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September 5, 2014

To: Coastal Commissioners and Interested Parties

From: Alison Dettmer, Deputy Director
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Subject: Reducing Ship Strikes to Whales

Summary

The Channel Islands National Marine Sanctuary (“CINMS”) Advisory Council has been researching and working towards solutions to the problem of ship strikes in the Santa Barbara Channel since the 2007 deaths of several blue whales. The Commission’s South Central Coast District Office staff sits on the Advisory Council. In February 2008, the Advisory Council’s Conservation Working Group developed a report and recommendations for the CINMS on the issue of ship strikes to whales. Among the solutions recommended in that report are vessel speed reductions and reconfiguration of the shipping lanes in the Santa Barbara Channel (called the Traffic Separation Scheme or TSS) away from known areas with high densities of large whales.

On June 1, 2013, with the support of CINMS, the U.S. Coast Guard and International Maritime Organization amended the Santa Barbara Channel TSS to avoid areas of likely large whale aggregations by shifting the south-bound TSS lane one nautical mile away from CINMS. On July 1, 2014, CINMS, the Santa Barbara County Air Pollution Control District, and the Environmental Defense Center also started a trial vessel speed reduction incentive program aimed at lowering the speed of shipping traffic in the Santa Barbara Channel and reducing vessel emissions and ship strikes. The incentive is \$2500 per trip for approved shipping companies that demonstrate a speed reduction to 12 knots or less from Pt. Conception to the beginning of the Ports of Los Angeles and Long Beach speed reduction program area (40 nautical miles from Pt. Fermin in Palos Verdes).

The CINMS Advisory Council is also working to establish a Shipping Working Group to continue evaluating the issue of ship strikes and to develop additional measures to minimize their occurrence and impact. This working group would include a wide range of stakeholders including marine mammal researchers, the shipping industry, US Navy, and representatives of state and federal resource agencies, including Commission staff.

Background

Between September and November of 2007, five blue whale fatalities occurred in the Santa Barbara Channel. Of the four whales examined, at least three had been struck by ships and sustained injuries that were thought to have resulted in their deaths (CINMS Advisory Council 2008). Although similar issues had been recognized elsewhere in the U.S. (most notably with critically endangered North Atlantic right whales near the Stellwagen Bank National Marine Sanctuary), considering the small area and short time period of this occurrence, it was one of the most significant recorded events of ship strike mortalities to endangered whales in California.

Three years later, between July and October 2010, two blue whales, one humpback, and two fin whales were found dead in and around Monterey Bay, Gulf of the Farallones, and Cordell Bank National Marine Sanctuaries. Accordingly, mortality from ship strikes has been identified as a threat to population recovery of these vulnerable whale species. Large whale distribution in coastal areas often coincides with ship traffic and in certain areas also overlaps with shipping traffic lanes.

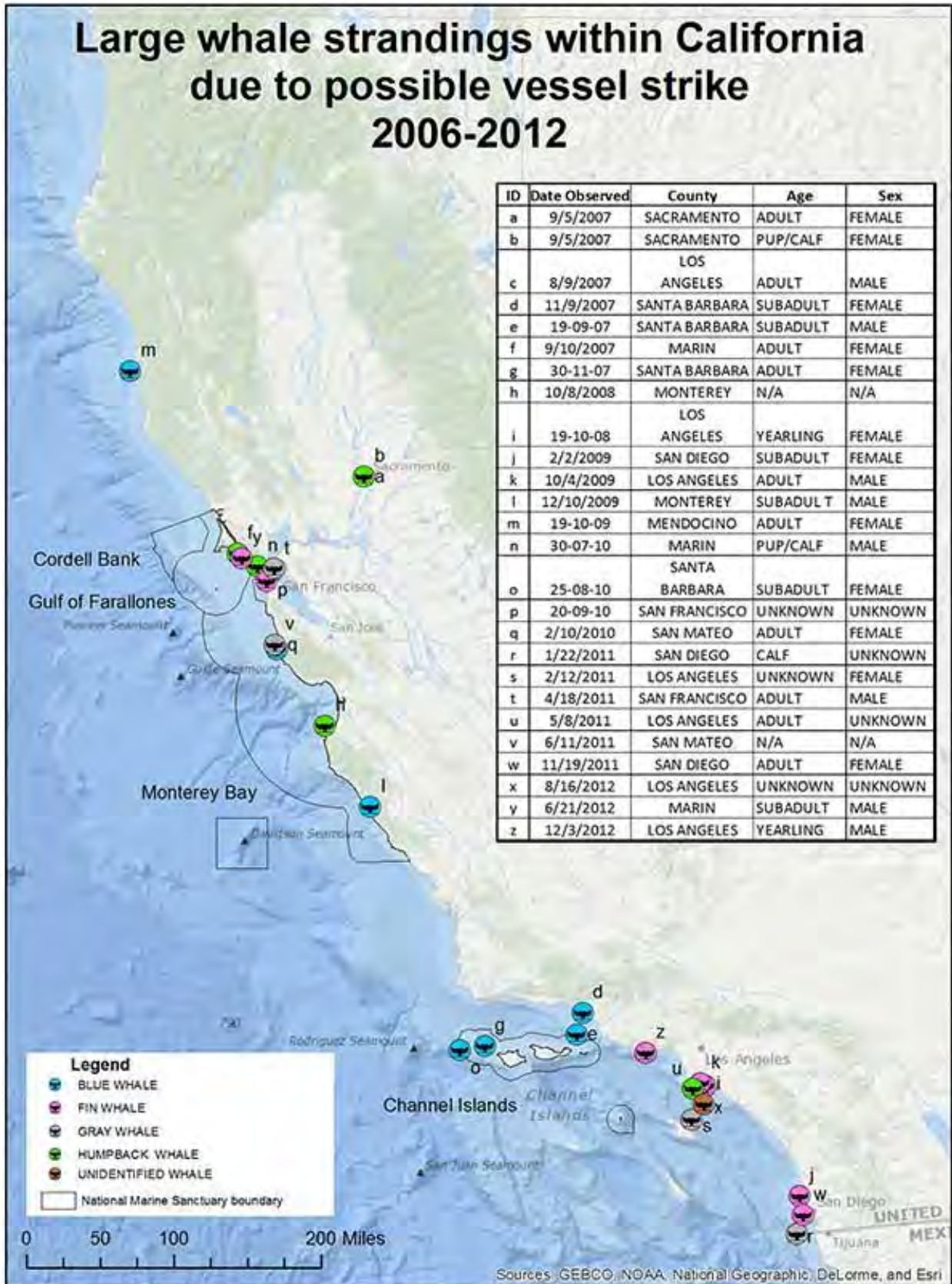
Large whales are vulnerable to collisions with all vessel types, sizes, and classes throughout the world's oceans. In California, ship strikes of gray whales are the most commonly reported followed by fin, blue, humpback, and sperm whales (NOAA 2014). When large vessels such as container ships strike whales, the ship crew may be unaware a strike has occurred due to the size and power of the vessel (as shown in the images below). Additionally, many large whales sink before stranding or washing up on a beach. As such, the number of ship strikes to whales is likely under reported, potentially by as much as a factor of between five and fifty (Kraus et al. 2005, Williams et al. 2011). Between 1988 and 2012, there were 100 documented large whale ship strikes along the California coast (NOAA 2014). Estimates of the number of whales struck by ships each year offshore of California (corrected for the low likelihood of detection) include as many as 6 humpback whales, 11 blue whales, and 7 fin whales (Redfern et al. 2013).



(Photos: (left): A. Schulman-Janiger (right): P. Chinn/The Chronicle)

The figure below from the Monterey Bay National Marine Sanctuary shows the 26 large whale strandings that occurred in California between 2006 and 2012 and are believed to be associated with ship strikes.

Large whale strandings within California due to possible vessel strike 2006-2012



The CINMS and its Advisory Council (which includes Coastal Commission staff representatives) began investigating the issue of ship strikes and large whales shortly after the blue whale mortalities in and around the CINMS during the fall of 2007. In February 2008 the CINMS Advisory Council released a report titled *Reducing Ship Strikes on Large Cetaceans in the Santa Barbara Channel and Channel Islands National Marine Sanctuary*. This report proposed the establishment of a working group focused on this issue and identified a variety of initial research and data needs and potential impact minimization strategies. These strategies included increased use of on-board marine mammal observers, ship speed reductions, modifications to shipping lanes, and distribution of recent whale sighting data to the shipping industry. The report also suggested additional outreach, education, and research.

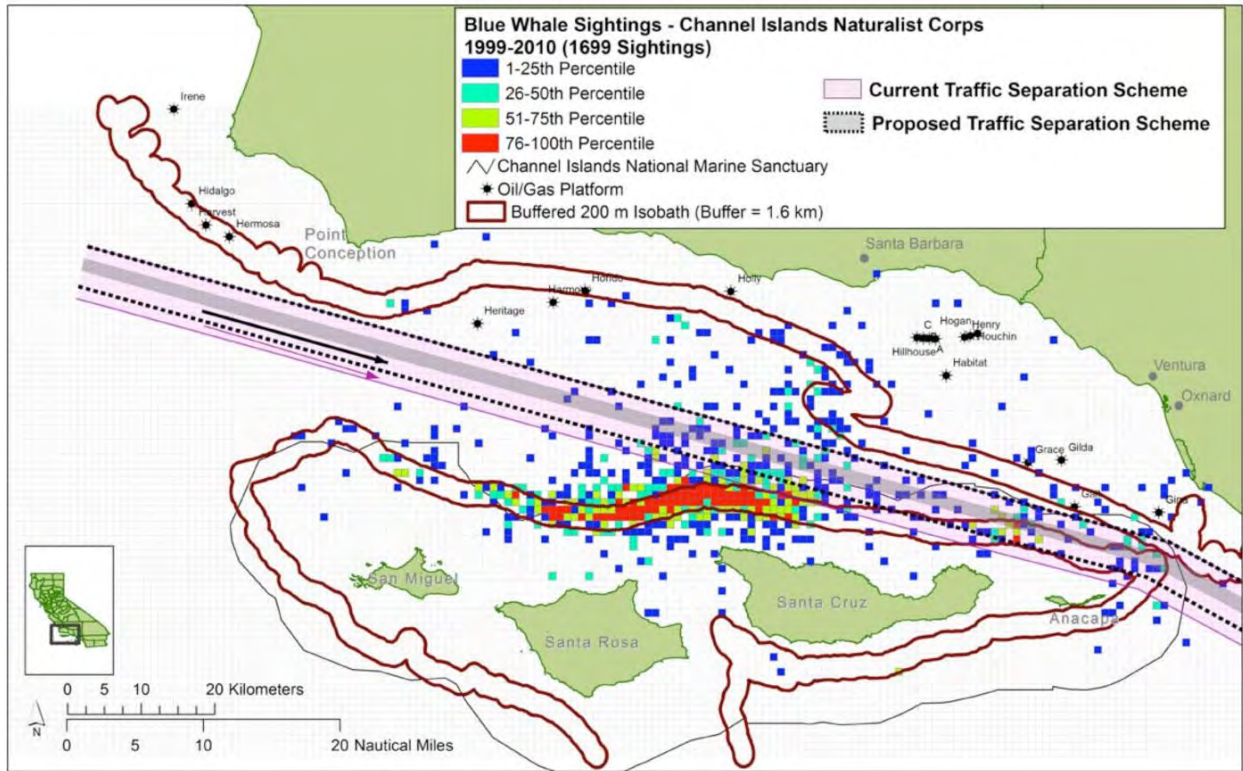
Subsequent to the release of this report, the CINMS and other organizations and agencies took the following steps: (1) modified the location of shipping lanes that service both the San Francisco Bay Area and Ports of Los Angeles and Long Beach; (2) initiated an incentive program to encourage speed reductions for oceangoing vessels entering and leaving the Ports of Los Angeles and Long Beach; (3) collected recent whale sighting information and dissemination to interested parties (researchers, shipping industry, U.S. Coast Guard, etc.); and (4) developed a stakeholder working group to evaluate and consider additional measures to further reduce the occurrence of ship strikes in Southern California. Each step is discussed in more detail below.

Modified Shipping Lanes

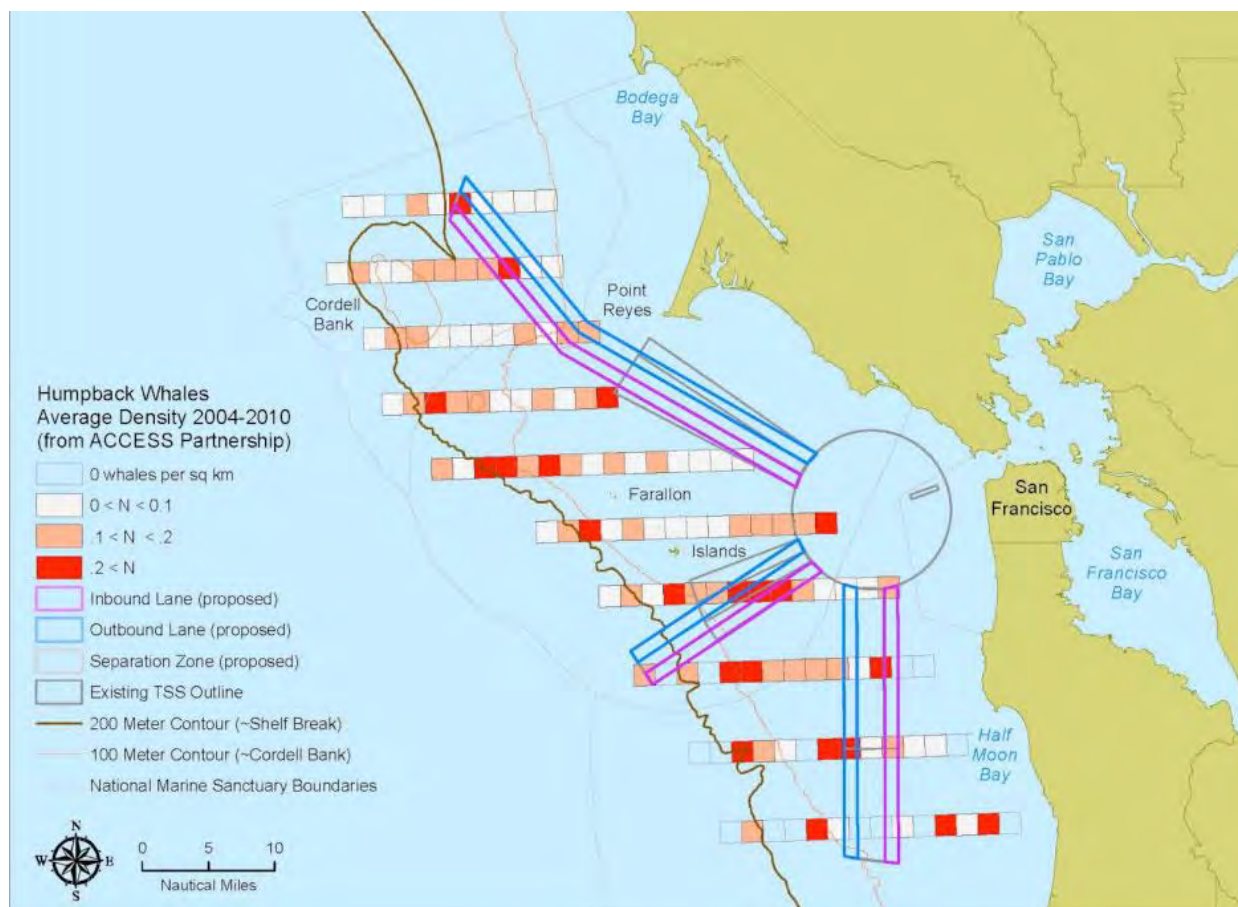
In areas of heavy shipping traffic such as confined channels and surrounding the entrances to ports, the U.S. Coast Guard and International Maritime Organization develops specified shipping lanes to reduce potential collisions between inbound and outbound vessels. These lanes, called Traffic Separation Schemes (TSSs), were established several decades ago north and south of the Golden Gate Bridge, in the Santa Barbara Channel, and surrounding San Pedro Bay near the Ports of Los Angeles and Long Beach. Since initial establishment of these TSSs, shipping patterns have shifted (both to keep pace with growing demand for products transported by oceangoing vessels and in response to air quality regulations focused on emissions from large container ships and tankers). Additionally, scientific understanding of large whale densities and spatial use patterns has also evolved. These changes combined with growing concerns about the occurrence and consequences of ship strikes prompted a recent reassessment of the location and configuration of TSSs in both northern and southern California.

A key component of this reassessment was the use of large whale spatial use data collected in recent years to determine if large whale density “hotspots” existed in or around TSS lanes. As shown in the figures below, sighting and whale density data collected for large whales around TSSs suggested that in several locations the TSS lanes pass through and in close proximity to areas in which large whales have been consistently observed. This research combined with long- and short-term tracking information from individual whales indicated that slight relocations of the TSS lanes around the mouth of San Francisco Bay and in the Santa Barbara Channel may effectively reduce the occurrence of ship strikes in these areas without significantly impacting shipping traffic and safety.

Memorandum on Reducing Ship Strikes
 September 5, 2014



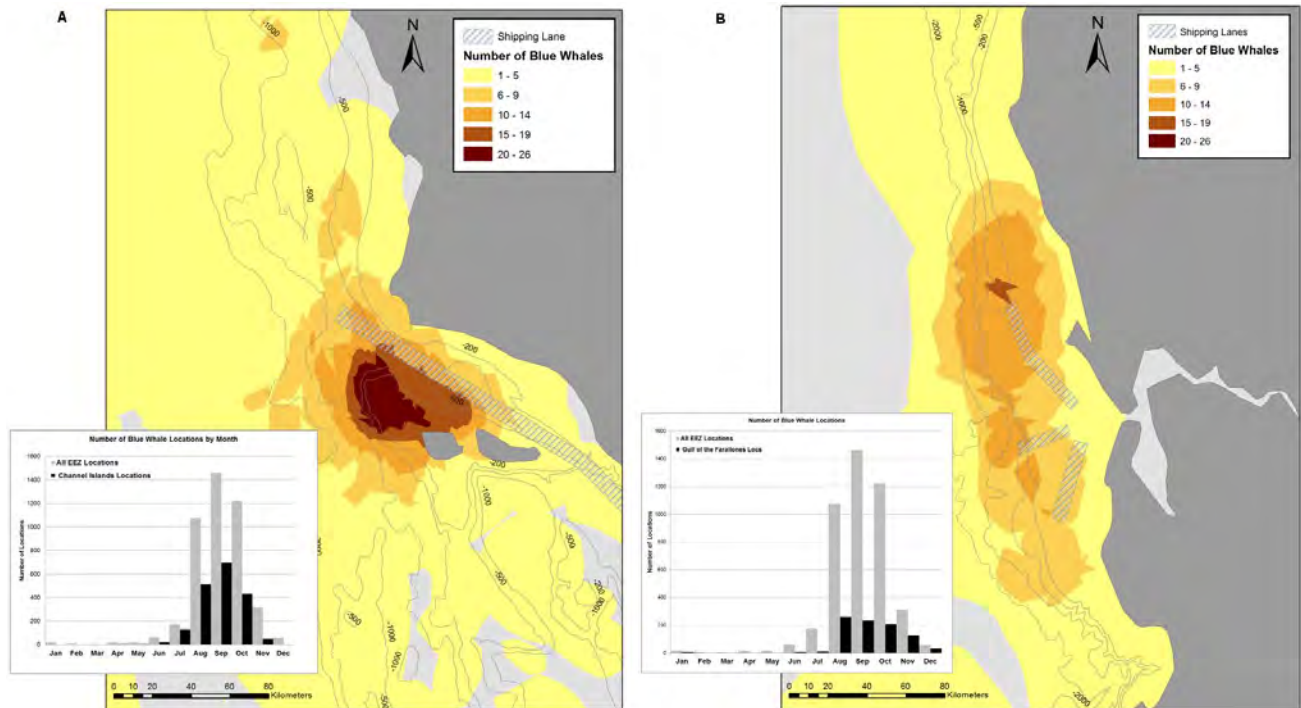
Memorandum on Reducing Ship Strikes
September 5, 2014



As a result of this TSS reassessment process, in June 2013, the U.S. Coast Guard and International Maritime Organization adopted a series of modifications to TSSs in northern and southern California to address the issue of ship strikes. These modifications closely follow the proposed changes noted in the figures above.

Despite these changes, however, the issue remains that there are areas with consistent large whale presence in close proximity to areas with heavy shipping traffic. The figures below are excerpted from a recent research paper by Irvine et al. (2014) that used short- and long-term GPS tracking of blue whales to establish core areas of use for these animals.

Memorandum on Reducing Ship Strikes
September 5, 2014



While the research by Irvine et al. (2014) strongly demonstrates the importance further refining spatial management measures for shipping (such as TSSs) as new information becomes available, it also indicates some of the limitations of this approach. Although consistent spatial use patterns can emerge for individual animals or populations on a seasonal or annual time-scale, these patterns can also vary significantly on shorter (daily/weekly) scales or over time based on oceanographic conditions and other less-well defined factors. Further, the ability to significantly modify TSSs is often very limited in locations with a large number of other spatial constraints, such as the Santa Barbara Channel with its islands and offshore oil rigs. These factors suggest that additional steps beyond spatial management may also be needed to reduce the occurrence and consequences of ship strikes.

Speed Reduction Incentive Program

Research carried out at Stellwagen Bank National Marine Sanctuary on the relationship between ship speed and the occurrence and severity of ship strike injuries to whales indicates that whale mortalities decline substantially when vessel speeds are at or below 10 knots (Vanderlaan and Taggart 2007, Wiley et al. 2011, Conn and Silber 2013). This research and concern about the impacts of ship strikes on North Atlantic right whales prompted NOAA in 2008 to establish a 10 knot speed limit for vessels of 65 feet or greater at certain times and locations along the U.S. east coast where right whales feed, migrate or reproduce. NOAA credits this regulation with significantly reducing ship strike fatalities. As Mark Schaefer, deputy NOAA administrator and assistant secretary of commerce for conservation and management, notes,

Since the ship speed restrictions went into effect, no known fatal ship strikes of North Atlantic right whales have occurred in the management zones. This rule is working.

Memorandum on Reducing Ship Strikes
September 5, 2014

Before this rule went into effect, 13 right whales died as a result of being hit by vessels in the same areas during an 18-year study period (SBNMS 2013).

The effectiveness of speed reduction is also supported by modeling results that estimate that vessel speed restrictions reduced total ship strike mortality risk levels to North Atlantic right whales by 80–90% (Conn and Silber 2013).

Although no speed regulations are in place in California waters for large oceangoing vessels, several voluntary incentive programs have been developed to reduce ship speeds. The first of these programs was developed by the Ports of Los Angeles and Long Beach (Ports) in 2008 as an air quality improvement strategy – vessel emissions of greenhouse gases and smog-forming pollutants are minimized at speeds of approximately 9 to 12 knots (Lindhjem et al. 2014). This program was initially focused on vessels approaching within 20 nautical miles of the Ports.

Based on the success of this program the Ports expanded it in 2009 to include the area within 40 nautical miles San Pedro Bay, as shown in the figure below. Compliance is evaluated by the Marine Exchange of Southern California (a shipping traffic control organization) and between January and June of 2014 approximately 98% of vessels entering and leaving the Ports were in compliance with the 20 nautical mile program and 88% were in compliance with the 40 nautical mile program (Port of Los Angeles 2014). Vessel operators are provided with a per trip cash incentive of between \$2500 and \$6000 for exceeding 90% compliance (i.e. if 90% or more of their vessel visits to the Ports comply with the speed reductions) (Port of Los Angeles 2009, Port of Long Beach 2010).



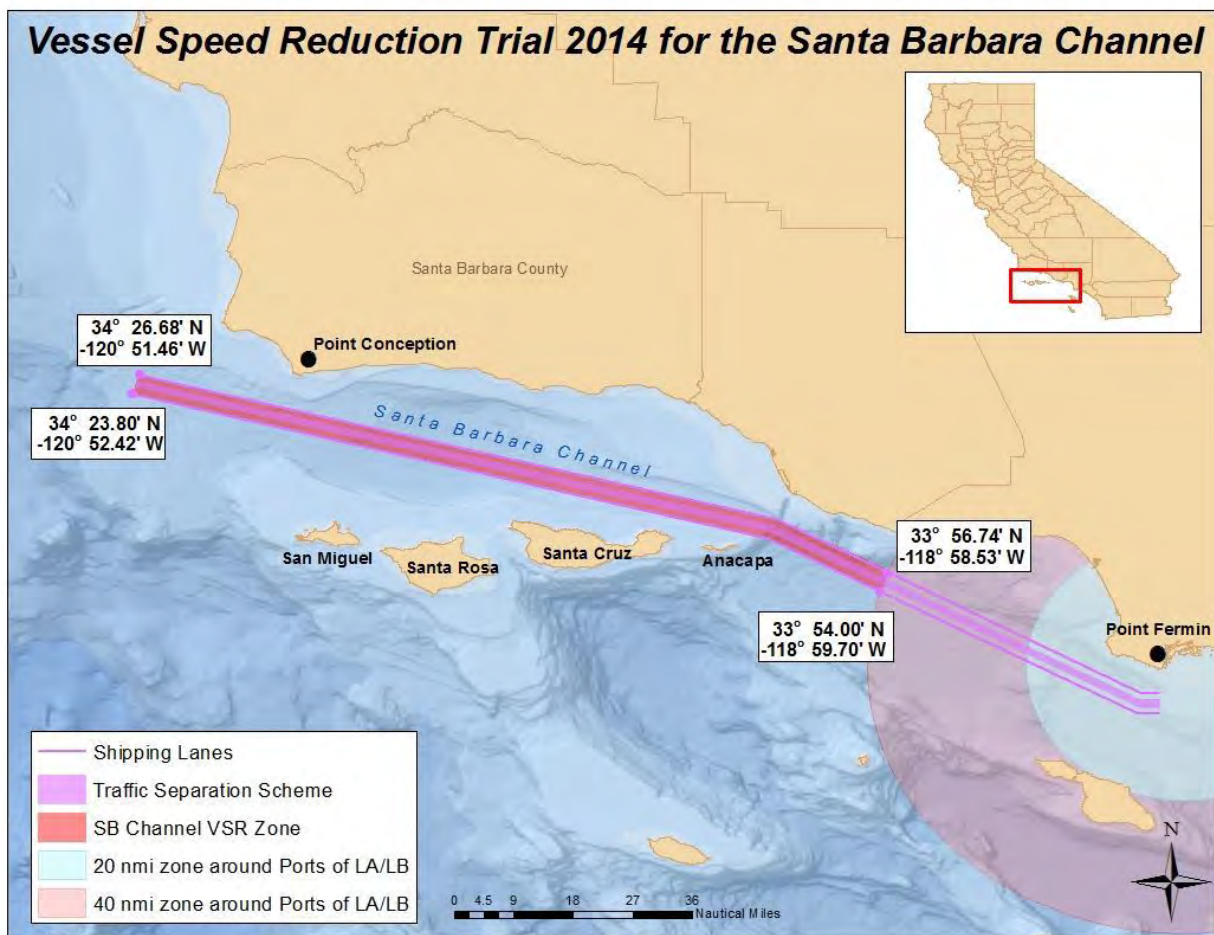
Emission reductions from these programs are estimated at over 50% per vessel for carbon dioxide and smog-forming nitrogen oxides (Khan et al. 2012). Although this emissions reduction is the intent of the program and it was not developed to protect whales from ship strikes, research on the benefits to whales from speed reductions suggests that voluntary compliance with the 20 and 40 nautical mile “slow-down zones” is likely reducing the likelihood and consequences of ship strikes in these areas.

Building off of the success of the vessel speed reduction program at the Ports of Los Angeles and Long Beach, the Port of San Diego in 2009 launched a similar program.

In addition, the CINMS, the Santa Barbara County Air Pollution Control District, and Environmental Defense Center initiated a pilot vessel speed incentive program in July of 2014 to

Memorandum on Reducing Ship Strikes
September 5, 2014

encourage shipping traffic to reduce speed to 12 knots in the Santa Barbara Channel (the area between Point Conception and the 40 nautical mile speed reduction zone established by the Ports). This program will be in place from July through October of 2014 and will be evaluated and potentially continued based on the results of that evaluation (SBAPCD et al. 2014). Based on the strong positive response to the program and interest from the shipping industry – the program administrators received over 60 requests for the six incentives initially available – it appears to have the potential to continue into the future. Full program evaluation will need to also consider quantification of estimated emission and ship strike mortality reductions, however. The modeling and analysis methodology developed by Wiley et al. (2011), Conn and Silber (2013), and Wiley et al. (2014) will likely provide a useful approach for the program administrators to consider.

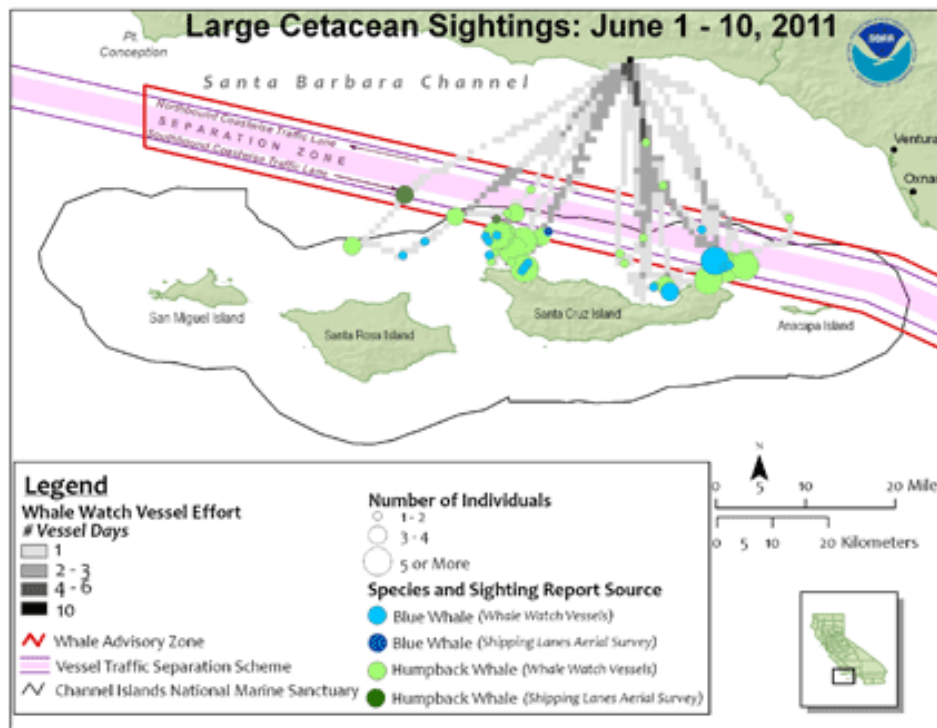


Monitoring and Reporting

An additional ship strike reduction measure in use at CINMS is the compilation and dissemination of whale location information. The CINMS established a Whale Advisory Zone south of Point Conception and through the Santa Barbara Channel to Point Dume. Sanctuary staff monitors, collects, and compiles whale sighting data in and around this area. Common data sources include information from aerial surveys conducted by NOAA, the U.S. Coast Guard,

Memorandum on Reducing Ship Strikes
September 5, 2014

California Department of Fish and Wildlife, and U.S. Navy chartered aircraft. Whale sightings are also reported by the Channel Islands Naturalist Corps volunteers aboard local whale watch and tour operator vessels. Information on seasonal presence, movement and general distribution patterns of large whales is shared with mariners, the NMFS Office of Protected Resources, U.S. Coast Guard, California Department of Fish and Wildlife, the Santa Barbara Museum of Natural History, the Marine Exchange of Southern California, and whale scientists. This information helps direct research efforts and provides advance notice to mariners when feeding aggregations and other high density concentrations of large whales are located near the TSS lanes. The figure below shows a data product developed by CINMS staff from whale sighting information (NOAA 2014).



A recent addition to this information collection and sharing program is the “Spotter” mobile app that facilitates the reporting and dissemination of wildlife location information. Spotter was developed in partnership with EarthNC, west coast sanctuaries, NOAA Fisheries, Point Blue Conservation Science (formerly PRBO Conservation Science), and the Pacific Merchant's Shipping Association (PMSA). The Spotter app streamlines collection of marine mammal sightings from commercial, whale watching and recreational boaters using smart phones and tablets.

Stakeholder Working Group

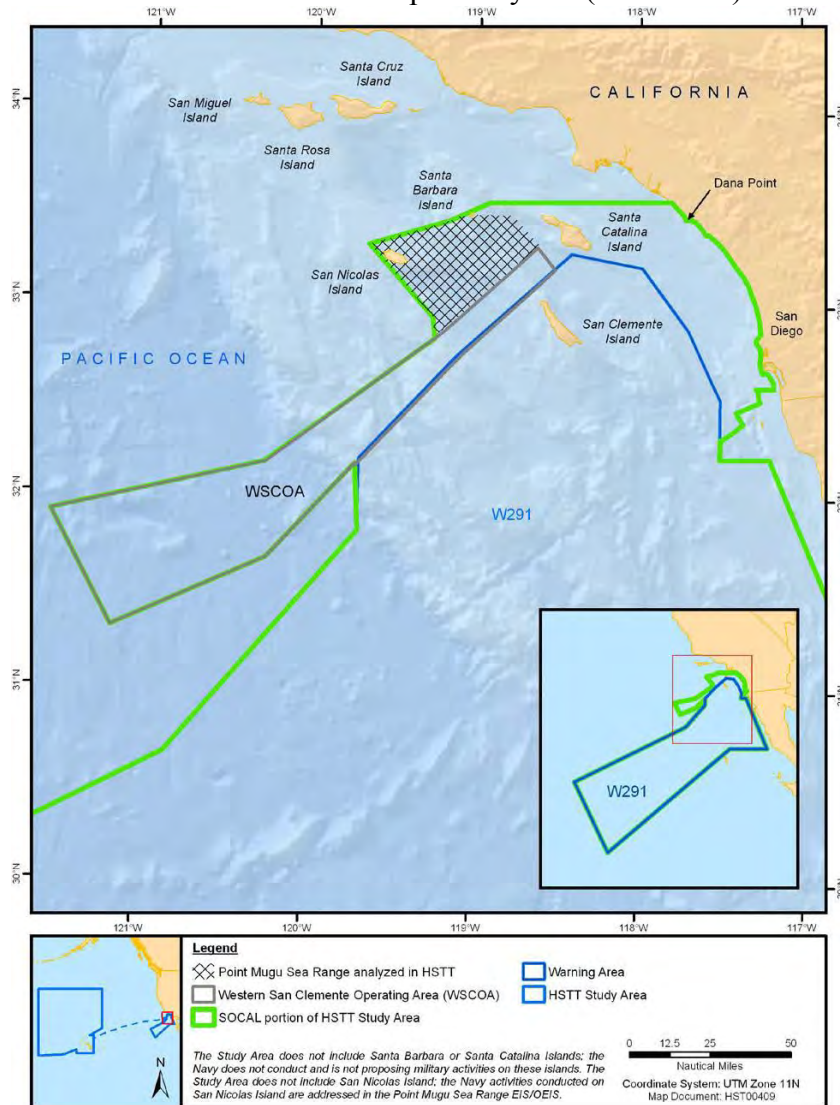
In addition to the spatial management and vessel speed reduction approaches outlined above, the CINMS Advisory Council is also working to convene a Shipping Working Group to consider the successes and challenges of these efforts and to continue evaluating the issue of ship strikes with an eye towards developing additional measures to minimize their occurrence and impact. This working group would include a wide range of stakeholders including marine mammal

Memorandum on Reducing Ship Strikes
 September 5, 2014

researchers, the shipping industry, US Navy, and representatives of state and federal resource agencies, including Coastal Commission staff. Funding is currently being sought to provide this working group with sufficient resources to meet and consider these issues.

Location of U.S. Navy Training and Testing

U.S. Navy training and testing activities in southern California are principally concentrated in the “SOCAL Range Complex” located south of the Santa Barbara Channel and typically avoid TSS shipping lanes, as shown in the figure below. U.S. Navy and NOAA reports suggest that approximately 16 marine mammal mortalities have resulted from strikes by Navy vessels offshore of California over the past 20 years (CCC 2013).



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Memorandum on Reducing Ship Strikes
September 5, 2014

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