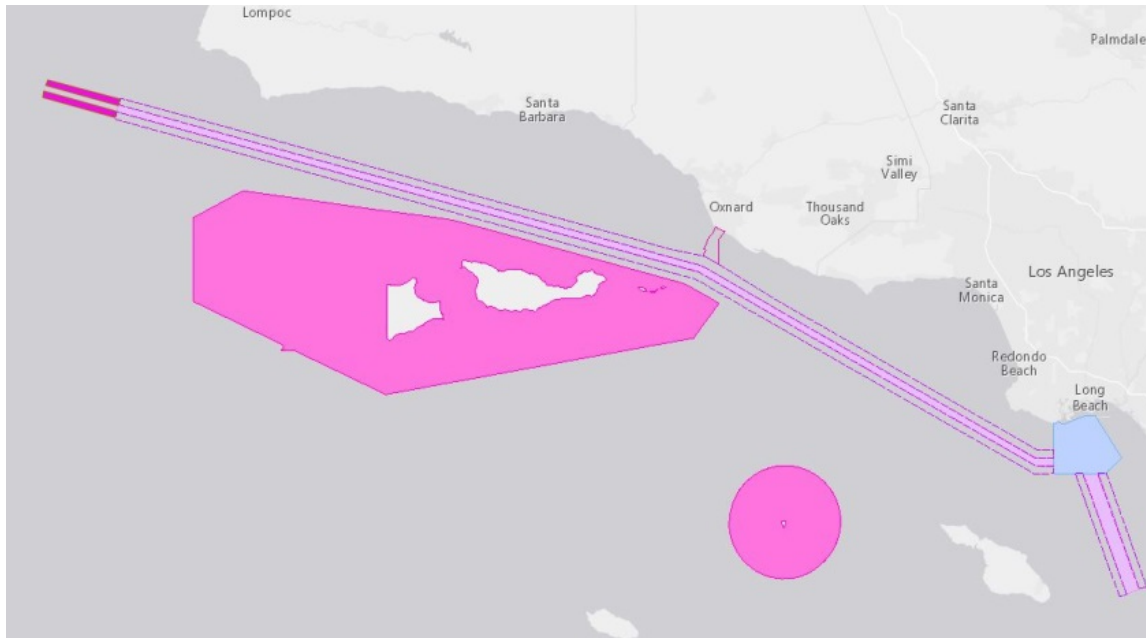


Figure 6: Santa Barbara Channel TSS Extension

### Goals Addressed

This measure aims to address the goal to decrease ship strikes to whales.

### Discussion

As noted above, before submittal to the IMO the US Delegation of federal agencies need time to collaborate and decide if and what proposal(s) to submit to the IMO. Proposals are generally submitted to the IMO in February, and it takes 9-12 months to move through the IMO process. It should be noted that at the time of writing, the US was still in the domestic rulemaking process from the 2013 TSS modifications; NOAA General Counsel suggested the likely need to wait for the current domestic rulemaking to conclude before the TSS could be amended again at the IMO level.

### Benefits

The western terminus of the current TSS is within an area of high predicted blue whale density. The extension of the current SB TSS to the northwest is expected to reduce ship strike risk by organizing vessel traffic to reduce its overall footprint in an area with predicted high whale densities. This is preferable to traffic being “fanned out,” which likely increases the co-occurrence of ships and whales in this high risk area. This option has been discussed by the MSWG but quantitative risk assessments have not yet been conducted. Some MSWG members recommended that NMFS conduct these quantitative assessments before moving forward to the IMO.

### Drawbacks

Some members questioned if the TSS increased the distance that vessels had to travel, and if it would increase emissions.

### Level of Support

There was **broad** support for this idea. Some members felt that this measure would be most effective if paired with other spatial measures such as an ATBA extension and a recommended route or TSS south of the Channel Islands. Some members, including the DoD, Mx SoCal and PMSA, felt that this proposal was unnecessary unless the ATBA was also extended. They have stated that if the ATBA is expanded then it would make sense to extend the TSS west to match the new ATBA boundaries. PMSA questions whether the extension of the SB TSS as a stand-alone option would improve navigational safety and reduce user conflicts, and thus does not support this approach.

## 1b. Western Route South of the Channel Islands

### Description

Create a new routing measure to the south of the northern Channel Islands for vessels arriving from or departing to the west, in order to minimize vessel impacts to whales. This route could be a TSS, recommended track, or recommended route (Figure 7).

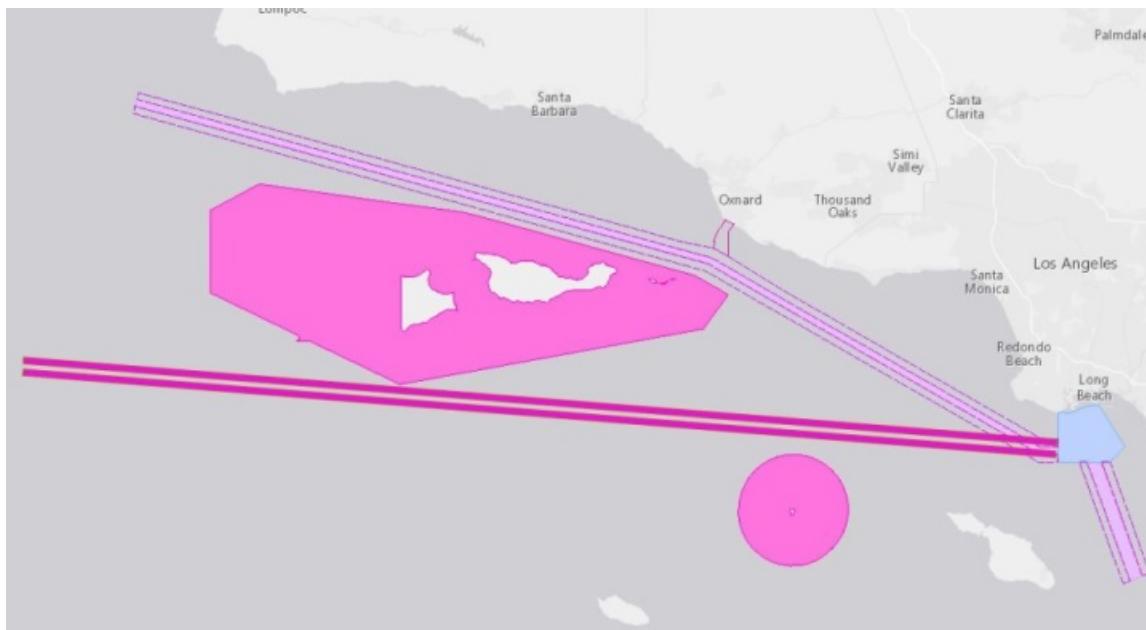


Figure 7: Western route south of the Channel Islands (3 miles wide)

### Goals Addressed

This measure aims to address two goals of the working group: decrease ship strikes to whales and increase navigational safety.

## Discussion

A Western Route south of the northern Channel Islands could be a TSS, recommended track, recommended route, or other IMO routing measure. These routing measures are described as follows:

- A TSS separates opposing streams of vessel traffic, and segregates inshore traffic, by appropriate means—for example, separations lines or zones—and by the establishment of traffic lanes. A TSS was implemented in the Santa Barbara Channel in 1969, and was altered in 2013 to avoid high predicted densities of whales. This TSS has high compliance.
- A recommended track is a routing measure that has been specifically examined to ensure so far as possible that it is free of dangers and along which ships are advised to navigate. Recommended tracks have been implemented in Monterey Bay National Marine Sanctuary to reduce the risk of collisions and oil spills. These recommended tracks have high compliance.
- A recommended route is a route of undefined width, for the convenience of ships in transit, which is often marked by centerline buoys.

A recommended track does not go through a domestic rulemaking process, whereas a TSS does. All three routing measures must go through the IMO process. Again, proposals are generally submitted to the IMO in February, and it takes 9-12 months to move through the IMO process. Additional time is required for federal agencies to collaborate and decide on a proposal to submit to the IMO. Once established, these routes would take at least one year to be modified, if new information about whale distribution patterns prompted a change. These are not dynamic routes. Since the region south of the Channel Islands is not geographically confined like the SB Channel, a recommended route or recommended track may be a more appropriate routing scheme than a TSS. The optimal width of the Western Route would be determined based on available whale data and input from the shipping industry and USCG in regards to safety. This route could be limited to a three mile wide corridor, similar to the SB TSS, or extended to a wider corridor for safety of navigation (Figure 8).

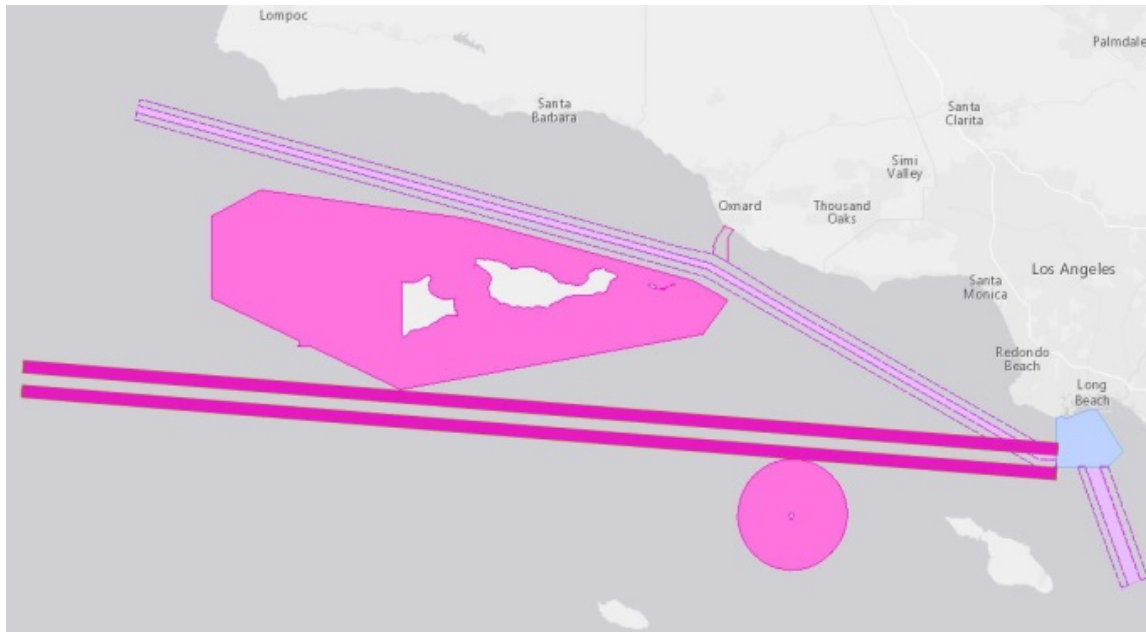


Figure 8: Western route south of the Channel Islands (6 miles wide)

An established Western Route may either 1) cause more ships to transit south of the islands or 2) organize the traffic that is already transiting south of the islands into a more predictable traffic pattern. As of writing, there are approximately 3-5 vessels south of the islands per day; however, this has fluctuated over the past years based on fuel standards regulations and may change in the future. There were opposing opinions by MSWG members as to whether a Western Route would encourage or discourage traffic from transiting in that area (or neither).

The MSWG also disagreed about whether the Western Route would improve navigational safety. Some MSWG members thought that the Western Route could improve safety of navigation because organized traffic is more predictable for ships. In support of this assertion, in the 2011 Port Access Route Study the USCG found “unbounded vessel traffic transiting the waters south of the Channel Islands to be a safety concern” and recommended “creating traffic lanes south of the Channel Islands to increase predictability by providing a defined route for vessel traffic transiting south of the islands” (United States Coast Guard, 2011). On October 6, 2009, the Los Angeles/Long Beach Harbor Safety Committee endorsed voluntary traffic lanes in the area south of the Channel Islands to address safety concerns created by increased traffic in the region (Figure 2) (United States Coast Guard, 2009). These voluntary lanes are not IMO approved but there is high compliance. The proposed new Western Route would essentially be an extension of the existing voluntary lanes. Mariners are already traveling south of the northern Channel Islands and, thus, some believe that this proposed route merely manages and organizes travel that is already occurring in a way that is optimal for marine mammals.

Mx SoCal and the shipping industry expressed concern that bringing ships closer together in a Western Route could actually decrease navigational safety due to the increased proximity of ships in the area. Mx SoCal has stated there is currently no ship-to-ship collision safety issue that warrants a new route south of the islands. Mx SoCal has stated that organizing traffic in narrow places like the Santa Barbara

Channel makes sense but does not make sense in open waters, such as the location of the proposed Western Approach. As stated by the USCG in an online SeaSketch discussion forum on November 13, 2015:

“The Coast Guard operates under the principle that risk can never be completely eliminated when any vessel is underway, but there are ways to mitigate risk. The body of water south of the Channel Islands is considered open water which significantly diminishes the risk of ship-to-ship collisions, groundings, and other shipping navigation hazards. The open water allows for vessels to practice avoidance tactics and operate in accordance with navigation rules and regulations, without the worry of nearby land, vessels, or obstructions. Once vessels navigate towards port (such as the Port of Los Angeles), available water decreases and traffic concentration increases, yielding an increase in safety of navigation concerns, or risk.”

It should be noted that laden tankers transit in a way that complies with a voluntary policy to stay 50 miles offshore as long as possible for safety and to reduce the risk of oil spills; in case they break down, this gives more time for rescue tugs to arrive on scene to assist.

### Benefits

In 2015, approximately 21-23% of vessel traffic that arrived to and departed from the Ports of LA/LB took a western approach and transited south of the northern Channel Islands (Appendix I). Organizing this existing traffic into optimal routes may reduce risk of ship strikes. In a ship strike risk analysis conducted by NMFS and Cascadia Research, four ship tracks south of the northern Channel Islands were analyzed to determine which one reduces the overall risk of ship strikes for blue, humpback and fin whales in that area (Figure 9) (Appendix H).

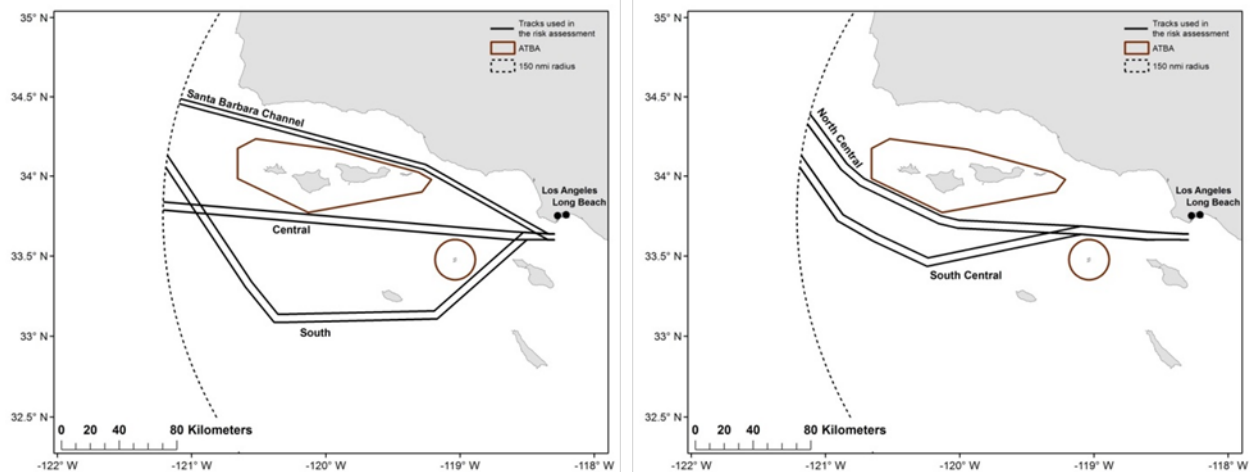


Figure 9: NMFS and Cascadia Research analyzed the risk of ship strikes in the North Central, Central, South Central, and South ship tracks, as well as the existing Santa Barbara Channel TSS (Redfern et al. 2015).

As stated in the risk analysis by Redfern et al. 2015:

“These analyses show that ship-strike risk south of the northern Channel Islands is lowest in the Central track for fin and blue whales. Risk for humpback whales is higher in the North Central

track, compared to the Central track. Risk for humpback whales is lower in the South Central and South tracks, compared to the Central track. However, the decreased risk in these two tracks is not as large as the increase in risk posed to fin whales in these two tracks. Consequently, the optimal track south of the northern Channel Islands is the Central track,” (Figure 10).

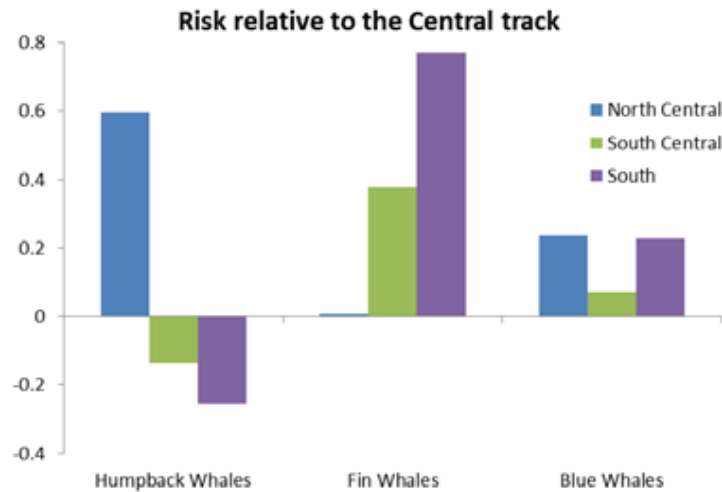


Figure 10: Ship strike risk in the North Central, South Central, and South tracks, relative to the Central track (Redfern et al. 2015).

The proposed Western Route is the Central track described in the risk analysis, chosen because, of the routes analyzed, it is the optimal route south of the northern Channel Islands to reduce the risk of ship strikes.

Also, a Western Route would limit the broad spread of vessel traffic that currently exists south of the Channel Islands, making room for the development of a more cost effective whale surveillance program in this area (e.g. targeted aerial monitoring of shipping routes to inform Dynamic Management Areas). Another added benefit may be utilizing the Western Route as an alternative in the event of bad weather or an oil spill.

A Western Route may result in fewer ships using the SB TSS, which may in turn reduce suspected harassment and the impacts of anthropogenic noise on whales. Noise in the Santa Barbara Channel may persist at relatively higher levels compared to other regions due to the reverberation of sound caused by the bathymetry of the Channel (Guerra et al. 2011, McKenna et al. 2009). Also, if a Western Route results in fewer ships in the SB TSS, it may reduce conflicts with recreational boaters having to cross the SB TSS when transiting to and from the islands.

### Drawbacks

In regards to reducing user conflict, if a new route south of the northern Channel Islands results in more ships transiting in that area, the Navy has stated that it will diminish the ability to dynamically manage ships in the Point Mugu Sea Range, which could impede the Navy’s testing operations. Currently, when the DoD has testing operations in the Point Mugu Sea Range, they identify a hazard pattern where ships



should not be. Then, the DoD and Mx SoCal radio ships in the region and ask them to move, speed up, or slow down to avoid the active part of the testing range. The Navy has stated that if there is a designated shipping route in the testing range, ships would be less likely to heed the DoD's requests to depart from the route. This could negatively impact testing operations. While some feel that this would not be the case in this proposal because the route is simply an option and vessels could still use an alternate route (i.e. SB TSS), the Navy maintains that if there is an established routing measure south of the Channel Islands, that will be seen as an encouragement to use that area by some shippers and it will likely increase the ship traffic in that area (thereby resulting in greater difficulty for the Navy's dynamic management in the area). If the Navy had the jurisdiction to force ships to move from the western route when needed, they would look more favorably on this option.

The Navy voiced its lack of confidence in the data used to create the proposed Western Route and discussed concern for the implications of a shipping lane being placed in a location that may increase risk. It was noted that whales are not static and, while some known aggregation areas exist (e.g., west of San Miguel Island), static shipping lanes could increase risk to whales if they happen to aggregate within the lanes. Concern was also raised in regards to the approach not addressing different impacts to different whale species, to which Jessica Redfern responded that the risk analysis did look at risk to different species. That risk analysis, and thus the consideration of impact to multiple species, is considered in this proposal.

### Level of Support

There was **mixed** support for this idea. Many supported it because of the potential benefits of organizing traffic that is already moving through the area in a way that maximizes benefits to whales. Some also noted in the SeaSketch forum that the 2011 USCG Port Access Route Study described a western route as improving navigational safety.

The DoD does not support the proposed Western Route because of the potential impediment to dynamic management, stated above. Mx SoCal and PMSA also do not support the proposed Western Route, because they see it as unnecessary and potentially unsafe. Mx SoCal believes that the existing voluntary Western lanes established by the Harbor Safety Committee already address any safety concerns and organize the traffic within 40 miles of the Ports to a sufficient degree. In addition, PMSA remains skeptical that a single fixed route can be optimized to reduce risks to migratory animals, and raised a concern about the lack of adequate resources to monitor the effectiveness of fixed routes in reducing the risk of vessel strikes on whales. PMSA also noted that, all other variable held constant, this alternative may increase air emissions and GHGs if it is a longer route. They also raised significant concerns about the unintended consequences of establishing a fixed TSS in this region.

The USCG does not currently see a need to formalize a shipping lane south of Channel Islands. Mariners currently safely transit this area and the USCG does not feel it has sufficient evidence that any modifications would increase safety of navigation. Furthermore, they stated that any such lanes could impact existing Navy's Point Mugu Sea Range and hazardous operations area and therefore they suggest that further review by appropriate federal agencies is warranted.

## 1c. Expansion of the ATBA

### Description

Expand the current ATBA to encompass more whale habitat, including an expansion to the north to meet the SB TSS, to the south to meet the proposed Western Route south of the Channel Islands, and to the west to encompass an area of high predicted whale densities (Figure 11).

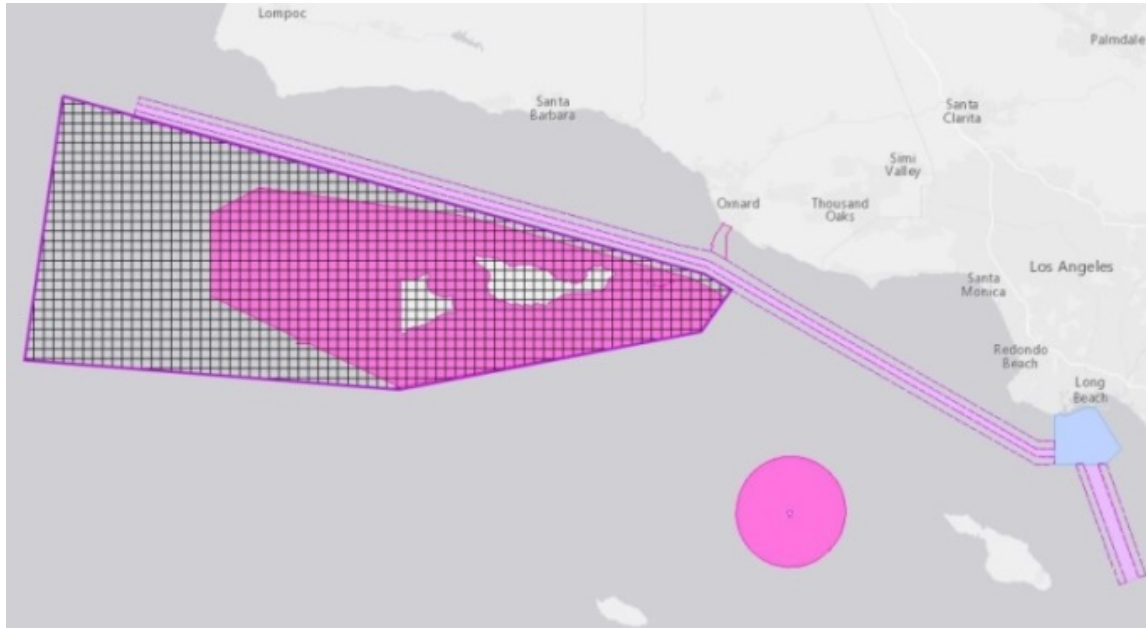


Figure 11: Expansion of the ATBA

### Goals Addressed

This measure is aimed to address two goals of the working group: decrease ship strikes to whales and increase navigational safety.

### Discussion

An ATBA is a routing measure that is created either because navigation is hazardous or because it is an area in which it is exceptionally important to avoid casualties, such as when a casualty would cause unacceptable damage to the environment. A precedent exists at the IMO level for creating ATBAs to include whale habitat. Implementation of this idea requires going through the IMO process. As noted above, before submittal to the IMO the US Delegation of federal agencies need time to collaborate and decide if and what proposal(s) to submit to the IMO. Proposals are generally submitted to the IMO in February, and it takes 9-12 months to move through the IMO process.

The proposed expansion of the current ATBA does not address the risk of ship strike further south of the northern Channel Islands, as it only proposes the expansion to reach the proposed Western Route. If utilizing the entire length of the Western Route, it is possible that ships will minimize overlap with an identified high density fin whale area. However, it is possible that ships coming from the southwest will not enter the Western Route at its westernmost point and will thus travel through high density fin whale habitat. A new ATBA in this area, which was discussed by the working group but not proposed here, may

encourage ships to transit through the entire Western Route, thus routing them west of this high density area and alleviating this threat.

### Benefits

ATBAs can be designed to prohibit ships from transiting areas of high predicted whale densities in order to reduce the risk of ship strikes.

### Drawbacks

The expansion of the ATBA in its proposed southwest corner would appear to likely alter ship behavior. Due to the fact that NMFS's in-progress analysis of whale data shows only a 2% higher risk of ship strike within the proposed ATBA, there were questions from the group as to the necessity of the expansion in this area (Redfern pers. comm. 2016).

### Level of Support

There was **broad** support for this idea. The working group unanimously supports the technical fix of expanding the northern boundary of the ATBA by 1 nautical mile (nm) to abut the current SB TSS. The DoD and shipping industry voiced concern about the proposed southwest corner of the ATBA, however, because it could force some ships to alter their current routes. The shipping industry was concerned that this would add length to transit and increase emissions, and the DoD was concerned that this may lead to unanticipated changes in shipping behavior. However, they both voiced general support for an ATBA expansion if these issues were addressed. Mx SoCal supported the ATBA and associated extension of the SB TSS. However, Mx SoCal noted that regarding the southwest corner of the expanded ATBA, the concern is that if northbound and southbound ships both head for the southwest corner point, which they are likely to do, this could create an unintended consequence of a head-on situation. Therefore, Mx SoCal noted some traffic management tool, such as a recommended route, is needed to move the southbound traffic a few miles West and the Northbound traffic can go to the corner point.

PMSA generally supports the expansion of the ATBA to reduce risks to the blue whale populations at the northwest terminus of the TSS. However, a careful review and modification of the western extension is needed before PMSA could offer full support. PMSA has stated that these boundaries are not final, and certainly not agreed to. PMSA believes that upon settlement of the ATBA boundaries it would make sense to evaluate extending the TSS, but not before. So long as any expansion does not impact existing shipping lanes, the USCG does not have any objections to expansion of these areas.

## 2. Vessel Speed Reduction

### Description

VSR is a recommended speed in a defined area, which is managed seasonally or dynamically. In this spatial approach, it is recommended that VSR is required for ships transiting the specified zone, with a speed reduction to 12 knots from approximately April 1-November 15. This date may be modified by NOAA to start before or end after those dates, depending on observed whale densities.

## Goals Addressed

This measure aimed address two goals of the working group: decrease fatality of ship strikes to whales and improve air quality.

## Discussion

The spatial extent should encompass both the SB TSS and proposed Western Route. If vessels choose to transit outside of these areas to avoid the VSR then the entire study area should be included in the VSR zone, which could be possible through the designation of a Particularly Sensitive Sea Area (see below). Some members voiced support for VSR to encompass the entire study region. One potential impact of extending the VSR zone farther south is increased programmatic funding from the other southern California air pollution control districts. The group also discussed the potential to have a speed reduction as a condition of port entry if the ports are willing to cooperate.

Voluntary VSR has proven ineffective in the study region in the past, with the LNM in the Santa Barbara Channel not resulting in reduced ship speeds (McKenna et al. 2012). Therefore, VSR should be incentive-based or required through regulation. It must be decided if this is to be a domestic VSR or intended to be forwarded to the IMO. As of now, there is very little precedent for speed reductions as IMO measures and thus this approach would not necessarily be accepted by the IMO. However, in 2014 the IMO approved seasonal VSR for TSSs in Panama in order to reduce the risk of fatal ship strikes to humpback whales. No precedent exists at the IMO level for VSR in a large region, i.e. VSR that is not restricted to an area with a defined routing measure such as a TSS or recommended route.

The MSWG discussed utilizing both Seasonal Management Areas (SMAs) and Dynamic Management Areas (DMAs) as ways to implement a VSR program. Both approaches can allow resource managers to determine the time of year to implement strategies to achieve their goals. The seasonal approach refers to a VSR program with a specified start date in the spring and end date in the fall, whereas dynamic focuses on a real-time response to whale aggregations. In the end, this approach focuses on seasonal management, with a dynamic start and end date, for several reasons. The reasons for deciding upon this approach are as follows, with some benefits and drawbacks of each in the sections below.

1. There is a concern that dynamic management is difficult to build into shipping schedules and thus any speed reduction in one area could lead to increased speeds in another area, negating any air quality benefits. It takes about two weeks to get a notice into the LNM, so there is a time lag between obtaining whale data and distributing it to mariners via LNM. This time lag could be reduced by having a regulatory approach with a defined trigger.
2. Seasonal management could be accomplished without the need for new technologies, whereas new technologies may be required for dynamic management (e.g. whale monitoring with infrared cameras, etc.).
3. SMAs have the potential to be easier to communicate to shippers than dynamic. Education and outreach about SMAs is achievable and efficient, as shown through the current LNM. With an SMA, there is time to translate and distribute the request with enough time for the ships to plan and incorporate SMAs in to schedules. Not all ships have an English speaking watch stander on

the bridge outside 25 miles from the Ports of LA/LB, making communication of real-time DMAs challenging.

4. When used with VSR, an SMA is better than a DMA for air quality because it allows for advanced planning, so reduced speeds can be incorporated into schedules, rather than relying on speed up.
5. Resource managers already have the technology and data needed to implement an SMA and are able to analyze shipping behavior in response to the VSR. DMAs would be difficult to manage because it is very resource intensive to collect information and distribute it in real-time, and it requires a lot of information, data, technology, and effort.
6. More evidence may need to be collected to compare the feasibility and effectiveness of DMAs and SMAs. On the east coast, DMAs have been challenging to implement, and “mariner observation of voluntary speed restrictions or voluntary avoidance of DMAs was minimal,” (Silber and Bettridge 2012).
7. If there is a possibility of ships changing their routes in response to a DMA, there is also a need for real-time whale data for all possible routes they would be instructed to use, which is currently unavailable.

NOAA’s voluntary VSR program in the Channel is triggered by observed whale aggregations in the TSS. Historically, the voluntary VSR zone usually starts in May and goes through mid-November. Additionally, air quality is most impacted by shipping from April to October, which is when emission reductions achieved by VSR would have the greatest impact. Therefore, it is proposed that the VSR should go into November if specified whale aggregations are observed.

The MSWG had many discussions on the optimal speed for a VSR program. In different proposals in SeaSketch, members recommended 12 and 10 knots as the appropriate speed. With regard to air quality, optimal speeds may be different for different vessels. In regards to ship strikes, scientific evidence shows a 10 knot speed reduction is more protective of whales. According to Vanderlaan and Taggart 2007, “the chances of a lethal injury decline from approximately 80% at 15 knots to approximately 20% at 8.6 knots. Notably, it is only at speeds below 11.8 knots that the chances of lethal injury drop below 50% and above 15 knots that the chances asymptotically increase towards 100%.” In other words, the probability of a fatal strike is far greater at higher speeds, especially those above 15 knots, and drops to below 50% at speed around 12 knots. Conn and Silber 2013 expanded on the data sample and found that, “owing to several new observations of serious injury vessel strikes at lower vessel speeds (e.g., one each at 2 and 5.5 knots), the relationship between lethality and strike speed was less extreme than the one produced by Vanderlaan and Taggart (2007) and used in previously published risk analyses.” In addition, Conn and Silber 2013 found that comparisons of a baseline year with years after implementation of the 10 knot mandatory speed restrictions along the U.S. eastern seaboard reduced total ship strike mortality risk levels by 80-90%. However, based on information gained in past discussions during the VSR trial program, the group understands that the navigation of certain ships is problematic at speeds lower than 12 knots. It was also noted that on the East coast there is a safety exemption that ships can use to travel faster than 10 knots, but they must log this beforehand. NRDC

representatives also noted that a reduction in speed from 12 to 10 knots reduces the spatial footprint of vessel noise by almost 50% (i.e. from ~14 km to ~7 km) (Gryba and Bailey 2015).

### Benefits

VSR both reduces the risk of fatal ship collisions with whales (Conn and Silber 2013; Vanderlaan and Taggart 2007) and reduces emissions (NOx and greenhouse gases as well as other pollutants) (Khan et al. 2012). A seasonal VSR zone during the summer has the added benefit of improving air quality during ozone season. As described in the background section, incentivized VSR does work under certain conditions. Two examples include: 1) Ports of LA/LB have incentivized VSR (12 knots within 40 miles of the ports), which has resulted in compliance from a majority of ships; 2) success of the 2014 VSR Trial in the Santa Barbara Channel, which offered monetary incentives. It appears that both monetary incentives and good public relations incentives are both effective at achieving compliance.

Right Whale SMAs on the east coast are effective at achieving the management goal of slowing vessels to 10 knots.

### Drawbacks

The shipping industry is concerned that a mandatory VSR program could make southern California ports less attractive to shippers, and they may choose to use other routes. For an incentivized approach, funds would need to be identified and the shipping industry is concerned that a voluntary, incentive based VSR program would eventually become mandatory. They also stated that large VSR zones negatively impact shipping efficiency due to increased travel time. Not all carriers are driven by an environmentally conscious image so good public relations alone are not likely to gain support from the entire industry.

The shipping industry voiced support for a dynamic over a seasonal approach. SMAs do not allow for deviations in animal distribution throughout the length of the VSR program. The Marine Exchange Vessel Traffic Services currently uses dynamic management effectively to coordinate the synchronization of ships in to and out of the port because they have access to necessary data and communications paths. Additionally, this is how the Navy and Air Force manage shipping traffic in the Point Mugu Sea Range to reduce interruptions of Naval and Air Force operations.

With regard to air quality, VSR may result in a “speed up” when ships leave the VSR zone in order to make up for transit time, which could negate the air quality benefits achieved.

### Level of Support

There was **mixed** support for vessel speed reduction, with the shipping industry voicing strong opposition and the DoD voicing concern. The shipping industry voiced concerns that VSR may negatively impact shipping efficiency. In addition, the shipping industry’s position on VSR is that it doesn’t necessarily reduce the risk of strike to whales, only the severity. The DoD was concerned that a VSR program limited to the Channel may have unintended consequences by shifting traffic to other potential routes, though this is not the management approach recommended in this section.

There was also concern that SMAs may not provide feedback as to whether changes in shipping behavior directly reduce the risk of a fatal ship strike. Staff noted that NOAA can provide feedback on

known occurrence of ship strikes during a SMA program, and industry is encouraged to report sightings of live or dead whales to assist with this analysis. The shipping industry has stated that they support DMAs over SMAs because they believe DMAs offer the best opportunity for success in reducing the risk of ship strikes. However, the shipping industry has stated that DMAs are actually more resource demanding (increased watch, monitoring AIS, reporting sightings, purchasing whale detection/avoidance equipment, etc.) compared to speed and course adjustments in SMAs.

The SBCAPCD noted that VSR is the only approach in this report that would positively impact air quality.

PMSA maintains that vessel emissions are a much larger and more complex issue than has been presented in the MSWG process. PMSA recommends that interested parties engage in other more comprehensive forums to address air emissions from vessels.

NRDC supports a VSR strategy but proposes 10 knots as optimal based on scientific evidence. The SBCAPCD states that there is limited data on emission differences between 10-12 knots. The shipping industry felt that 10 knots could lead to fuel penalties as a result of inefficiencies and are not convinced of the increase in protection of whales from 12 to 10 knots.

Mx SoCal supports VSR if it is in a limited geographic area.

PMSA supports the concept of a VSR incentive trial, but is strongly opposed to the concept of VSR regulations for the following reasons:

- The MSWG failed to define the boundaries of a proposed VSR zone.
- Question the notion and the literature that reducing vessel speeds to 12 knots or lower will provide adequate risk reduction for the whales.
- Many vessels cannot safely maneuver at these reduced speeds.
- The separation of vessels and whales offers the best chance for reducing risk.

### 3. Particularly Sensitive Sea Area

#### Description

A PSSA is an area of “special protection through action by IMO because of its significance for recognized ecological or socioeconomic or scientific reasons and which may be vulnerable to damage by international maritime activities” (IMO 2016). A PSSA is a broad designation that offers flexibility and itself does not impose any management measures or restrictions, but in order for a PSSA to be brought to the IMO, there need to be associated protective measures to prevent, reduce, or eliminate the identified vulnerability of the area. The existing ATBA and TSS in the region could be cited as the associated protective measures, or new measures could be brought to the IMO with the PSSA, such as a region-wide VSR recommendation/requirement.

#### Goals Addressed

The idea addresses the goal of reducing ship strikes in the Santa Barbara Channel.

## Discussion

The goal of a PSSA in the Channel Islands region would be to protect whales from ship strikes. Therefore, the PSSA would need to be large enough to encompass the area in the SB Channel and to the south of the Channel where ships are transiting to/from the Ports of LA/LB. A shipping industry representative stated that a PSSA would not cause ships to avoid the area entirely. A PSSA takes about one year to implement at the IMO, and an additional four months if other measures are implemented as well. It takes additional time to actually get it on nautical charts.

## Benefits

PSSAs are included on nautical charts, so they notify mariners that there may be certain restrictions in that area. Thus, a PSSA may increase compliance with other voluntary measures.

## Drawbacks

Other similar working groups have considered implementing PSSAs vs. ATBAs and decided that an ATBA was easier to implement. An ATBA can be implemented as an associated protective measure along with a PSSA. Implementing a PSSA requires government resources, so it may not be worthwhile to implement it on its own without additional protective measures.

## Level of Support

There was **broad** support for this idea; however, members did not consider it a high priority item for action, because the benefits achieved by implementing a PSSA may not be worth the resources required for implementation at the IMO level. Any recommendations requiring review by the IMO will require further review by USCG offices at the Headquarters level.

## Recommended Follow Up

At the time of writing, Jessica Redfern and Thomas J. Moore, NMFS, were conducting a second ship strike risk analysis to assess the ship strike risk from dispersed versus concentrated ship traffic. The results of this analysis are forthcoming and may inform SAC discussion of this approach.



## Other Options Not Explicitly Included in Approaches

### 1. VSR Incentive Trial

#### Description

Conduct a new VSR incentive trial that would build on the first VSR incentive trial conducted in 2014. A new VSR trial could address some additional questions that were not included in the first trial. This would inform any VSR that may be implemented in the future.

#### Discussion

There are many ways that the trial could be expanded and new questions that could be answered, including: Are different incentive amounts effective? Can more positive public relations be included in incentives? Can proof of schedule adjustments be incorporated so that “speed up” when leaving a VSR zone is avoided? Can whale sighting reporting via Whale Alert be included and/or thermal imaging tested as well?

#### Benefits

There was broad support from the working group to pursue a new VSR incentive trial and including a mechanism for participating ships to report whale sightings in the new VSR trial (this was not a requirement in the first trial). It is likely that the same shipping companies that participated in the 2014 trial would participate in the 2016 trial. This approach may also be able to be combined with an infrared whale detection pilot study.

#### Drawbacks

This requires an increased funding requirement but there may be funding from the SBCAPCD and VCAPCD.

#### Level of Support

There was **unanimous** support for the VSR trial idea.

PMSA supports the concept of a second VSR incentive trial. This is an opportunity to evaluate other key factors including expanded participation and improved data collection. As with the first VSR trial, PMSA highly recommends a way to collect whale observation data as part of the program.

### 2. Passive Acoustic Monitoring

#### Description

Conduct a pilot study to assess the utility of passive acoustic monitoring to locate whales in the region and inform dynamic management.

#### Goals Addressed

This idea would aim to address the goal of reducing ship strikes on whales.

## Discussion

Passive acoustic monitoring has been successfully employed on the east coast to monitor North Atlantic Right Whales and inform DMAs. This is a research idea and is not intended to inform dynamic management areas at this time.

## Benefits

Passive acoustics can be used to assess the presence or absence of whales to help inform management. This technology can monitor for whales at all times, without the need for observers.

## Drawbacks

The cost associated with installing a bottom-mounted passive acoustic array throughout the region is likely prohibitive. Acoustics cannot be used to estimate the number of whales in the area and it is not always possible to geolocate the whale that is vocalizing. This technology may be more useful to detect the broad seasonality of whale presence. It is also important to note differences between its usage on the East coast and its potential use in the study area. The whale species in this region are very different from the North Atlantic Right Whale and not all species vocalize. Some vocalizations may not accurately reflect the abundance of a certain species so acoustics may not be useful to estimate the density, abundance, distribution, location, or behavior. The Channel Islands region is very different from the North Atlantic Right Whale habitat, in that there is deeper water, a larger area, more whale species, and less funding.

## Level of Support

There was **mixed** support for this idea, given the drawbacks identified above. This idea received less overall enthusiasm and support from MSWG than other options. Members recommend not placing a clear timeline or funding level at this point, until other whale observing systems are looked into. The NRDC notes that as research it may lead to management tools but presently it cannot reduce the risk of ship strikes in the near-term and is too speculative as to long-term promises.

## RECOMMENDED NEXT STEPS

The MSWG participants acknowledged that their efforts as captured in this report serve to advance the current thinking and dialogue on how to address ship-whale strike challenges around the Santa Barbara Channel, but they also recognized that additional work needs to be done. They supported continuing the following efforts:

### **Socioeconomic Evaluation of Alternatives to Manage Shipping**

At the time of writing, a team of NOAA scientists from the National Centers for Coastal Ocean Science was conducting an analysis to evaluate the socioeconomic impacts of different ship management options in the CINMS region. The results of this analysis are forthcoming and will inform the SAC's deliberations.

### **Second Ship Strike Risk Analysis**

Also at the time of writing, another team of NOAA scientists from the NMFS (including working group member Jessica Redfern) were working on a second ship strike risk analysis. The results of this analysis are forthcoming and will inform the SAC's deliberations.

### **Vessel Speed Reduction, Air Pollution, and Whale Strike Tradeoffs**

Also at the time of writing, a group of graduate students from the Bren School of Environmental Science & Management at the University of California Santa Barbara were conducting an economic analysis titled, *Vessel Speed Reduction, Air Pollution, and Whale Strike Tradeoffs in the Santa Barbara Channel Region: Solution oriented Integration of Health and Ecosystem Service Valuation*. The results of their analysis are forthcoming and will inform the SAC's deliberations.

### **SAC Process and Consideration by CINMS**

This report will be forwarded to the SAC for discussion at the SAC meeting in March 2016. At that time, the SAC will receive all information and advice that came out of the working group process. The SAC will then consider what the process will be for passing advice on to CINMS Superintendent Chris Mobley.

## GLOSSARY OF TERMS

**Area to be Avoided (ATBA)**- an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or by certain classes of ships.

**Automatic Identification System (AIS)** - an automatic tracking system used on ships and by vessel traffic services for identifying and locating vessels by electronically exchanging data with other nearby ships, AIS base stations, and satellites.

**Dynamic management Area (DMA)** - management area that depends on real-time data, such as a specific number of whales observed in a certain area, to trigger management.

**International Maritime Organization (IMO)** - is the United Nations' specialized agency responsible for improving maritime safety and preventing pollution from ships.

**Local Notice to Mariners (LNM)**- A weekly notice compiled by the US Coast Guard for the purpose of providing corrections of a local nature to navigational publications and nautical charts.

**NO<sub>x</sub>**- ozone-forming Nitrogen Oxides emitted from shipping vessels that contribute to smog and often have a negative effect on air quality.

**Port Access Route Study (PARS)** - Study undertaken by the US Coast Guard that must be completed before establishing new or adjusting existing fairways or traffic separation schemes.

**Particularly Sensitive Sea Area (PSSA)**- an area of the marine environment that merits special protection through action by the IMO because of its significance for recognized ecological, socio-economic, or scientific attributes where such attributes may be vulnerable to damage by international shipping activities.

**Recommended Route**- a route of undefined width, for the convenience of ships in transit, which is often marked by centerline buoys.

**Recommended Track**- a route that has been specially examined to ensure so far as possible that it is free of dangers and along which ships are advised to navigate.

**Seasonal Management Area (SMA)** - management area that has a pre-determined time frame for a specific management strategy (e.g. VSR) to be observed.

**Traffic Separation Scheme (TSS)** - a routing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes.

**Vessel Speed Reduction (VSR)** - Recommended speed in a defined area, either managed seasonally or dynamically.

## REFERENCES

- Abramson, L., S. Polefka, S. Hastings, and K. Bor. 2009. Reducing the Threat of Ship Strikes on Large Cetaceans in the Santa Barbara Channel Region and Channel Islands National Marine Sanctuary. Prepared and adopted by the Channel Islands National Marine Sanctuary Advisory Council. 73 pp. <http://channelislands.noaa.gov/sac/pdfs/sscs10-2-09.pdf> (accessed March 2016).
- Birney, K., M. Byrd, S. Hastings, S. Herron, B. Shafritz, and R. Freedman. 2015. Protecting Blue Whales and Blue Skies: Report on the 2014 Vessel Speed Reduction Incentive Trial in the Santa Barbara Channel. <http://channelislands.noaa.gov/management/resource/pdf/vsr-report-final-march2015.pdf> (accessed March 2016).
- Calambokidis, J., G. H. Steiger, C. Curtice, J. Harrison, M. Ferguson, E. Becker, M. DeAngelis, and S. M. Van Parijs. 2015. 4. Biologically important areas for selected cetaceans within U.S. waters – West coast region. In S. M. Van Parijs, C. Curtice, & M. C. Ferguson (Eds.), Biologically important areas for cetaceans within U.S. waters (pp. 39-53). *Aquatic Mammals* (Special Issue), 41(1). 128 pp.
- Conn, P.B., and G. K. Silber. 2013. Vessel speed restrictions reduce risk of collision-related mortality from North Atlantic right whales. *Ecosphere* 4(4): 43.
- Flynn, K.R., and J. Calambokidis. 2015. Large ships as an observation platform for whale sightings and for informing dynamic management areas: a successful test case from the US West Coast. Abstract (Proceedings) 21st Biennial Conference on the Biology of Marine Mammals, San Francisco, California, December 14-18, 2015.
- Gryba, R., and M. Bailey. 2015. Using Fine Scale Marine Mammal Distributions to Predict Potential Effects of Underwater Vessel Noise. Abstract (Proceedings) 21st Biennial Conference on the Biology of Marine Mammals, San Francisco, California, December 14-18, 2015.
- Guerra, M., A.M. Thode, S.B. Blackwell, and A.M. Macrander. 2011. Quantifying seismic survey reverberation off the Alaskan North Slope. *Journal of the Acoustical Society of America*, 130(5), 3046-3058.
- Hogarth, W.T. 2007. Memorandum for: Rodney R. McInnis, Administrator, Southwest Region, NMFS. Subject: Unusual Mortality Declaration of 2007 Blue Whales along the Southern California Coast. 11 Oct. 2007.
- International Maritime Organization. 2016. Particularly Sensitive Sea Areas. Accessed Mar. 3, 2016. Available at: <http://www.imo.org/en/OurWork/Environment/PSSAs/Pages/Default.aspx>
- Irvine, L.M., B.R. Mate, M.H. Winsor, D.M. Palacios, S.J. Bograd, and D.P. Costa. 2014. Spatial and temporal occurrence of blue whales off the U.S. west coast, with implications for management. *PLoS One* 9(9): e109485. doi: 10.1371/journal.pone.0109485
- Khan, M.Y., H. Agrawal, S. Ranganathan, W.A. Welch, J.W. Miller, and D.R. Cocker. 2012. Greenhouse Gas and Criteria Emission Benefits through Reduction of Vessel Speed at Sea." *Environmental Science & Technology Environ. Sci. Technol.* (2012): 12600-2607.
- McKenna, M.F., M. Soldevilla, E. Oleson, S. Wiggins, J.A. Hildebrand. 2009. Increased underwater noise levels in the Santa Barbara Channel from commercial ship traffic and the potential impact on

- blue whales (*Balaenoptera musculus*). Pages 141-149 in Damiani CC, Garcelon DK (eds). 2009. Proceedings of the 7th California Islands Symposium. Institute for Wildlife Studies, Arcata, CA.
- McKenna, M.F., S.L. Katz, C. Condit, and S. Walbridge. 2012. Response of Commercial Ships to a Voluntary Speed Reduction Measure: Are Voluntary Strategies Adequate for Mitigating Ship-Strike Risk?, *Coastal Management*, 40:6, 634-650.
- Oleson E., J. Calambokidis, J. Barlow, and J. Hildebrand. 2007. Blue whale visual and acoustic encounter rates in the Southern California Bight. *Marine Mammal Science* 23(3): 574–597.
- Redfern J.V., J. Calambokidis, and T.J. Moore. 2015. Ship-strike risk in the Southern California Bight. Materials from Channel Islands National Marine Sanctuary Marine Shipping Working Group.
- Redfern J.V., M. F. McKenna, T. J. Moore, J. Calambokidis, M. L. Deangelis, E. A. Becker, J. Barlow, K. A. Forney, P. C. Fiedler, and S. J. Chivers. 2013. Assessing the Risk of Ships Striking Large Whales in Marine Spatial Planning. *Conservation Biology* 27.2: 292-302.
- Silber, G.K., and S. Bettridge. 2012. An assessment of the final rule to implement vessel speed restrictions to reduce the threat of vessel collisions with North Atlantic right whales. NOAA Tech Memo NMFS-OPR 48.
- Silber, G.K., S. Bettridge, and D. Cottingham. 2008. Report of a workshop to identify and assess technologies to reduce ship strikes of large whales. Providence, Rhode Island (2008): 8-10.
- Sullivan, K., M. Fennell, W. Perryman, D. Weller, K. Jacovino, M. Norman, and C. Tombach Wright. 2015. Semi-automated Detection, Tracking, and Counting of Gray Whales (*Eschrichtius robustus*) off the California Coast. Society for Marine Mammalogy, 21st Biennial Conference on the Biology of Marine Mammals. December 2015.
- United States Coast Guard. 2009. Marine Safety Information Bulletin 11-09.
- United States Coast Guard. 2011. Port Access Route Study: In the approaches to Los Angeles-Long Beach and in the Santa Barbara Channel. 76 FR 67395
- Vanderlaan and Taggart. 2007. Vessel collisions with whales: the probability of lethal injury based on vessel speed. *Marine Mammal Science*, 23(1): 144-156.
- Zitterbart, D.P., L. Kindermann, E. Burkhardt, and O. Boebel. 2013. Automatic Round-the-Clock Detection of Whales for Mitigation from Underwater Noise Impacts. PLoS ONE 8(8): e71217. doi:10.1371/journal.pone.0071217

## APPENDICES

### Appendix A: Marine Shipping Working Group Proposal

#### **Safe Passage: Balancing the Needs of Humans, Whales and Ships in the Santa Barbara Channel Region**

##### **January 2014 CINMS SAC Meeting**

*Prepared by Kristy Birney, SAC Conservation Representative, and Sarah Pierce, Bren School 2013 Graduate January 17, 2013*

##### **Introduction:**

The marine shipping industry is a major contributor to the national economy and provides transportation for goods around the world. The Santa Barbara Channel region is heavily transited by large commercial vessels traveling into and out of the ports of Long Beach and Los Angeles (two of the nation's busiest ports). Traditionally, thousands of cargo ships transit through the Santa Barbara Channel region each year utilizing an internationally approved Traffic Separation Scheme (TSS) within the Santa Barbara Channel. Since 2009, many cargo ships have been bypassing the TSS and instead traveling on the south side (backside) of the Channel Islands. The presence of vessels and changes in traffic patterns in the Channel region presents four distinct, local management challenges including the potential for: ship strikes on endangered whales, air pollution and greenhouse gas emissions, navigation safety concerns, and conflicts with naval operations. Each of these issues is discussed in more detail in Appendix A.

Based on interviews with key stakeholders, we know that the leading agencies at the federal, state, and local level are interested in developing new strategies and solutions to address Marine Shipping concerns in the Santa Barbara Channel region. Local congressional members, including Lois Capps and Julie Brownley, have expressed interest in seeking collaborative solutions to address Marine Shipping issues also. This is a very timely opportunity to show "good government" and "community effort" by collaborating in a proactive manner to develop more sustainable solutions to a complex problem.

For more than six years, the Channel Islands National Marine Sanctuary Advisory Council (SAC) has been the local forum for community and stakeholder conversations about how to meet the needs of the shipping industry while also protecting human health, natural resources, and sensitive marine species such as endangered whales. This proposal builds on the previous SAC community work to reduce the risk of ship strikes in the region.<sup>1</sup> The SAC is now poised to develop advice regarding a comprehensive strategy to address marine shipping issues in the Santa Barbara Channel region. This proposal represents a departure from a single issue, piece-meal approach. Instead, an integrated and collaborative process is proposed.

##### **Proposal:**

To address each of the concerns listed above, the SAC's Conservation Working Group (CWG) requests that the SAC establish a Marine Shipping Working Group with the goal of making recommendations to:

- (1) Reduce the risk of ship strikes on endangered whales,
- (2) Decrease air pollution and greenhouse gas emissions,
- (3) Improve navigational safety and promote efficient maritime shipping throughout the region, and
- (4) Manage ship traffic to minimize Naval operation interruptions and reduce conflicts with other ocean users (e.g. fishing and whale watching concessionaires).

The concept of such a group is unanimously supported by the stakeholders initially interviewed by Kristi Birney, the SAC Conservation Representative and Chair, and the CWG (see Appendix A for more details). In addition, representatives also indicated that they would be interested in representing their organization and participating in a Working Group process (see Participation section below).

### **Why the SAC?**

The SAC is an established policy forum with key players who have expertise and knowledge on this topic. In addition, the SAC structure and openness to the public offers a unique venue for the community to address issues and concerns related to Marine Shipping. The SAC has historically recognized that the physical and biological resources of the Sanctuary (including whales) ebb, flow, and move in ocean currents at a far larger scale than Sanctuary boundaries. Previous Working Groups and Subcommittees have addressed issues and provided guidance on a wide range of topics that extend beyond the physical boundaries of the Sanctuary. These groups have included: Subcommittee on Large Cetaceans and Shipping, Military Working Group, Ports and Harbors Working Group, and Water Quality Subcommittee. Each of these previous Subcommittees or Working Groups addressed issues that were not confined to the Sanctuary boundaries, recognizing that human activities taking place beyond the Sanctuary can adversely impact natural resources inside the Sanctuary.

### **Scope:**

A new SAC-supported Working Group would build on progress and lessons learned from efforts by agencies, scientists, and industry, including implementation of recommendations identified in the [SAC's 2009](#) report and the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries' 2012 [Joint Working Group \(JWG\)](#) recommendations to reduce the risk of ship strikes on endangered and other whales. The new Marine Shipping Working Group would explore an array of potential solutions, including those that utilize dynamic management, to address shipping issues in the region (one of the unfulfilled SAC 2009 recommendations).

### **Approach:**

The Working Group would explore, discuss, and evaluate options to address competing human uses of the ocean (e.g., military activities and commercial shipping) and impacts to Santa Barbara and the marine environment (e.g., air pollution and whale ship strikes) using a multi-stakeholder collaborative process. Stakeholders would utilize data sets, models (e.g. SeaSketch), and other tools available within the project budget. Collaborating with affected parties, the Working Group would explore solutions that evaluate ship routing options, incentives, and/or regulatory options to reduce ship speed. The Working Group would aim to find win-win solutions that offer the most logical approach for protecting whales, addressing human health issues, and fostering robust maritime commerce off Santa Barbara's coast in a more sustainable manner.

### **Participation:**

The Marine Shipping Working Group would be supported by professional facilitation, the Sanctuary staff, and a California Sea Grant fellow.<sup>2</sup> Participants would serve as either Working Group members<sup>3</sup> or technical experts.<sup>4</sup> Participation in the Working Group could include (but would not be limited to) participation from the following SAC Members, outside experts, and other agencies:

#### Confirmed Participants:

- U.S. Navy, John Ugoretz
- NOAA Fisheries (NMFS), Elizabeth Petras and Jessica Redfern
- Marine Exchange of Southern California, Captain Kip Louttit
- Santa Barbara County Air Pollution Control District (APCD), Brian Shafritz and Mary Byrd
- Pacific Merchant Shipping Association (PMSA) (Shipping Industry), TL Garret
- Chamber of Shipping of America (Shipping Industry), Kathy Metcalf
- Cascadia Research (Scientific Community), John Calambokidis
- California Sea Grant, Phyllis Grifman and/or James Fawcett
- Environmental Defense Center (EDC) (Conservation Community), Kristi Birney
- Channel Islands National Marine Sanctuary (CINMS), Chris Mobley, Michael Murray, or Sean Hastings  
TBD (non-voting)

#### Possible Additional Participants:

- U.S. Coast Guard (USCG), Radiah Jones
- California Coastal Commission, Cassidy Teufel



- Channel Islands National Park (NPS), staff TBD
- Island Packers (Whale Watching and Island Concessionaire), Andrea Mills
- Education Seat and/or Sanctuary Education Team (SET) for technical support
- Additional participants may be identified including, but limited to:
  - Maersk and/or other shipping line representatives
  - Terminal operators and/or Port representatives

This list of names of ideal participants is based on initial consultation with agencies, organizations, or groups that took place during the convening assessment interviews. Each of the individuals listed above expressed interest in participating in a Working Group. However, a final membership and technical expert list will be presented at the March SAC meeting after confirming participation with each individual.

**Proposed Outcomes:**

The CWG proposes that the Marine Shipping Working Group aims to accomplish the following:

- Identify, collect, and review existing data;
- Review agency, industry, and stakeholder actions to date that have occurred in an effort to implement the 2009 SAC ship strike reduction recommendations;
  - Review existing table tracking progress on the SAC 2009 Ship Strike Report recommendations prepared by Kristi Birney.
  - Review the SET's evaluation of education and outreach outcomes from their Ship Strike and Large Cetaceans logic model (development of this evaluation is currently underway).
- Use the best available information, but also identify critical data gaps that should be addressed in an adaptive management approach in order to enhance confidence in the sustainability and validity of proposed management solutions;
- Identify solutions that address a variety of human uses (e.g. military activities, fishing, and commercial shipping) and potential impacts to the Santa Barbara region and the marine environment (e.g. air pollution and whale ship strikes), using an ocean planning tool (e.g. SeaSketch) as a supporting analysis tool;
- Prioritize options for ship routing within and outside the Santa Barbara Channel region for the geographic area spanning from Point Conception to the Ports of LA/Long Beach.<sup>5</sup> Discussions might include options such as dynamic or seasonal routing, voluntary lanes, areas to be avoided, incentives for vessel speed reduction, and/or reconsideration of shipping lane adjustments as proposed by the USCG Port Access

**Route Study;**

- Develop and issue a report with a suite of management recommendations that allows agency managers and the shipping industry to explore dynamic management and/or other management options;
- Integrate efforts by APCD, CINMS, and EDC to refine the incentive-based voluntary vessel speed reduction program; and
- Complete a work plan and timeline for implementing the SAC recommendations and identify potential funding sources.

**Management Options:**

The 2009 Ship Strike report indicated that NOAA should explore a range of management options including but not limited to: incentives and mandate vessel speed reduction, Season Management Areas (SMAs), Dynamic Management Areas (DMAs), and Areas to be Avoided (ATBAs). Thus, the Working Group will be building on lessons learned from the previous six years of efforts by agencies, industry, and researchers to implement the 2009 SAC Ship Strike Report recommendations. Building on this strong foundation, it is expected that discussion will focus on how strategies can be implemented rather than if a strategy should be explored.

For example, dynamic management has the potential to provide both resource managers and shipping companies with options and flexibility.<sup>6</sup> Dynamic management is a tool that is adaptive and responsive in real-

time and would be transformative as it would allow managers to consider the temporal and geographic components of whale ship strikes, air pollution, and Navy testing and training operations. Dynamic management is an approach for managing vessel routing in areas where whales are detected and actions might include: temporary re-routing, incentives for vessel speed reduction, giving mariners the option to either proceed at a reduced speed or route around the dynamic management area (DMA), or delay entry into a DMA.<sup>7</sup> Under a DMA approach, ships could slow down when whales are present, or choose alternative routes that avoid whales and avoid conflicts with other ocean users (e.g. navy operations). Shipping companies would also be able to consider operational alternatives to address economic effects. A Dynamic management system builds on the best available data and a strong communication network is needed between managers and ship operators. No implementation recommendations are pre-determined at this time and this DMA example is used to illustrate the types of discussions that are expected to take place within the Working Group.

### **Funding and Support:**

Financial support for the Marine Shipping Working Group is currently being pursued by EDC, CINMS, and APCD. Total project costs are estimated to be approximately \$180,000- \$200,000 for the following expenses:

- Meeting support (meeting venue, food, travel stipends)
- Ocean planning tool (development of a computer model, integration of existing data, development of analytics, staff support for utilizing tool)
- California Sea Grant Fellow (hosted by CINMS)
- Facilitation

At this time a “planning grant” of \$65,000 has been secured from the Santa Barbara Foundation. Upon confirmation that all of the key players will participate in the Working Group, there is an opportunity to go back to the Santa Barbara Foundation for the additional funding that is needed for this project. The Working Group would not commence working until all of the necessary funding is secured. EDC and our partners are also exploring other opportunities to partner and leverage the Santa Barbara Foundation “planning grant” and fill project funding needs. If your agency or organization is willing and able to provide additional or matching funds for this innovative project please contact Kristi Birney at [kbirney@EnvironmentalDefenseCenter.com](mailto:kbirney@EnvironmentalDefenseCenter.com).

### **Timeline**

It is expected that the Marine Shipping Working Group would need between 12 and 18 months to work through the process and draft a report. Another 6 months would be needed for final report adoption and development of an implementation work plan. Specific activities and timeline include:

#### Phase One (2014-2015):

- New SAC Marine Shipping Working Group established (February/March 2014).
- Project funding pursued and secured and membership finalized (February- May 2014).
- Working Group convenes (May-July 2014).
  - Working Group reviews existing data sets, modeling options, and other tools for data analysis.
  - An ocean planning tool (e.g. SeaSketch) is selected, populated, and analytics are created for data evaluation.
    - Marine Shipping Working Group members and subject matter experts provide guidance on data to include in the ocean planning tool and, where necessary, provide additional data for inclusion.
- Marine Shipping Working Group members engage in face-to-face and/or online discussions and utilize the ocean planning tool (e.g. SeaSketch) to explore a variety of solutions. Facilitation could be used to help with the meeting process and/or substantive discussions. (May 2014- June 2015).
  - We anticipate the Marine Shipping Working Group would hold 6-8 meetings with some combination of in-person and online meetings.

- Marine Shipping Working Group selects a suite of potential management actions (June 2015).

**Phase Two (2015):**

- Marine Shipping Working Group develops a comprehensive report (including a timeline) with a reasonable range of solutions to address local impacts and solutions to explore ship routing options and incentives for vessel speed reduction (July-December 2015).
- Work plan and strategies are developed for possible approaches for implementing report recommendations (January-December 2015).

**Vessel Speed Reduction (VSR) Pilot:**

Concurrently, but as a separate effort from the Marine Shipping Working Group, APCD, CINMS, and EDC staff will be working to determine the optimal structure for a VSR pilot project. This Pilot is being pursued for its potential benefits to air quality and additional co-benefits to whale conservation. Should funds become available for this effort it will include: using approximately \$20,000 of grant funding to financially incentivize a small number of ships (working with either one operator or several operators) to reduce speeds while transiting the Santa Barbara region during whale season (June- October). Lessons learned from this VSR pilot study can be used to determine: 1) how to implement a full scale VSR initiative for the Channel, and 2) how to integrate the VSR initiative into the Marine Shipping Working Group process. The agencies will work with industry on the rollout of the VSR incentive program. Technical advice, updates and lessons learned from this effort will be shared with the Working Group. In addition, lessons learned from the pilot will be used to strengthen proposals for additional VSR funding at the State level to implement a full VSR initiative.

**Proposed Next Steps:**

1. SAC approval of the Working Group process, general membership (specific members and technical experts to be determined by March meeting), and project proposal.
2. Kristi Birney, in partnership with the Executive Committee and CINMS staff, will prepare a report suggesting a process design for the Working Group which may include: an approach for sharing and/or obtaining data, a process timeline, techniques for breaking an impasse and handling conflicts, protocol to assist participants in securing approval from supervisors/constituents/clients not at the table, and protocols including the identification of a facilitator should one be needed.

**SAC Next Steps:**

This section outlines the general role the SAC will have over the life of the Marine Shipping Working Group.

- Authorize Working Group formation.
- Provide feedback/approval of Working Group process details.
- Receive periodic progress reports from the Working Group. This will allow for SAC questions and feedback to be addressed and incorporated along the way.
- SAC members will keep their constituencies informed about the Working Group progress along the way, reporting back with concerns, questions, or ideas.
- SAC provides a forum for sharing information along the way to a larger public and or media audience.
- Final approval of Working Group recommendations before they are officially given to the CINMS and shared with other agencies and groups. It is anticipated that the Working Group will be asking the SAC to approve final recommendations that would need to be distributed by the CINMS to other relevant agencies and organizations.

**Appendix A (MSWG Proposal): Background and Support Material for MSWG**

Appendix A provides background and support material for the Marine Shipping Working Group and includes the following topics:

- Relevance

- Issues
- Benefits
- Issues for Consideration

**Relevance:**

The CWG recently completed a review of the SAC's 2009 recommendations. This review showed that much effort has been put forward and a variety of different strategies have been employed to reduce the risk of lethal whale strikes. However, current policy strategies, such as voluntary vessel speed reduction notices, education and outreach, and adaptive management have failed to achieve voluntary compliance with ship speed

recommendations. A review of cooperation with speed advisories found that less than 1% of ships traveled significantly slower than the requested voluntary speed of 10 knots.<sup>8</sup> The Working Group may be interested in reviewing why the program was not successful with industry representatives participating in the Working Group.<sup>9</sup> Short of regulation and lawsuits, collaborating with affected parties to explore solutions that organize ship traffic and reduce ship speed offers the most logical approach for protecting whales and addressing human health issues.

From July through November 2013, Kristi Birney and Sarah Pierce carried out more than 15 stakeholder interviews, reaching more than 20 individuals, to determine the level of interest in using a SAC Working Group as the forum for discussing the issues and challenges that marine shipping presents in the Santa Barbara Channel region. A memo summarizing the results of these interviews can be found in Appendix B. The interviewees expressed unanimous support for development of a formal SAC Working Group (e.g., Marine Shipping Working Group). Stakeholders identified the following issues or concerns that they would want addressed by this Working Group:

- Risk of whale ship strikes
- Air pollution from shipping in the Santa Barbara region
- Conflicts with other ocean users (i.e. naval operations) and concerns about navigational safety

**Issues:**

Thousands of cargo ships transit the Santa Barbara Channel region each year and some have recently rerouted outside (or backside) of the Channel Islands. Current traffic pattern data<sup>10</sup> indicate that approximately 50% of ships are using the Santa Barbara Channel Traffic Separation Scheme (TSS) with the remaining 50% traveling on the backside of the Islands, through the Point Mugu Sea Range, where the Navy conducts missile testing and training exercises. This presents four distinct local challenges:

- (1) Whales and Ship Strikes: Ship strikes are a primary threat to recovering endangered whales. In 2007, four blue whales were struck and killed by cargo ships in a three-week period inside the Santa Barbara Channel. Since that time, on average, up to four dead whales wash ashore in our region (Point Conception to Ports of LA/Long Beach) annually as a result of ship strikes. Scientists estimate up to 10 times more strikes go undetected.<sup>11</sup> Blue whale populations are not recovering at expected levels and scientists believe that ship strikes are a primary reason for this slow recovery.<sup>12</sup>
- (2) Air Quality and Greenhouse Gases: Ships account for more than 50% of ozone-forming nitrogen oxides (NOx) in Santa Barbara County. Reducing ship emissions could help the County attain the state ozone standard, which it is not in compliance with now. In addition, ships emit greenhouse gases (GHG) and other air pollutants which negatively affect air quality and human health. While there are existing regulations and air quality programs in place designed to make progress towards meeting the National Ambient Air Quality Standards (NAAQS) under the Clean Air Act, these may not be sufficient for meeting more stringent state standards. Additional measures may be necessary to meet state standards. Under existing regulations, any affected source must do their fair share to reduce both criteria pollutants and greenhouse gas emissions. It is noted that it is the responsibility of the appropriate agencies, not the SAC to carry out these regulations. It is a reasonable expectation

that the Working Group would compare the relative benefits of different alternative strategies or develop new approaches for air quality improvements, but would not be responsible for carrying out regulations.

- (3) Navigational Safety: Cargo ships traditionally traversed the Santa Barbara Channel region using internationally designated shipping lanes (TSS).<sup>13</sup> However, in 2009, many of the cargo ships started bypassing the TSS within the Santa Barbara Channel, and instead traveling on the backside of the Channel Islands outside of any internationally recognized TSS. The US Coast Guard conducted a Port Access Route Study (PARS) that recommended a TSS be established on the backside of the islands for vessel safety. This recommendation was never pursued at the international or federal level. However, with the assistance of the U.S. Coast Guard and Marine Exchange, vessels traveling on the backside of the Islands have been monitored and are notified of any threats when they transit the area. There have been no reported instances of near vessel warnings, or accidents since the rerouting of vessels began in 2009. Within the Santa Barbara Channel, the PARS study also concluded that the width of the Channel's TSS could be reduced by one nautical mile and navigational safety would be maintained while also reducing ship interaction with whales. This TSS modification went into effect in June of 2013.
- (4) Interruption of Naval Operation and Conflict with Existing Users: Cargo ships traveling on the backside of the Channel Islands can interrupt Navy operations. The Maritime Industry, through the Marine Exchange, has been cooperating with the Navy to avoid conflicts. The established communication system has been in place and working since 2009. Other than some delays, there have been no cancellations of Navy operations due to a vessel transiting the range.

#### **Benefits:**

The CWG believes that a new Marine Shipping Working Group would bring new partnerships together, provide a comprehensive view of the issues listed above, and explore management options that could provide win-win solutions including the following community benefits:

Reduced Risk of Whale Strikes: Improved protection for whales through rerouting and/or slowing ships down when whales are present reduces the probability of lethal strikes.<sup>14</sup> The Santa Barbara Channel is a critical feeding ground for several endangered baleen whale species including humpback, blue, and fin whales. The Channel region also has some of the highest densities of ship traffic. The co-occurrence of ships and whales in space and time elevates the risk of vessel strikes, and possible whale mortality. Improved protection in known feeding areas in and around the Channel Islands could help rebuild whale populations and improve ocean health. In addition, protecting whales is important for supporting the local whale watching industry and tourism which contributes to an ocean based economy.

Improved Air Quality: Engines of large ships have reduced power demands at lower speeds, so reducing ship speeds will reduce emissions of NOx, particulates, air toxics, Black Carbon, and greenhouse gases. Reducing vessel speed to 12 knots will reduce shipping NOx and GHG emissions by more than 50%. One of the economic benefits to slowing ships down is moving Santa Barbara County closer to attaining the state ozone standard, which it is currently out of compliance with. Reduced emissions from ships would also positively impact local businesses which could find it difficult to meet stricter and stricter air regulations that will result if the County cannot reduce pollution from marine shipping. One factor to consider is that if a vessel increases speed, above its normal transit speed, to make up lost time, the benefits of slowing down may be lost due to the exponential relationship between energy consumption and vessel speed. However, speed reduction could still substantially reduce the local NOx load along the length of the Channel and enhance Santa Barbara County's efforts to come into compliance with the state ozone standard.

Minimize Interruption of Navy Operations, Reduced Conflict with Other Ocean Users, and Improved Navigational Safety: Organizing and/or coordinating ship traffic can help minimize interruption of Navy operations and may reduce navigational safety concerns. The lack of a TSS on the backside of the Islands is

viewed as a navigational safety concern by some stakeholders interviewed during the convening assessment. Cancellation of naval testing operations is costly to taxpayers and can reduce military readiness. As discussed above, the Maritime Industry, through the Marine Exchange, is cooperating with the Navy to avoid conflicts and a communication system has been established between the two entities. It is expected that the Working Group would create an opportunity for the shipping industry, the Marine Exchange, and the Navy to educate other stakeholders about this system.

**Issues for Consideration:**

During the CWG interviews, stakeholders identified several issues for consideration and further discussion including: Emission Control Area (ECA) air quality regulations and future ship routing patterns, and the implementation of recommendations. Each of these issues is discussed in more detail below:

ECA Air Quality Regulations: It was noted by several stakeholders that the International Maritime Organization (IMO)-approved ECA air quality regulations for North America may result in a change to ship routing patterns, and there is uncertainty about how the shipping industry will respond to these new regulations. The ECA, enacted in 2012, aims to reduce air pollution from ships along the North American coastline. Regulations become more stringent over time and, in 2015, fuel sulfur content will be limited to 0.1% for any ship traveling within 200 nautical miles of the mainland coast. In 2015, the ECA fuel standard will match California's current fuel standard which extends 24 nautical miles from the mainland coast and shores of the Channel Islands. The IMO international regulations for Marine Vessels, and the established North American ECA, also aim to reduce NOx emissions. Engine standards that have been in place since 2011 reduce NOx emissions by 30%, and the new engine standards currently scheduled for implementation in 2016 will reduce vessel NOx emissions by 80%. The NOx standards apply only to newly installed engines, so the high levels of NOx in the Channel from the existing fleet will not be reduced from these regulations for a number of years. In addition, there is a chance the ECA 2016 implementation date may be delayed five years. A new SAC Working Group would provide a venue for engaging industry representatives in discussions about current and future ship routing patterns. This proactive approach could enhance stakeholder and agency understanding of shipping industry routing plans in advance of the ECA regulation going into effect.

Implementation of Recommendations: During the interview process several stakeholders raised questions about how recommendations would be implemented. The SAC Charter clarifies that a Working Group provides advice to the SAC, which in turn provides guidance regarding Sanctuary management to the Sanctuary Superintendent. In turn, the Superintendent is committed to sharing SAC advice with all relevant agencies that could implement the advice. The SAC is not a decision making body and there is no guarantee that recommendations will be implemented. However, it is anticipated that the Working Group will use a consensus building approach to develop recommendations that are mutually beneficial. Exploring win-win solutions could address multiple issues, benefit multiple stakeholders, and result in recommendations that agencies or other sectors may be interested in implementing. For example, the Gulf of the Farallones and Cordell Banks National Marine Sanctuaries' JWG Report indicates that implementation of recommendations is being pursued in partnership between different Working Group members such as NOAA and the U.S. Coast Guard. Additionally, the JWG effort has resulted in collaboration between the shipping industry and NOAA, with the shipping industry providing funding for the development of a whale identification poster, an iPhone/iPad Whale Spotter application, and additional whale data collection. A new Marine Shipping Working Group will provide a venue for the identification of specific needs for the Santa Barbara Channel region and strengthen partnerships (i.e. between NOAA, the U.S. Coast Guard, the Navy, or the shipping industry) that could address these needs.

**Appendix B (MSWG Proposal): Convening Assessment Memo  
Comprehensive Planning Approach for Marine Shipping in the Santa Barbara Channel Region  
November CINMS SAC meeting**

*Prepared by Kristy Birney, SAC Conservation Representative, and Sarah Pierce, Bren School 2013 Graduate  
December 10, 2013*

### **Introduction**

During July through November 2013, a variety of stakeholder groups were interviewed to determine the level of interest in using a SAC Working Group as the forum to discuss issues and challenges marine shipping presents in the Santa Barbara Channel region. Appendix A has a full list of groups and agencies that were interviewed.

The interviews were framed in such a way so that stakeholders could address the following topics: Issues and Interests; Information and Needs; Participation; and Process Needs. See Appendix B for a full list of interview questions and the background information that was provided to each stakeholder.

This memo outlines general responses from the stakeholders. It does not discuss the position of any party. Responses are summarized below under the following categories:

- Issues
- Interest, Information, and Needs
- Other Issues for Consideration
- Process
- Proposed Next Steps

### **Issues:**

Stakeholders were asked to identify the range of issues around ship routing in the Channel Islands region.

The following issues were identified by stakeholders:

- Whale strikes
- Underwater noise effects
- Emissions and air quality
- Ship to ship collisions
- Oil spills and hazardous discharges
- Ballast water discharges
- Impacts to sensitive or endangered species
- Safe vessel passage across the Santa Barbara Channel Traffic Separation Scheme (TSS)
- Navigational safety on the back side (south side) of the Channel Islands
- Conflicts with other ocean users
- Conflicts with naval testing operations
- Economic impacts to shipping industry

Several issues were identified by multiple stakeholders including: navigational safety concerns with interruption of Navy testing operations and conflict with other users, ship strikes on endangered whales, production of air emissions, impacts to coastal water quality, and economic impacts to shipping industry. However, several stakeholders clarified that the overall volume of daily ship traffic the backside (south side) of the Channel Islands is fairly low and spread over a wide area. As a consequence traffic routing on the backside of the Channel Islands does not necessarily present a high threat to navigational safety and several stakeholders indicated that the relatively risk of a ship to ship collisions or oil spills is low.

### **Interest, Information, and Needs:**

Stakeholders were asked to identify the interest, information, and financial needs for each individual or organization to participate in a facilitated, meaningful discussion to identify and evaluate potential solutions to the issues mentioned above.

### **Interest in Participation**

- All stakeholders interviewed indicated that a new SAC Working Group would be the right forum for discussing concerns and issues around marine shipping. All stakeholders expressed either

support or interest in participating in a SAC Working Group to discuss a comprehensive approach to addressing marine shipping issues and concerns.

### **Informational Needs**

- Although some data gaps were identified, stakeholders appear to have enough data to move forward with a Working Group process.
- SeaSketch, an ocean planning platform, was identified as a possible tool that could be used to integrate data and allow working group members to compare different options and evaluate tradeoffs between options in an open stakeholder forum.
- There is an existing whale habitat model, developed by the Southwest Fisheries Science Center, NOAA Fisheries Service, that assesses the risk of ship strikes to humpback, blue, and fin whales from alternative ship routing in Southern California.
  - Model predictions for humpback and fin whale densities reflect the best existing available data. However, the model is missing some existing blue whale data. It was noted that if existing blue whale data was integrated, an updated analysis would more accurately reflect blue whale habitat in the Santa Barbara Channel region.

Data sources that were identified include:

- AIS data
- Marine Exchange
- Scripps HARPS for noise data
- PARS study
- Whale siting data
  - Naturalist Corps reporting
  - Aerial Survey Data
  - Whale Spotter App
- Air quality data
- Southwest Fisheries Science Center (habitat modeling and ship based whale surveys)

Data gaps that were identified include:

- Whale densities (by species and location) on the backside (south side) of the Channel Islands
- Real-time whale sighting data
- Drivers for shipping industry routing decisions
- Night-time location and behavior of whales
- Whale response to vessel speed and close approach
- Whale sighting data from shipping industry
- Vessels without AIS<sup>15</sup>

### **Financial Needs**

- Some stakeholders identified that they would need financial assistance for staff time and/or travel expenses. Others noted that as long as the goals of the working group were in line with their organization's mission, they would most likely not need financial support.
- Several stakeholders noted that additional funding might be needed for data analysis (i.e. evaluation of AIS data or integration of existing whale data).

### **Other Issues for Consideration:**

- Emission Control Area (ECA) air quality regulations and future traffic pattern routes in 2015
- Voluntary Western Approach Traffic Separation Scheme
  - organizes ship traffic into and out of the Ports of Long Beach and LA
- Working Group jurisdiction
- Implementation of recommendations



**Process:**

Stakeholders were asked to assist with defining a process for moving forward.

- Establishing a timeline was identified as important and stakeholders suggested timeframes ranging from one to two years for completing a final report and wrapping up the Working Group process.
- In general, stakeholders suggested that hiring a facilitator could be beneficial but may not be necessary.
- Grant funding to support a Working Group was identified as being helpful.<sup>16</sup>

**Proposed Next Steps:**

Based upon stakeholder feedback, the Conservation Working Group (CWG) believes that the issues around ship routing in the Channel Islands region are sufficiently framed to permit meaningful discussion between stakeholders. Interviewees expressed support for developing a formal SAC working group (e.g., Marine Shipping SAC Working Group) that would discuss challenges that ship routing inside and outside the Santa Barbara Channel presents to our community. Solutions may be explored to: 1) reduce conflicts with other ocean users and improve navigational safety, 2) reduce the risk of whale strikes, and 3) improve air quality in the Santa Barbara region.

Next, the CWG will utilize the input from stakeholder interviews to develop a full project proposal outlining the Scope, Participation, Proposed Outcomes, Deliverables, and Funding for a Marine Shipping SAC Working Group. This proposal will be circulated over the next two months with individual stakeholders that were interviewed to get feedback and input on the full proposal. Feedback will be assimilated into a final proposal that will be presented to the SAC for consideration during the January 2014 meeting.

**Appendix A (Convening Assessment Memo):**

Agencies and Organizations Interviewed:

- NOAA Fisheries Service
  - West Coast Region
  - Southwest Fisheries Science Center
- U.S. Coast Guard
- Santa Barbara County Air Pollution Control District
- Channel Islands National Marine Sanctuary
- National Parks Service
- California Coastal Commission
- Cascadia Research
- Marine Exchange
- Island Packers
- Navy
- Ocean Conservancy
- Shipping Industry
- Sea Grant
- Captain Aschemeyer, Former Executive Director, Marine Exchange

## Appendix B: Outreach and Education Activities through September 2015

Activity	Description	Dates	Message(s)	Primary Audience(s)	Evaluation/Feedback
<b>Whale Advisory Listserv &amp; CA Air Resources Board Ocean Going Vessels listserv</b>	Communicate w/ shipping industry and others about whale conservation and management off the U.S. west coast <a href="http://www.rain.org/mailman/listinfo/noaa-whale-advisory-l">http://www.rain.org/mailman/listinfo/noaa-whale-advisory-l</a>	2012-present	Notify of voluntary vessel speed reduction (VSR) and relevant working group meetings; distribute outreach materials	Shipping Industry	Whale Advisory Listserv - mostly shipping industry representatives (163 members total); CARB listserv - thousands of members. Compliance with voluntary VSR remains low.
<b>Local Notice to Mariners (LNM) (District 11)</b>	LNMs are the vehicle for the USCG to communicate to professional mariners up to date information on changes to navigation rules, aids to navigation, and local hazards. Published online and in print once per week. CINMS publishes voluntary VSR notices in District 11 LNM during whale season <a href="http://www.navcen.uscg.gov/?pageName=lnmDistrict&amp;region=11">http://www.navcen.uscg.gov/?pageName=lnmDistrict&amp;region=11</a> <a href="#">USCG MARINE SAFETY INFORMATION BULLETIN 11-09</a>	LNMs issued seasonally from 2007-present when whales are present. The Marine Safety Info Bulletin has been published from 2009-present	Request to exercise caution and slow down due to large numbers of whales; voluntary VSR notices (maps included)	Mariners	According to McKenna et al. (2012), "the Code of Federal Regulations states that failure to be aware of them [LNMs] constitutes neglect of duty for licensed officers operating large vessels. Thus, a reasoned basis exists for believing that vessel masters are aware of it." However, McKenna et al. also states that there has been no change in average daily ship speed related to the LNM periods, indicating that a lack of compliance is not due to a lack of awareness, but rather because of the voluntary nature of the VSR.
<b>Marine Band Radio - NOAA WX 3</b>	The NOAA Weather Radio network provides voice broadcasts of local and coastal marine forecasts on a continuous cycle. The Oxnard National Weather Service office	2007-present when whales advisory in	Broadcast VSR/whale advisory	Mariners	

	broadcasts the Whale Advisory message	effect			
<b>Whale Alert &amp; Spotter Pro</b>	Mobile applications that allow people to record whale sightings; Spotter is for trained whale observers <a href="http://www.whalealert.org/">http://www.whalealert.org/</a>	2012-present	Report whale sightings. Voluntary VSR and other managed ocean zones are displayed on the maps	Public and Mariners	Adoption by the shipping industry has been low. Quality and value of data needs to be evaluated -- may be more useful as an education/awareness tool
<b>Whale Alert Brochure and Pocket Guide</b>	<a href="http://channelislands.noaa.gov/management/resource/pdf/whale-alert-pocket-guide.pdf">http://channelislands.noaa.gov/management/resource/pdf/whale-alert-pocket-guide.pdf</a>	2015	Report whale sightings	Public and Mariners	<i>Results not known</i>
<b>Whale Alert Infographic</b>	Encourages use of whale alert <a href="http://channelislands.noaa.gov/management/resource/pdf/ship-strike-infographic.pdf">http://channelislands.noaa.gov/management/resource/pdf/ship-strike-infographic.pdf</a>	2015	Report whale sightings	Public and Mariners	<i>Results not known</i>
<b>Whale Poster</b>	Developed with the Pacific Merchant Shipping Association to encourage mariners to identify whales and report sightings <a href="http://channelislands.noaa.gov/management/resource/pdf/whale-poster.pdf">http://channelislands.noaa.gov/management/resource/pdf/whale-poster.pdf</a>	2013	Whale Identification and reporting. Report sightings to whales@noaa.gov. Report distressed or entangled whales to (877) SOS-WHALE [767-9425]	Large Ships and Mariners	According to JWG 2015 update, whales@noaa.gov has only received reports from one commercial operator, a NOAA vessel, and one whale watch operator <a href="http://farallones.noaa.gov/management/pdf/sac/15_05/shipstrike_update_doc.pdf">http://farallones.noaa.gov/management/pdf/sac/15_05/shipstrike_update_doc.pdf</a>
<b>Dock Walks</b>	Walk around the port to interact directly with Captains and crews and distribute information.	One attempt	Raise awareness of ship strike threat, develop relationship with Mariners	Mariners	A NMFS representative attempted a dock walk and determined it was not feasible (one can't simply walk on to a container ship-- access is limited). Also, there was no dedicated staff or training.
<b>Presentations</b>	NOAA staff have made dozens of presentations and hosted meetings. Example: Ship strike overview - US Attorney's Office We	On-going	Raise awareness of ship strike threat, develop relationship with Dept. of Justice	Shipping representatives, general public, US	Generally raises awareness of ship strike issue and NOAA efforts to minimize risk

	Love Wildlife Lunch and Learn (Bingham 2013)			Attorneys Office	
<b>Web and Social Media</b>	<a href="http://channelislands.noaa.gov/management/resource/ship_strikes.html">http://channelislands.noaa.gov/management/resource/ship_strikes.html</a>	on-going	Overview of ship strikes and resources	Public	CINMS facebook page has 4,088 page likes, most are 25-54 years old, mainly from Santa Barbara, Ventura, and LA; 200 followers from Bangladesh.
<b>Press Releases, Podcasts, and Other Media (print, radio, television)</b>	<a href="#">PRESS RELEASE: Protecting blue whales and blue skies: Results from 2014 ship speed reduction trial in Santa Barbara Channel</a>	3/3/2015	VSR program	Public/media	Thousands of impressions. VSR trial was covered by Sky News, KCLU, PRI, LA Times, Reuters, and San Jose Mercury News. It was also covered at Capitol Hill Ocean Week 2015.
	PRESS RELEASE: Slowing ships down for cleaner air and whale protection (Six global shipping companies to participate in trial incentive program for Santa Barbara Channel)	8/4/2014	VSR program	Public/media	
	PRESS RELEASE: More ships to slow down for cleaner air and whale protection: Ventura County Air Pollution Control District chips in for ship speed reduction incentive trial	9/9/2015	VSR program	Public/media	
	<a href="#">Thank You Ocean Podcast Video: West Coast Ship Strikes</a>	2012		Public	
	<a href="#">Thank You Ocean Podcast Video: Reducing the Threat of Ship Strikes to Whales</a>	2013		Public	
<a href="#">Thank You Ocean Podcast Video: Slowing Ships for Cleaner Air, Safer Whales</a>	2014	VSR program	Public		

<p><b>Coast Pilot 7 (Chpt. 3 and 5)</b></p>	<p><a href="http://www.nauticalcharts.noaa.gov/nsd/coastpilot_w.php?book=7;">http://www.nauticalcharts.noaa.gov/nsd/coastpilot_w.php?book=7;</a>  <a href="http://www.nauticalcharts.noaa.gov/nsd/xml2html.php?xml=coastpilot/files/cp7/CPB7_E47_C03_20150904_1812_WEB.xml">Chpt 3 (Sec. 93-112): http://www.nauticalcharts.noaa.gov/nsd/xml2html.php?xml=coastpilot/files/cp7/CPB7_E47_C03_20150904_1812_WEB.xml</a></p>	<p>2015, edition 47</p>	<p>Detailed messaging about whales and ship collisions.</p>	<p>Professional and all other mariners</p>	
<p><b>Marine Exchange of Southern California Direct Communication with Ships' Agents</b></p>	<p>Mx SoCal has a list of ships' agents that they push information to every day. Every arriving ship has an agent that handles its matters, so this could reach every arriving ship. The primary information that is transmitted is Naval operations. Information is transmitted in multiple ways (such as email).</p>		<p>Primarily information about Naval operations. Sometimes information on whale sightings. Could be expanded to include more whale messaging.</p>	<p>Shipping Agents</p>	<p>A more formal/expanded use of this address list could be formed.</p>

### Appendix C: Research and Monitoring Activities through September 2015

Recommendation from SAC 2009 Ship Strike Report	Progress Made	Status/Gaps/Work Remaining
<p><b>1. Improve monitoring efforts to track whale distribution spatially and temporally within sanctuary, within and in close proximity to shipping lanes (i.e. acoustic, aerial and photographic monitoring)</b></p>	<p>Acoustic Monitoring: Scripps deployed 4 HARPS (bottom-mounted passive acoustic data recorders called High-frequency Acoustic Recording Packages, or HARPs) in 2009; continued HARP monitoring from 2009-2012. NMFS deployed a passive hydrophone on the south side of Santa Cruz Island in 2014. CINMS and NMFS sought 2015 grant funds to deploy 2 MicroMARS hydrophones, grant was not awarded.</p>	<p>2 HARPS removed, 2 remain at either end of the SB Channel. Need a long-term funding source and dedicated personnel to process and report on data; currently funded via Navy grant to Scripps Institute of Oceanography in the Hildebrand lab.</p>
	<p>Aerial Monitoring: Aerial flight surveys conducted by NOAA within CINMS from 1999-2011; Partnership with NMFS expanded the geographic range of surveys to include the south side (back side) of the islands in 2011-2012 only; Starting in 2013 with PMSA funding, CINMS conducts seasonal monthly aerial surveys on charter aircraft of the shipping lanes.</p>	<p>The number of aerial surveys was reduced in 2010 due to budget and NOAA aircraft being relocated out of the region. Aerial surveys conducted in 2011-12 south of the islands discontinued due to funding. Current funding may last through 2016 whale season for shipping lane flights only. Need to deepen the pool of flight trained observers. Dedicate smart device with Spotter Pro to streamline recording sightings.</p>
	<p>Photographic Monitoring: Channel Islands Naturalist Corps records whale sightings data year round and provides photo ID data to John Calambokidis, Cascadia Research, who also carries out photo ID monitoring during research cruises.</p>	<p>It is expected that the Naturalist Corps photographic monitoring will continue into the future.</p>

	<p>Opportunistic Sightings - Citizen Science (CINC): Channel Islands Naturalist Corps volunteers record opportunistic whale sightings while aboard commercial whale watching vessels out of the Santa Barbara, Ventura, and Channel Islands harbors. Volunteers use either the Spotter Pro mobile application or paper forms to record the date, time, species, geographic coordinates, number of individuals, distance between the vessel and the animal, behavior and which vessel they are aboard at the during the sighting. This is opportunistic sighting data that have not been effort corrected.</p>	<p>Long time series (15 years) with many data points, but spatial coverage is greatly limited. Observations are concentrated near the Santa Barbara and Ventura harbors, where most of the whale watching vessels depart. Data gaps exist for the western SB channel and back side of the islands. Began collecting effort data in 2013 when naturalists started using Spotter Pro (a mobile app) to record sightings.</p>
	<p>Opportunistic Sightings - Citizen Science (Whale Alert): Whale Alert is a mobile app that the public can use to record whale sightings.</p>	<p>Adoption rate is relatively low - &lt;10,000, media effort</p>
	<p>CINMS staff and Cascadia Research completed a report characterizing cetacean sightings in and around SBC shipping lanes. Results demonstrated that seasonally there was close association between blue, fin and humpback whales with portion of the shelf break (200 meter isobaths). The report also identified hot-spots for specific species including humpback, fin, and blue whales. The report demonstrated that certain areas have greater probabilities for encountering whales.</p>	<p>The report identifies the need to carry out further statistical analysis for determining whale distribution probabilities. It also acknowledges the need for additional staff resources to complete this analysis.</p>
<p><b>2. Improve understanding of life history, biology and behavior of large whales in SBC</b></p>	<p>John Calambokidis has conducted whale tagging and behavior studies (2009-2012). This research suggests blue whales dive shallower when ships are nearby and that the whales float and drift close to the surface at night.</p>	<p>Tagging data set relatively small. Cascadia Research and its partners continue looking for additional opportunities to conduct more whale behavior research.</p>
	<p>Oregon State University Marine Mammal Institute (Bruce Mate and others) have conducted tagging work around the sanctuary.</p>	
	<p>Publication in review about noise effects from</p>	<p>Ocean noise paper with CINMS case study in</p>

	<p>commercial vessels on whale communication and behavior in the Santa Barbara Channel region (from HARP data). Data suggests in some cases, whales have longer surface intervals after ships pass nearby.</p>	<p>peer review.</p>
	<p>NMFS Southwest Region convened a Science Workshop at the NOAA Science Center (May 19-20, 2010) to focus on data needs, determine how to fill data gaps, and identify future work. Action items identified: 1) collate available whale distribution data to develop a model to determine whale densities in the SBC 2) identify methods to determine potential impacts to whale populations (i.e. significance of threat) along the U.S. West Coast 3) identify short and long term data needs 4) convene workshop to collate available shipping data and 5) some workshop participants expressed their intent to send comments to the U.S. Coast Guard on the LA PARS study. In 2014, NMFS convened a workshop where they provided updates on the 2010 recommendations.</p>	<p>1) Working group has not convened, but several whale distribution models exist (see links). More research is needed to refine models. 2) Methods to identify severity of threat have not been agreed upon. Multiple papers analyze the impacts of vessel collisions to whale populations. Bettridge et al. 2015: Vessel collisions were identified as a moderate threat with an increasing trend for the Central America distinct population segment of humpback whales, which feeds in CINMS. Redfern et al. 2013: The estimated number of ship strikes for fin and humpback whales may be sustainable. Even conservative estimates of the number of blue whale ship strikes are higher than the potential biological removal (the max number of animals that may be removed annually by anthropogenic causes while allowing the population to reach or maintain its optimal sustainable population). Monnahan et al. 2015: Estimate that density dependence, not ship strikes, is the key reason for observed lack of increase in blue whale populations, and future strikes will likely have a minimal impact on the long-term population. Although they estimated ship strike mitigation would have minimal impacts on population trends and status, current levels of ship strikes are likely above legal limits set by the U.S. Additional analysis is</p>



		needed for other species. 3) Short and long term data needs are being developed by NMFS. 4) Workshops for sharing shipping data have not yet convened, but the data that would have been gathered via that type of venue has been completed. 5) Some Workshop participants commented on the USCG PARS study.
<b>3. Monitor annual distribution of krill</b>	Indirect sensing of krill via airplane is possible through chlorophyll concentrations, but predictive capacity is limited.	We are not aware of any efforts to monitor krill for its relationship to whale biology in the SBC Region.
<b>4. Continue and improve monitoring efforts to track vessels (spatially and temporally) within the Sanctuary, within and in close proximity to shipping lanes</b>	CINMS staff has developed in-house capacity to receive, process, and analyze Automated Identification System (AIS) data that can track vessel traffic within the SBC Region. AIS capacities currently cover the entire Sanctuary, SB Shipping lanes, and south side (back side) of the islands. AIS data was used to analyze vessel compliance during the Vessel Speed Reduction Incentive Trial.	CINMS staff continues to upgrade AIS capabilities. In March 2013, a new automated AIS system was installed at Santa Cruz Island. Access to AIS data west and north of VAFB would fill gaps in coverage, an MOU with VAFB has not moved forward.
<b>5. Recruit local colleges, universities, and research institutions to assist with research.</b>	In 2010/11 CINMS and NMFS partnered as clients on a UCSB Bren group project titled "Reducing the Risk of Vessel Strikes to Endangered Whales in the Santa Barbara Channel: An Economic Analysis and Risk Assessment of Potential Management Scenarios." This study developed two models. One estimating the change in relative risk of a lethal strike based on predicted whale distributions. A second model calculated change in total cost to the shipping industry across four different management scenarios. Results suggest that mandatory speed reduction has the potential to be the most cost effective management option.	The Bren report identifies the need for further research to refine the whale distribution and relative risk model.

	In the fall of 2012, a UCSB Bren school cost benefit class examined the costs and benefits of using CA Cap and Trade auction funds to slow down cargo ships within the SBC. Results varied with the majority of groups identifying that over the long term (20+ years) benefits outweighed costs; however, several groups had the opposite findings.	
	In 2015/2016, CINMS, NCCOS, and SBCAPCD are partnering as clients on a UCSB Bren group project titled, "Vessel Speed Reduction, Air Pollution, and Whale Strike Tradeoffs in the Santa Barbara Channel Region: Solution-oriented Integration of Health and Ecosystem Service Valuation"	Current Bren project wraps up in spring 2016 to provide whale valuation data, NCCOS economic impact analysis expected in Summer 2016.
<b>6. Seek out additional sources of funding for research</b>	Hollings Grant to fund the development of Spotter Pro, a mobile app that will be used by the Naturalist Corps to record whale sightings; NCCOS Ship Strike Whale Award (100K) funding 2015 Bren Project and NCCOS Economic Analysis of MSWG recommendations; Vessel Speed Reduction Trial funding (90K awarded by SB Foundation, SB and Ventura Counties APCDs).	Hollings Grant not awarded. NCCOS \$\$ awarded. See note above about additional hydrophones not being funded and funding constraints for aerial monitoring.
<b>Additional Areas of Research (Identified by Sanctuary Staff and Marine Shipping Working Group)</b>	<b>Progress Made</b>	<b>Status/Gaps/Work Remaining</b>
<b>Monitor and Assess safety of navigation in the SBC region</b>	In 2011, USCG published a Port Access Route Study to assess whether the creation of, or modification to, a vessel routing system is necessary to improve safety of navigation when approaching LA/LB and transiting the SBC. The report concluded that creating a TSS south of the Channel Islands to accommodate USCG's safety concerns for vessels using the alternate approaches to LA/LB would keep traffic on a predictable course.	Proposed TSS south of the Islands did not move out of the US Delegation to the IMO for consideration. Traffic continues south of the islands. A western voluntary lane was put in place by the Harbor Safety Committee and it is widely utilized.

<p><b>Analyze the impacts of ship emissions on local air quality in Santa Barbara County and the effectiveness of different management strategies to reduce ship emissions. Expand studies to include all southern California coastal counties.</b></p>	<p>The Deep Sea Vessel/Shipping Channel Technical Working Group (TWG) conducted a comparative technical analysis of the air quality impacts between two potential operational control strategies for Southern California and reached the following conclusions: 1) Reducing the speed at which ships travel reduces the flux of NOx emissions that reach onshore. The magnitude of the reductions is dependent upon the degree of speed reduction and the distance traveled at the reduced speed with the reductions proportional to the distance traveled and the reduced speed. 2) The impact of moving the shipping lane further offshore on the onshore flux of NOx emissions is more sensitive to meteorological conditions. On some days there is an emission reduction benefit and on other days there is a disbenefit, depending on the specific weather and wind conditions.</p>	
	<p>Port of LA/Port of LB analyze emission reduction benefits from VSR in their 2010 Clean Air Action Plan (starting on p. 108)</p>	
	<p>Santa Barbara County Clean Air Plan (2013) indicates that 57% of nitrogen oxide emissions in Santa Barbara County are from marine shipping.</p>	
<p><b>Analyze the impact of vessel speed reduction on ship emissions generally</b></p>	<p>Multiple publications analyze the impact of VSR on ship emissions, and generally conclude that lowers speeds lead to reductions in air pollution emissions. Khan et al. (2012) states, "VSR to 12 knots yielded carbon dioxide and nitrogen oxides emissions reductions (in kg/nautical mile) of approximately 61% and 56%, respectively, as compared to vessel cruise speed."</p>	
<p><b>Policy research, such as, continue to evaluate effectiveness of voluntary and</b></p>	<p>McKenna et al 2012: Voluntary speed reductions have been largely ineffective in southern California.</p>	

<p><b>incentive based seasonal slow speed zones and shift in SB Channel TSS, and future implemented management measures</b></p>	<p>Vessel Speed Reduction Incentive Trial Report</p>	
	<p>Vessel Speed Reduction Incentive Trial Report 2015: Incentivized vessel speed reduction works, but need funding and resources to scale up from a pilot project</p>	
	<p>Review of tools that have been employed internationally to reduce ship strike risk: 1) Abramson et al. 2009 includes four case studies from the United States 2) Silber et al. 2012 reviews IMO actions to reduce vessel threat to whales</p>	<p>Need to conduct lit review of what has happened internationally in the last 5 years</p>
<p><b>Identify and assess emerging technologies to enhance whale detection and whale avoidance</b></p>	<p>Silber et al 2008: The problem of ship strikes is a complex one with no easy technological fixes. Technologies applicable to reducing ship strikes are limited almost entirely to those that enhance whale detection. However, detection and relating information about a whale's location representing only part of the equation: the mariner must possess capabilities (e.g. adequate communication systems, adequate response time) to take evasive action to a detected whale. All technologies assessed had certain advantages and disadvantages when considered relative to this problem. See full report for more information.</p>	<p>Studies are needed to confirm that any technology developed and used for this purpose are clearly capable of reducing strikes and to ensure that added environmental impacts are not introduced.</p>
<p><b>Explore expansion of whale sighting data collection efforts with vessels of opportunity e.g. shipping industry, NPS, USCG, CDFW, oil industry service vessels, research vessels</b></p>	<p>NOAA Fisheries, working with Cascadia Research Collective, has conducted 6 ride-alongs on commercial vessels to assess the viability of commercial ships as sighting platforms and the ability to engage crews in reporting sightings. Preliminary data indicates that these vessels are valuable observation platforms. Full write up expected December 2015.</p>	

<b>Ship/whale interactions and ship strike risk</b>	There are many publications that look at ship strike risk, the fatality of ship strikes, and the impacts of various management measures on reducing the risk of ship strikes. See reference library.	
<b>Improve monitoring efforts to track whale distribution spatially and temporally throughout the region, especially south of the Channel Islands</b>	NOAA SWFSC conducted 7 Marine Mammal Survey cruises from 1995 to 2008	

## Appendix D: Available Data Layers in SeaSketch

MSWG Study Area Extent	<b>Navigation &amp; Shipping Activity</b>
<b>Marine shipping Management Programs</b>	Local AIS Counts & Speed Over Ground 2008-2013
2015 Whale Advisory Zone	2014 Sanctuary AIS Total Count
2015 Voluntary Slow Speed Zone	Local Tanker AIS Count 2008-2013
2013-2014 Expanded Whale Advisory Zone	Aids to Navigation
2014 Vessel Speed Reduction Trial Zone	Wrecks and Obstructions
2012 Whale Advisory Zone	Principal Ports
2009-2011 Whale Advisory	COLREGS Demarcation Lines
Current Shipping Lanes and IMO Regulations	Lighthouses
LA/LB Speed Reduction Incentive Program	Submarine Cables
Western Voluntary Lane	Coastal Maintained Channels
Old Shipping Lane & TSS	Anchorage Areas
Sea Range Sub-Areas (by Type)	Danger Zones and Restricted Areas
Sea Range Sub-Areas	Unexploded Ordinances
Sea Range	AIS Stations
Military Safety Zones (Southern Channel Islands)	Navigational Charts
<b>Whale Data</b>	Marine Cadastre Vessel Densities 2011 (by vessel type)
Blue Whale BIA (Feeding)	<b>Air Regulations</b>
Humpback Whale BIA (Feeding)	Regulated California Waters
Gray Whale BIA (Migratory)	ECA Boundaries
Channel Islands Naturalist Corps Observations	<b>Additional Ocean Uses</b>
Representative Whale Watch Trip Paths	Boat Launch Sites
Whale Density Habitat Models (Redfern et. Al 2013)	Marinas
Blue Whale Home Range (Irvine et. Al 2014)	Ports and Harbors
Whale Strandings Due to Vessel Strike (NMFS Database)	Fishing Piers and Jetties
SWFSC Marine Mammal Survey Cruise Sightings (NMFS)	Coastal Access Points
Naval Aerial Surveys	Surf Spots
Naval Aerial Survey Transect Lines A & B	SCUBA Dive Sites
CINMS Aerial Surveys (SAMSAP)	Ocean Waves Resource Potential
CINMS Aerial Surveys Flight Paths (SAMSAP)	Oil Platforms
	US Exclusive Economic Zone
	Aquaculture Activity on State Leased Parcels
	Halibut Trawl Grounds
	CDFW Marine Districts
	Cowcod Conservation Area
	High Frequency Radar Locations
	Weather Radar Stations (Federal)
	Dominant Ocean Use Summary
	Non-Consumptive Uses
	Extractive/Fishing Uses
	Industrial/Military Uses

Additional Reference & Boundaries
Cities
Counties
Ecoregion Sections
State Parks
State Waters
Areas of Special Biological Significance
Ecological Reserves
National Wildlife Refuges
State Game Refuges
National Parks (coastal)
Critical Habitat Designations
Groundfish Essential Fish Habitat
Kelp Administrative Bed Boundaries
State Marine Life Refuges
State Marine Protected Areas (MPAs)
Federal Extensions for Channel Islands MPAs
National Marine Sanctuaries
Artificial Reefs
Bathymetric contours (m)
1 mile buffer around 200m isobath
Gray Whale Migration (Not Official)
Shore Types
Wetlands
Estuaries
Surfgrass
Eelgrass
Kelp Canopy (by year)

## Appendix E: MSWG Policy Memo (April 23, 2015)

**Date:** April 23, 2015

**To:** Marine Shipping Working Group (MSWG) members

**From:** MSWG Co-Chairs and Support Staff

**RE:** Guidance on charge, geographic scope, and miscellaneous process items

---

### Overview

The Marine Shipping Working Group (MSWG) of the Channel Islands National Marine Sanctuary (CINMS) Advisory Council (SAC) held its inaugural meeting on February 25, 2015. This memorandum (memo) provides guidance and additional clarification on the charge, geographic scope (or Study Region), and other process-related issues raised by MSWG members. Supporting information has been provided to the MSWG and is referenced throughout this memo.

### Context – Need for Action – Future Steps

The presence of ocean going vessels and changes in their traffic patterns in the Channel Islands region presents distinct, local management challenges, including the potential for vessel strikes on endangered whales, air pollution and greenhouse gas emissions, navigation safety concerns (e.g., ship-to-ship collisions), and conflicts with naval operations and other ocean users.

In 2009, the U.S. Coast Guard conducted a [Port Access Route Study \(PARS\)](#) with the intent to provide safe access routes for vessel traffic proceeding to and from ports the ports of Los Angeles and Long Beach and in response to safety concerns about vessels using alternate approaches to these ports. Safety concerns included vessel traffic congestion and a lack of defined and predictable routes for vessels transiting south of the northern Channel Islands. The PARS findings resulted in adjustments by the International Maritime Organization to the existing Santa Barbara Channel traffic separation scheme (TSS) to enhance protection of the marine environment, specifically to help reduce the risk of ship strikes on endangered whales. Although the PARS recommended creation of traffic lanes south of the Channel Islands, no action has been taken to date.

U.S. Congressional Representatives Lois Capps, Julia Brownley and Alan Lowenthal have since expressed interest in seeking collaborative solutions to address these marine shipping issues. Since 2007, the CINMS Advisory Council (SAC) has provided a local forum for related community and stakeholder conversations.

Recommendations from the MSWG process will be forwarded to the SAC, which in turn provides guidance to the Sanctuary Superintendent. Where appropriate, the Superintendent will consider what if any actions CINMS should pursue. The Superintendent is also committed to sharing SAC advice with all relevant agencies that have a role in implementing recommended actions. The SAC is not a decision making body and there is no guarantee that recommendations from the MSWG will be implemented.



We believe the MSWG members represent a competent, capable, and responsible group of individuals and organizations to address these ocean use challenges. The MSWG process is opportunity for stakeholders to share recommendations with the SAC and CINMS to help shape future actions.

### **Incorporation and relationship of MSWG Goals**

MSWG members bring a wealth of knowledge and expertise from a variety of perspectives and professions. The SAC has convened the MSWG to develop and deliver recommendations focused on the following goals:

- (1) Reduce the risk of ship strikes on endangered whales;
- (2) Decrease air pollution and greenhouse gas emissions;
- (3) Improve navigational safety and promote efficient maritime shipping throughout the region; and
- (4) Manage ship traffic to minimize interruption to navy operations and reduce conflicts with other ocean users (e.g., fishing and whale watching concessionaires).

These recommendations (or “proposals”) may include advice on ship management measures, education and outreach, and research, and should strive to address each of the goals listed above. In cases where that is not possible, MSWG members should detail how and why a recommended action does or does not address these goals.

As MSWG members form recommendations to address these goals, it is important that they take into consideration existing and proposed future actions, outside of the MSWG process, that may directly or indirectly address one or more of the MSWG goals. For example, as was pointed out at the first MSWG meeting, actions are being taken at the state, national and international level to improve air quality and reduce ship-borne pollution (e.g., California clean marine fuel regulations passed in 2009 and the more recent establishment of an Emission Control Area [ECA] in the U.S. Exclusive Economic Zone).

### **Guidance on Accomplishing the MSWG Charge**

The MSWG is charged with crafting advice in the form of management, education and outreach, and research recommendations or proposals that address each of the goals to the greatest extent possible. The MSWG is encouraged to build on the management, education and outreach, and research actions employed and recommendations provided to date in the national marine sanctuary system and elsewhere. Specifically, the Marine Shipping Working Group, with staff support, should aim to accomplish the following:

- Identify, provide, collect and review existing relevant information and data;
- Review past or existing agency, industry and stakeholder management, education and outreach, and research actions;
- Identify solutions that address a variety of human uses (e.g., military activities and commercial shipping) and potential impacts to the study region’s marine environment

- (e.g., air pollution and whale ship strikes), using SeaSketch to support analysis;
- Consider and prioritize the use of available vessel management tools such as, but not limited to, routing, areas to be avoided, vessel speed reduction, and/or reconsideration of shipping lane adjustments as proposed by the U.S. Coast Guard PARS;
- Develop and issue a report with recommendations that allow agency managers to consider dynamic management and/or other management options;
- Consider how to scale-up the incentive-based voluntary vessel speed reduction program;
- Complete a work plan and timeline for implementing the recommendations.

Literature on these historic and current actions and recommendations has been provided to the MSWG, and will be summarized during the upcoming April 30, 2015, webinar. Please refer to the: *Approach to Implementing the Marine Shipping Working Group's Charge For Discussion with MSWG* PDF, provided ahead of the February 25, 2015 meeting. Furthermore, the upcoming April 30 webinar will include a review of shipping management approaches (e.g., routing), and the processes by which they are adopted. Armed with this historical information and the available tools, the MSWG is encouraged to explore and develop ship traffic management, education and outreach, and research advice, focusing on the Study Region described below.

### **Development of Proposals Taking into Consideration Different Shipping Traffic and Whale Patterns**

MSWG proposals and recommendations should build on lessons learned, using the best available data and information. As part of each MSWG proposal or recommendation, MSWG members should provide specific text describing the effectiveness of the proposal under different shipping traffic and whale patterns toward achieving the MSWG Goals. The range of proposals at a minimum should include the following:

- The current situation where ships and/or whales are located north and south of the northern Channel Islands;
- The situation where shipping or whales occurs predominantly in the Santa Barbara Channel; and
- Consideration of additional possible future shipping and/or whale patterns.

MSWG members are invited to define additional potential future shipping or whale patterns by uploading ideas into SeaSketch. MSWG support staff and SeaSketch team members are standing by to assist with using this tool.

### **Geographic Scope – The Study Region**

MSWG deliberations and recommendations to the SAC should focus on the Study Region depicted in the map figure below. The Study Region is the geographic area with a northern boundary at 34° 34' N; a western boundary at 120° 580' W; a southern boundary at 33° 18' N; and an eastern boundary 33° 18' N and the mainland shoreline. This area encompasses the Santa Barbara Channel, the approaches to Los Angeles-Long Beach Ports; particularly the area south of

San Miguel, Santa Rosa, Santa Cruz and Anacapa Islands; and north of San Nicholas and Santa Barbara Islands where vessel traffic has been identified. At the heart of the Study Region, is the Channel Islands National Marine Sanctuary. Additional features and considerations that define the Study Region include:

- Existing Traffic Separation Scheme (TSS or shipping lanes) in the Santa Barbara Channel;
- Concentration of regional shipping traffic occurring outside an existing TSS (i.e., south of CINMS);
- Geographic extent of the best available regional human use and biological data and information, including, but not limited to, whale and air quality data and military use areas;
- Whale Advisory Zones prescribed by NOAA in recent years;
- Seasonal management areas and vessel speed reduction zones employed to date; and
- The 2009 U.S. Coast Guard Port Access Route Study region.

MSWG support staff recognizes the global extent of the shipping industry, the large-scale movements of endangered whales, and additional factors, such as local, regional and federal jurisdictions that have different geographic scales.

MSWG support staff also recognizes that ongoing and future education and outreach, research and monitoring will be needed in and beyond the Study Region. Similarly, any prescribed management actions in the Study Region will require an understanding of the effects on areas outside Study Region boundaries. For example, when NOAA and the U.S. Coast Guard recommended (and the International Maritime Organization eventually adopted) narrowing the TSS in the Santa Barbara Channel, the agencies also recognized the need to narrow the TSS approaching the ports for navigational safety and consistency.

## Appendix F: MSWG Policy Memo (June 17, 2015)

**Date:** June 17, 2015

**To:** Marine Shipping Working Group (MSWG) members

**From:** MSWG Co-Chairs and Support Staff

**RE:** Revised Study Region

---

### Issue

In April 2015, MSWG co-chairs and support staff designated a MSWG study region with a northern boundary at 34° 34' N; a western boundary at 120° 58' W; a southern boundary at 33° 18' N; an eastern boundary 118° 54' W; and the mainland shoreline (see [April policy memo](#) and Figure 1 below). The purpose of the study region is to focus MSWG efforts on areas most relevant to Channel Islands National Marine Sanctuary (CINMS) and shippers heading into and out of the Santa Barbara Channel.

The MSWG Data Subgroup is a group of MSWG members who have expressed interest in participating in additional discussions and activities regarding data and analytics. On June 9, 2015, the following members of the Data Subgroup participated in a conference call: John Berge, TL Garrett, Kip Louttit, Walt Schobel, Jessica Redfern, Kristi Birney, and John Calambokidis. On the call, Data Subgroup members explained that as they began to use SeaSketch and explore the analytics associated with designing potential management options, subgroup members felt that the impacts of those management areas stretched beyond the April 2015 MSWG study region in a way that hampered true understanding of the management options.

### Approach

MSWG co-chairs and support staff reviewed the MSWG study region and proposed a modification based on the concerns of the Data Subgroup. The eastern boundary has been expanded to 118° 15' W to include the full extent of the northern and voluntary western shipping lanes (See Figure 2 below). Additionally, SeaSketch analytics will **not** be bound by this study region; instead, they will include all available data in SeaSketch. These proposed revisions have been presented to and received support from Data Subgroup members.

It is important to note that the charge of the MSWG is not to manage port operations at the Port of Los Angeles/Long Beach. Given that the MSWG is a working group of the Channel Islands National Marine Sanctuary Advisory Council, management recommendations should still focus primarily on the sanctuary and adjacent waters, and be mindful that proposed actions and advice from the MSWG may have affects outside the study region.

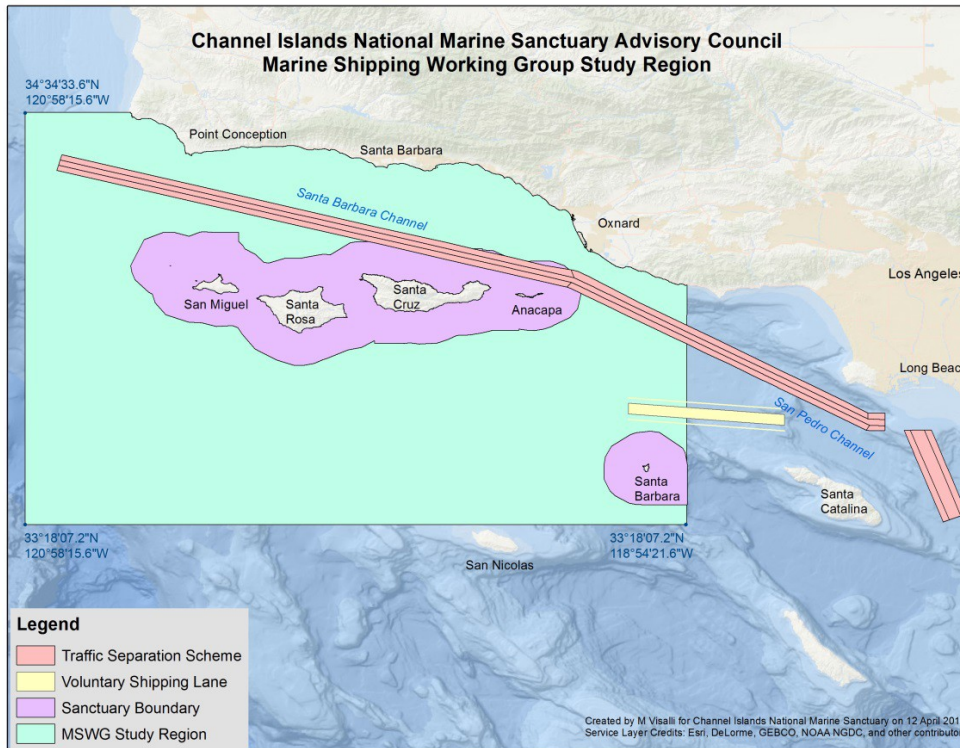


Figure 1: Initial MSWG Study Region (April 2015)

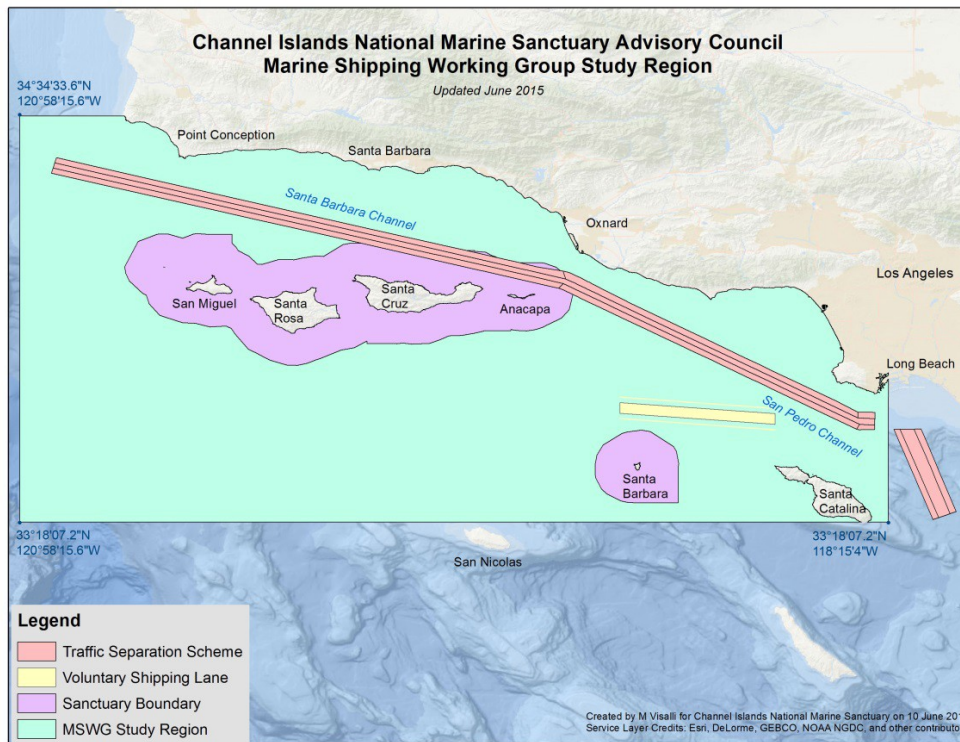


Figure 2: Revised MSWG Study Region (June 2015)

## Appendix G: MSWG Survey Results on Education, Outreach, and Research

Education & Outreach	Continue	Discontinue	Modify	Additional MSWG Input
Whale Advisory Listserv	4	0	1	Useful tool for general information
				Agree that additional management-level shipping industry reps could be added to the list. Perhaps at some point emails could go to this list about the level of compliance with voluntary VSR as a call to improved compliance.
Local Notice to Mariners	5	0	0	Mandatory for Navy operations
				This should continue until additional methods are identified for getting the word out.
Marine Band Radio	4	0	1	Helpful, but would be better with more detailed information. Lat/longs of recent whale sightings
				Not familiar with this but seems it should continue.
Whale Alert and Spotter Pro	4	0	1	Keep in use, make more user friendly and cost effective, distribute more widely...that's not a lot to ask, right? Is it possible for information to be stored in an app that will send data whenever it's connected to wifi?
Whale Alert Pocket Guide	3	1	0	No one carries pocket guides with them. Perhaps make this an app for phones?
				Continue, unless costly and time consuming
Whale Poster	3	0	1	Limit distribution to key locations. Not worth spending too much money on.
				Continue, unless costly and time consuming
Dock Walks	0	3	0	Does not appear to be an effective means of conveying messages.
				Don't know enough about this to comment.
Presentations	3	0	1	
Web & Social Media	4	0	0	
Press Release, Podcasts, Other	5	0	0	
Coast Pilot 7	4	0	0	
Marine Exchange Direct Communication with Ships' Agents	2	0	2	Request FCC approval for AIS text alerts
				Increase the list of recipients if possible and include more whale specific messaging.

Research	Continue	Discontinue	Modify	Additional MSWG Input
Acoustic Monitoring	2	0	1	Acoustic monitoring has limited value, in particular for real-time avoidance but also in terms of acquiring specific location data. At present only one buoy exists within the region that can conduct this monitoring. Multiple stations are needed for localization. Also, these methods do not detect whales that are not actively calling.
				Continue but if resources are limited and other monitoring is preferable over this, then discontinue.
Aerial Monitoring	2	0	1	Increase efforts outside the SB Channel and efforts to gather spatially specific seasonal data.
Photographic Monitoring	2	1	0	Only include as available while conducting other monitoring.
Opportunistic Sightings (CINC)	2	0	1	Be sure to include effort data and relay information to ships via AIS text.
Opportunistic Sightings (Public)	2	0	1	Limited utility without verification, but nice to have.
Whale Behavior & Tagging	3	0	0	
Impacts of Noise of Behavior	3	0	0	
Modelling to Integrate Existing Datasets	3	0	0	
Monitoring krill distribution	2	1	0	Long-term if advances are made in krill detection this could be revisited.
Monitoring Vessels with AIS	3	0	0	No need for modification. AIS data exist.
				Strongly support continuing with and improving tracking efforts.
Partner with Bren Master's GP	3	0	0	
Monitor & Assess Safety of Navigation	3	0	0	
Impact of Ship Management Measures on Local air Quality	2	1	0	Additional emissions studies (both stack emissions measurements and modeling studies) could be useful.
Evaluate risk of ship strikes on whales	3	0	0	Only continue as additional information becomes available.

Other Questions (check box options)	Number Checked			
<b>Seek additional funding for:</b>				
Updates to Spotter Pro and Whale Alert mobile apps	3			
Additional socioeconomic studies	0			
Expended VSR incentive trial	1			
Other (descriptions at right)	2			(1) Additional support for research on whale science and on air emissions and ship speeds. (2) Additional aerial surveys to increase information on spatially specific seasonal whale patterns. Fund infrared auto-detection.
<b>Policy Research to Evaluate Effectiveness of Existing Management Measures:</b>				
Voluntary VSR	1			It seems voluntary VSR has been shown to be ineffective and that additional studies of this are not needed. Evaluation of seasonal VSR versus dynamic management would be useful.
Incentive VSR	3			
Shifting the TSS	1			
Other	1			
<b>Assess Emerging Technologies to Enhance Whale Detection:</b>				
Visual Surveys	2			
Tagging & telemetry	1			
Passive acoustics	1			
Active acoustics	0			
Thermal imaging (infrared)	3			



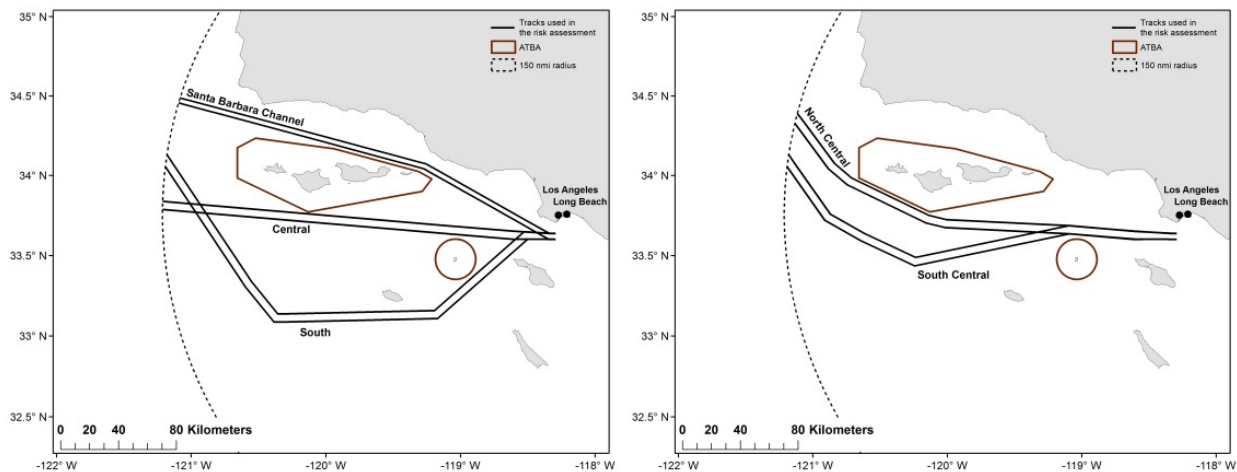
Radar	0			
Predictive model	2			
<b>Explore using vessels to collect whale data:</b>				
Commercial shipping vessels	3			
NPS vessels	3			
USCG	3			
CDFW	3			
Oil industry service vessels	3			
Navy service vessels	3			
Research vessels	3			
Other (decribed at right)	1			Any vessel type in the area of focus should be encouraged to provide whale sighting data. For some, the data may also include species designations while other types may only be able to input on the number of whales sighted.

## Appendix H: Ship Strike Risk Analysis

Jessica V. Redfern  
John Calambokidis  
Thomas J. Moore  
October 2015

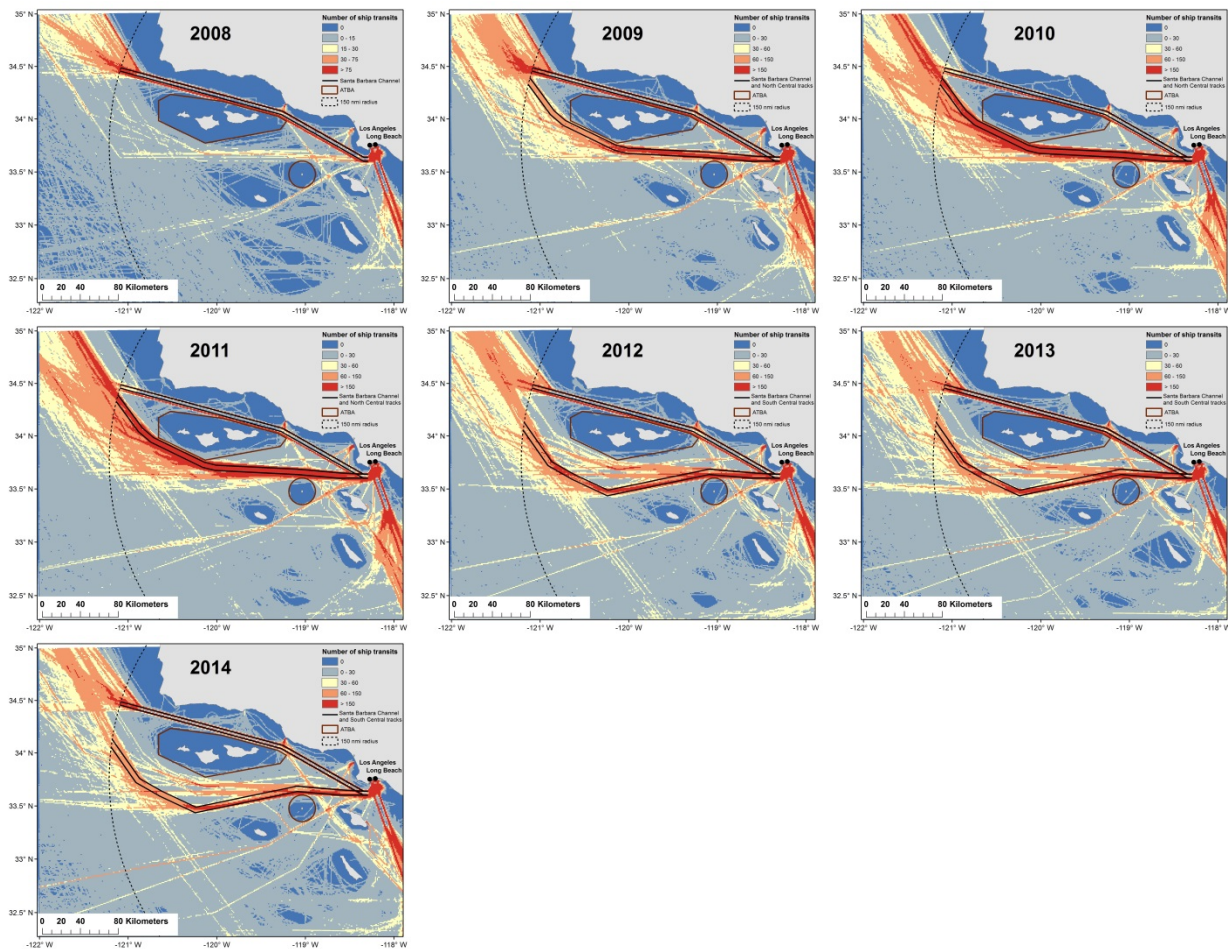
### Ship-strike risk in the Southern California Bight

Five ship tracks are analyzed in this risk assessment. All tracks begin at the edge of a circle with a 150nmi radius from the ports; the length of the radius was derived from the extent of the whale density predictions in Redfern et al. (2013). Starting all tracks at this fixed distance from the ports ensures that comparisons among tracks are equitable.

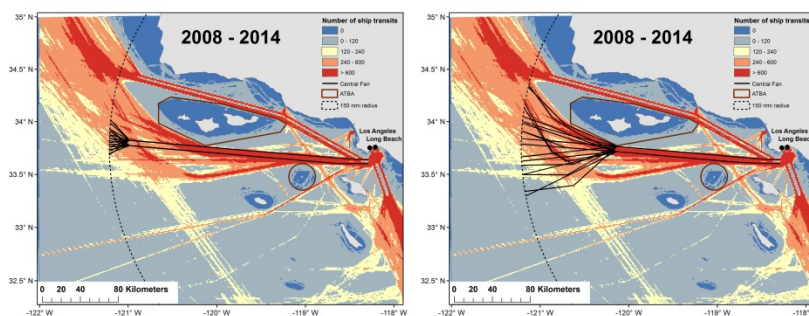


Shipping traffic in the Southern California Bight is dynamic and has shifted multiple times since 2008. Annual maps of shipping traffic (cargo vessels, tankers, and passenger ships with length greater than or equal to 80m) are shown below. The Santa Barbara Channel track overlaps with the official traffic separation scheme (TSS), but is extended to the edge of the circle, and is shown on all traffic maps. As a single track, it is most representative of traffic patterns in 2008 when a majority of ships travelled in the TSS. The North Central track is shown on the 2009, 2010, and 2011 traffic maps and captures the dominant path followed by ships south of the northern Channel Islands. The South Central track is shown on the 2012, 2013, and 2014 traffic maps and captures the dominant path followed by ships south of the northern Channel Islands. The South Central track is very similar to the bathymetry feature avoidance (BFA) option that has been discussed during the working group meetings.

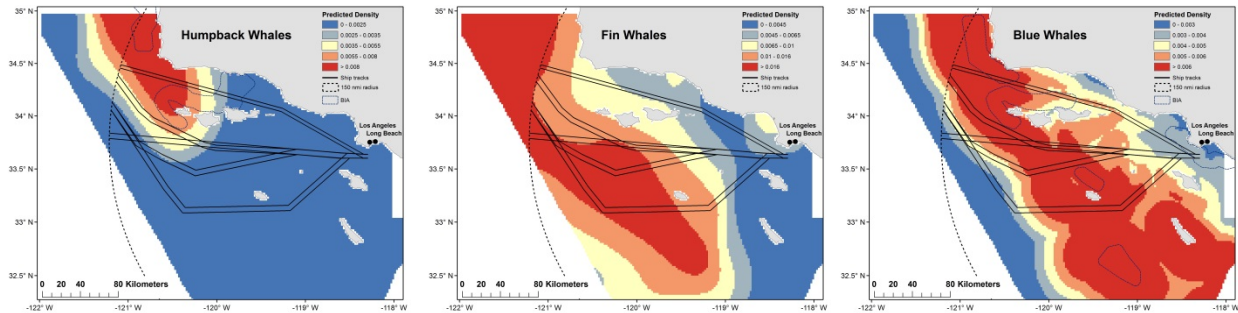
The Central and South tracks do not correspond to primary traffic patterns but do capture areas where ships are known to travel. The Central track was drawn to assess risk in a straight path south of the Islands. It is angled to meet the currently established western voluntary lanes. The South track was drawn to assess risk from ships traveling a far southern path.



We also looked at the possibility of starting the Central track at points inside the circle, instead of on the boundary of the circle. Tracks that start inside the circle are associated with a fan of traffic that captures the paths followed by ships as they enter or exit the track. Fan patterns were derived from 2014 traffic data, but capture traffic patterns observed between 2008 and 2014. The fans are shown below on maps of cumulative traffic between 2008 and 2014. We consider a track that starts at the same radius from the port as the Santa Barbara Channel TSS and a track that starts just below the southernmost point of the area to be avoided (ATBA) associated with the Sanctuary.



Maps of the five ship tracks are overlaid on predicted species densities and Biologically Important Areas (BIAs; Calambokidis et al. 2015) below. Fin whale BIAs have not yet been designated



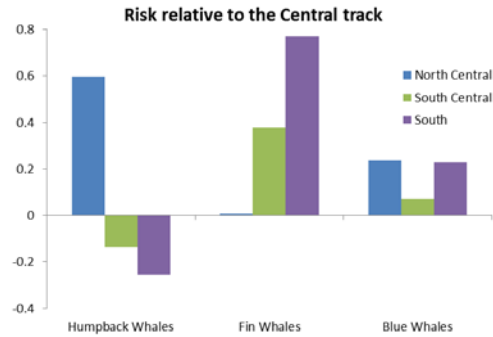
We address the following questions in the risk assessment:

1. What is the optimal track south of the northern Channel Islands?
2. How does risk in this optimal track compare to risk in the Santa Barbara Channel track?
3. How does risk change when we assume all ships travel in Santa Barbara Channel track, all ships travel in the optimal track south of the northern Channel Islands, or ships travel in both the Santa Barbara Channel track and the optimal track south of the northern Channel Islands?
4. How does risk change when ships travel in a fan when entering and exiting the Central track?

### Identifying the optimal track south of the northern Channel Islands

To assess the risk associated with each track south of the northern Channel Islands, we summed the number of whales predicted within 0.0338km on either side of the lines representing inbound and outbound traffic. The width on either side of the line was derived from the average of reported vessel beams in our study area during 2014 (i.e., 33.8m). We present the risk relative to number of whales in the Central track.

These analyses show that ship-strike risk south of the northern Channel Islands is lowest in the Central track for fin and blue whales. Risk for humpback whales is higher in the North Central track, compared to the Central track. Risk for humpback whales is lower in the South Central and South tracks, compared to the Central track. However, the decreased risk in these two tracks is not as large as the increase in risk posed to fin whales in these two tracks. Consequently, the optimal track south of the northern Channel Islands is the Central track.



The South Central track in our analyses is similar to the bathymetry feature avoidance option that has been discussed by the working group. The blue whale habitat models developed by Redfern et al. show that the number of blue whales is highest at the 200m isobath. This isobath is a proxy for the shelf edge off southern California and is generally acknowledged to be an important bathymetry feature for blue whales. Risk calculated using the predictions from the habitat models shows that South Central track has a higher risk for blue whales compared to the Central track. This increased risk may be due to the longer length of the South Central track compared to the Central track. It is also possible that features other than bathymetry play an important role in determining offshore blue whale distributions. The habitat models developed by Redfern et al also found strong relationships between blue whales and mixed layer depth and surface chlorophyll concentrations.

### Comparing risk north and south of the northern Channel Islands

Risk was calculated as above. We present the risk in the Central track relative to risk in the Santa Barbara Channel track. We also calculated the percentage of each track that overlaps with the BIAs.

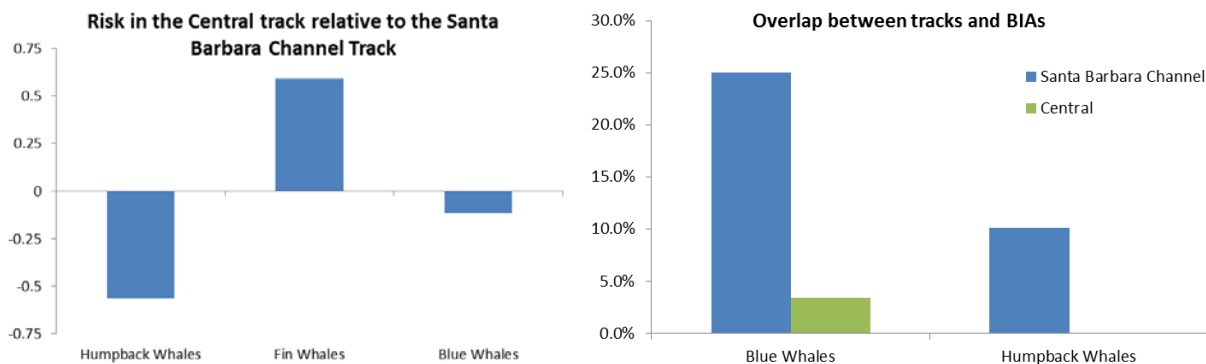
Similar to the results in Redfern et al (2013), this risk assessment shows that risk in the Central track is lower for humpback and blue whales, compared to the Santa Barbara Channel track. Two additional factors not encompassed in the calculations likely make the central track even more beneficial to blue whales than the Santa Barbara Channel track:

1. Our calculations were limited only to the tracks out to the dashed line shown in the maps, but as can be seen above, the Santa Barbara Channel track ends in an area of highest blue whale density which ships would have to transit through to get to the track, while the central track ends in the lowest density, west of that high density band. While our calculations could not encompass the tracks outside of this area, it is clear that if they did it would magnify the benefit to blue whales of the central track.
2. Our habitat density calculations are based on the more course broad SWFSC surveys. One concern acknowledged in Redfern et al. (2013) is that these do not represent the more fine scale areas of concentration in areas like the Santa Barbara Channel which is more captured by the more extensive and finer scale effort from other sources including Cascadia surveys (as reflected in the BIAs), as well as satellite tag data that shows the western Santa Barbara Channel shipping lanes overlapping with the main concentration of blue whale core areas (Irvine et al. 2014). The high incidence of ship strikes of blue whales in 2007 appeared directly attributed to the very high density overlapping the

shipping lanes in the Channel (Berman- Kowalewski et al. 2010). This is a little more captured in the BIA analysis below.

Calambokidis et al (2015) delineated areas containing important feeding areas for blue and humpback whales (BIAs). The Santa Barbara Channel track has a 25% overlap with blue whale BIAs compared to a 3% overlap with the Central track. For humpback whales, the Santa Barbara Channel track has a 10% overlap with their BIAs compared to no overlap with the Central track. Consequently, risk to whales in important feeding areas is higher in the Santa Barbara Channel track compared to the Central track.

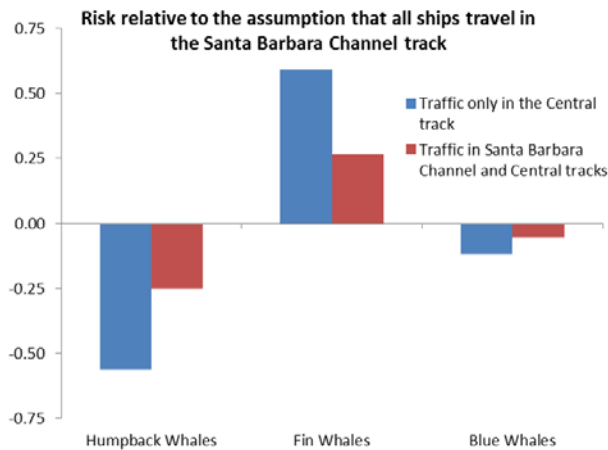
One key point about these analyses is that they do not address seasonality of different species. Both blue and humpback whales are present only seasonally (humpback whales generally present in spring through fall and blue whales more present in summer and fall) while fin whales appear to be present more year round (Calambokidis et al. 2014, Douglas et al. 2014). Advantages of the central track versus the Santa Barbara Channel track in terms of risk to whales would be greatest in summer and fall (both blue and humpback whales present) and lowest in winter (mostly fin whales present).



### **Risk associated with ships traveling both north and south of the northern Channel Islands**

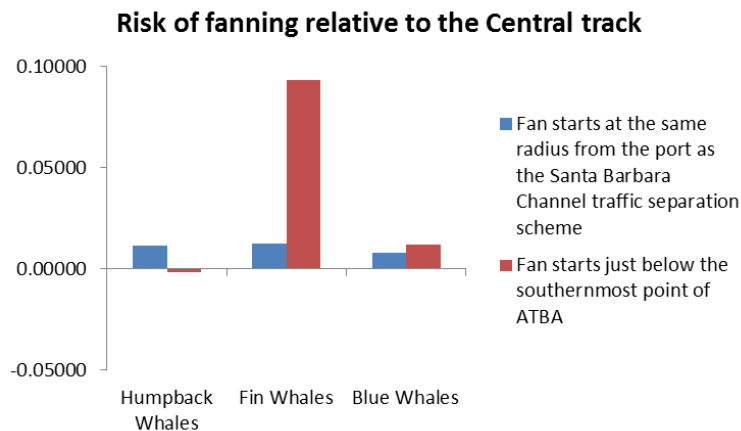
All of the above analyses assume that all western and northern traffic to and from the Ports of Los Angeles and Long Beach travels in a single track. In particular, the analyses above assume that 908 vessels arrive at and 816 vessels depart from the ports; the number of arrivals and departures were derived from August to November 2014 MX SoCal data (Kip Louttit). The MX SoCal data can also be summarized according to whether ships traveled north or south of the northern Channel Islands. We used these data to consider a scenario in which traffic traveled in the Santa Barbara Channel track and the Central track. Specifically, we assumed that 511 vessels arrived and 441 vessels departed from the Santa Barbara Channel track and 397 vessels arrived and 375 vessels departed from the Central track. We present previous results for the risk in the Central track relative to risk in the Santa Barbara Channel track and risk when ships travel in both the Santa Barbara Channel and Central track relative to all ships traveling in the Santa Barbara Channel track. These results show that relative risk is intermediate for all species (i.e.,

the decrease is not as large for humpback whales and the increase is not as large for fin whales) when traffic travels both north and south of the northern Channel Islands.



### Risk associated with ships traveling in a fan when entering and exiting the Central track

We assessed risk in fanning patterns associated with a Central track that starts at the same radius from the port as the Santa Barbara Channel TSS and a Central track that starts just below the southernmost point of the ATBA. Risk generally increases when ships travel in a fan pattern as they enter and exit the Central track. The increase in risk is much higher for fin whales when the fan extends farther eastward (i.e., to the southernmost edge of the ATBA). There is considerable uncertainty about the path that ships would take to approach a Central track that begins farther eastward. However, it remains likely that risk would increase for fin whales on more eastward tracks because many ship paths south of the northern Channel Islands overlap with areas predicted to have high densities of fin whales.



### Species considerations

Some of the analyses suggest potential trade-offs between some large whale species. Below we identify some considerations in evaluating risk and benefits to different species:

- While our calculations compare risk based on occurrence of whales, they do not reflect any differences in susceptibility of different species to being struck. Based on direct monitoring of blue whales in close encounters with ships (McKenna et al. 2015), blue whales appear to engage in only limited avoidance of ships potentially making them more susceptible to ship strikes than other species. This also appears reflected in the high proportion of strandings of blue and fin whales that are associated with ship strikes compared to other species (Douglas et al. 2008).
- Humpback and fin whale abundance has been increasing off the US West Coast while that of blue whales has been stable (based on photo-ID mark recapture) or even declining (based on line-transect estimates from the 1990s to more recent years) (Calambokidis and Barlow 2004, 2013). The reason for blue whales not increasing has been debated in recent years especially in light of a recent analysis that suggested blue whale abundance may never have been high in this region and may already be back at historical pre-whaling numbers.
- Overall abundance of fin whales is higher than for blue whales. Both species are still listed as endangered under the ESA. Humpback whale overall abundance in the North Pacific in the mid 2000s was estimated at around 20,000 but the distinct feeding areas off California and Oregon numbers about 2,000 (Barlow et al. 2011, Calambokidis et al. 2008, Calambokidis and Barlow 2013). NOAA has proposed recognizing separate humpback whale breeding area Distinct Population Segments (DPS) under the ESA and delisting the Mexico DPS but recognizing the Central America DPS as threatened. Southern California represents the primary feeding areas for humpback whales breeding in Central America (Calambokidis et al. 2000, 2008).

## Literature cited

- Barlow, J., Calambokidis, J., Falcone, E. A., Baker, C. S., Burdin, A. M., Clapham, P. J., Ford, J. K. B., Gabriele, C. M., LeDuc, R., Mattila, D. K., Quinn, T. J., Rojas-Bracho, L., Straley, J. M., Taylor, B. L., Urbán R., J., Wade, P., Weller, D., Witteveen, B. H. and Yamaguchi, M. 2011. Humpback whale abundance in the North Pacific estimated by photographic capture-recapture with bias correction from simulation studies. *Marine Mammal Science* 27: no. doi: 10.1111/j.1748-7692.2010.00444.x
- Berman-Kowalewski, M., F.M.D. Gulland, S. Wilkin, J. Calambokidis, B. Mate, J. Cordaro, D. Rotstein, J. St. Leger, P. Collins, K. Fahy, and S. Dover. 2010. Association between blue whale (*Balaenoptera musculus*) mortality and ship strikes along the California coast. *Aquatic Mammals* 36: 59-66.
- Calambokidis, J. and J. Barlow. 2013. Updated abundance estimates of blue and humpback whales off the US West Coast incorporating photo-identifications from 2010 and 2011. Final Report for contract AB-133F-10-RP-0106. PSRG-2013-13R. 8pp.
- Calambokidis, J., G.H. Steiger, K. Rasmussen, J. Urbán R., K.C. Balcomb, P. Ladrón de Guevara P., M. Salinas Z., J.K. Jacobsen, C.S. Baker, L.M. Herman, S. Cerchio and J.D.



- Darling. 2000. Migratory destinations of humpback whales that feed off California, Oregon and Washington. *Marine Ecology Progress Series* 192:295-304.
- Calambokidis, J., E.A. Falcone, T.J. Quinn, A.M. Burdin, P.J. Clapham, J.K.B. Ford, C.M. Gabriele, R. LeDuc, D. Mattila, L. Rojas-Bracho, J.M. Straley, B.L. Taylor, J. Urbán R., D. Weller, B.H. Witteveen, M. Yamaguchi, A. Bendlin, D. Camacho, K. Flynn, A. Havron, J. Huggins, N. Maloney, J. Barlow, and P.R. Wade. 2008. SPLASH: Structure of Populations, Levels of Abundance and Status of Humpback Whales in the North Pacific. Final report for Contract AB133F-03-RP-00078 prepared by Cascadia Research for U.S. Dept of Commerce. May 2008.
- Calambokidis, J, GH Steiger, C Curtice, J Harrison, MC Ferguson, E Becker, M DeAngelis, and SM Van Parijs. 2015. Biologically Important Areas for Selected Cetaceans Within U.S. Waters – West Coast Region. *Aquatic Mammals* 41(1), 39-53. DOI 10.1578/AM.41.1.2015.39
- Campbell, G.S., L. Thomas, K. Whitaker, A.B. Douglas, J. Calambokidis, and J.A. Hildebrand. 2014. Inter-annual and seasonal trends in cetacean distribution and abundance off southern California. *Deep-Sea Research II*. <http://dx.doi.org/10.1016/j.dsr2.2014.10.008>
- Douglas, A.B., J. Calambokidis, S. Raverty, S.J. Jeffries, D.M. Lambourn, and S.A. Norman. 2008. Incidence of ship strikes of large whales in Washington State. *Journal of the Marine Biological Association of the United Kingdom* 88:1121-1132.
- Douglas, A.B., J. Calambokidis, L.M. Munger, M.S. Soldevilla, M.C. Ferguson, A.M. Havron, D.L. Camacho, G.S. Campbell and J.A. Hildebrand. 2014. Seasonal distribution and abundance of cetaceans off southern California estimated from CalCOFI cruise data from 2004 to 2008. *Fishery Bulletin* 112:197-220. doi: 10.7755/FB.112.2-3.7
- Irvine L, Mate B, Winsor M, Palacios DM, Bograd SJ, Costa DP, Bailey H. 2014. Spatial and Temporal Occurrence of Blue Whales off the U.S. West Coast, with Implications for Management. *PLoS ONE*. 9(7)
- McKenna, M.F., J. Calambokidis, E.M. Oleson, D.W. Laist, and J.A. Goldbogen. 2015. Simultaneous tracking of blue whales and large ships demonstrates limited behavioral responses for avoiding collision. *Endangered Species Research* 27 (3):219-232. doi:10.3354/esr00666
- Redfern, J. V., M. F. McKenna, T. J. Moore, J. Calambokidis, M. L. DeAngelis, E. A. Becker, J. Barlow, K. A. Forney, P. C. Fiedler, and S. J. Chivers. 2013. Assessing the risk of ships striking large whales in marine spatial planning. *Conservation Biology* 27:292-302.

## Appendix I: Marine Exchange of Southern California Vessel Traffic Report

Marine Exchange of Southern California Vessel Traffic Report										
Arrivals to and Departures from the Ports of Los Angeles and Long Beach										
June - December 2013										
January - December 2014										
January - September 2015										
Provided to the Marine Shipping Working Group										
7-8 October 2015										
Note: This short version gives totals for 2013/4. Long Version has values for each month.										
Vessel ARRIVALS to Los Angeles and Long Beach										
	North		West		South		East		Total	Month
	Santa Barbara Channel		Pacific Missile Test Range (NAVAIR Ranges) ("back side of Channel Islands")		South America, Panama Canal, Mexico & San Diego		El Segundo (Chevron Offshore Terminal)			
<b>2013</b>										<b>2013</b>
June- December										
7 Month Total/Percent	896	34%	825	31%	864	33%	64	2%	2649	7 Month Total/Percent
<b>2014</b>										<b>2014</b>
January- December										
12 Month Total/Percent	1486	34%	1238	28%	1600	36%	101	2%	4425	12 Month Total/Percent
<b>2015</b>										<b>2015</b>
January	115	36%	84	26%	119	37%	5	2%	323	January
February	107	33%	61	19%	151	46%	9	3%	328	February
March	154	39%	79	20%	159	40%	6	2%	398	March
April	144	39%	68	19%	144	39%	11	3%	367	April
May	164	44%	74	20%	130	35%	6	2%	374	May
June	145	39%	84	23%	133	36%	7	2%	369	June
July	164	44%	83	22%	117	32%	6	2%	370	July
August	159	41%	88	23%	133	35%	4	1%	384	August
September	162	45%	77	21%	116	32%	8	2%	363	September
January-September										
9 Month Total/Percent	1314	40%	698	21%	1202	37%	62	2%	3276	8 Month Total/Percent
Vessel DEPARTURES from Los Angeles and Long Beach										
	North		West		South		East		Total	Month
<b>2013</b>										<b>2013</b>
June- December										
7 Month Total/Percent	780	31%	864	34%	855	33%	54	2%	2553	7 Month Total/Percent
<b>2014</b>										<b>2014</b>
January-December										
12 Month Total/Percent	1423	32%	1304	30%	1599	36%	94	2%	4420	12 Month Total/Percent
<b>2015</b>										<b>2015</b>
January	77	29%	70	26%	113	42%	8	3%	268	January
February	70	28%	55	22%	117	46%	12	5%	254	February
March	111	31%	83	23%	155	44%	7	2%	356	March
April	108	33%	78	24%	127	39%	10	3%	323	April
May	143	41%	93	27%	109	31%	5	1%	350	May
June	128	38%	87	26%	113	34%	7	2%	335	June
July	138	39%	95	27%	117	33%	4	1%	354	July
August	159	44%	79	22%	115	32%	5	1%	358	August
September	138	42%	71	22%	110	34%	7	2%	326	September
January-September										
9 Month Total/Percent	1072	37%	711	24%	1076	37%	65	2%	2924	9 Month Total/Percent
Notes:	1	Arrival and Departure totals are not equal because ships may remain inport or at anchor, or depart by a different route than their arrival route.								
	2	East reflects local movements between the Ports of Los Angeles and Long Beach and adjacent anchorages, and the Chevron Offshore Terminal at El Segundo.								
	3	Blue rows indicates new information since last CINSMAC meeting 18 September 2015.								
	4a	The 2013 and 2014 trend of arrivals and departures spread evenly (1/3, 1/3, 1/3) between the 3 approaches/departures (North, West, and								
	4b	In 2015, arrivals/departures from/to the North and South are up significantly, and arrivals/departures from/to the West are down significantly. There is a slow trend up to/from the South.								
	4c	The MX is presently unable to determine if the shift is due to the industry trend to fewer, larger ships; the Emissions Control Area change from 24 to 200 miles on 1 January 2015; or something else; or if the shift is temporary or permanent.								
	5	Congestion from October 2014 - May 2015, with as many as 36 ships anchored outside LA/LB and as many as a dozen drifting off Mexico, all awaiting berth, may skew traffic patterns during that 8 month period.								
	6	12 month Total row accounts for ships that arrived one month & departed next; the monthly counts do not.								
POC:		Captain J. Kipling Louttit, Executive Director, 310-519-3127 or klouttit@mssocal.org								