



Protecting Blue Whales and Blue Skies



Report on the 2014 Vessel Speed Reduction Incentive Trial in the Santa Barbara Channel

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March 2015

ACKNOWLEDGEMENTS

We would like to acknowledge the many contributors that assisted with the trial program:

Channel Islands National Marine Sanctuary
Santa Barbara County Air Pollution Control District
Environmental Defense Center
National Marine Sanctuary Foundation
Ventura County Air Pollution Control District
Pacific Merchant Shipping Association
Marine Exchange of Southern California

Special thanks to the shipping lines that participated in the trial program:

COSCO
Hapag-Lloyd
K Line
Maersk Line
Matson
Mitsui O.S.K. Lines
United Arab Shipping Company

EXECUTIVE SUMMARY

Overview

In 2014, the Channel Islands National Marine Sanctuary, the Santa Barbara County Air Pollution Control District, and the Environmental Defense Center launched a trial incentive program to slow ships down in the Santa Barbara Channel to reduce air pollution and protect endangered whales. The trial was based on existing successful ship speed reduction programs at the Ports of Los Angeles and Long Beach.

Seven global shipping companies participated in the effort and slowed 27 transits to 12 knots or less from July through November in the reduced speed zone, with most of the transits occurring between July to October. This time period coincides with the busiest whale season and the prime period for high levels of ozone air pollution. The program achieved more than 16 tons of ozone-forming nitrogen oxides emissions reductions from the 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.

The trial demonstrated the willingness of shipping companies to participate in a voluntary, non-regulatory, non-port program, and the feasibility of implementing such a vessel speed reduction program in the Santa Barbara Channel. The success of the trial also provides a solid foundation for a future larger-scale program.

Issue

Each year, thousands of large container ships going to and from the Ports of Los Angeles and Long Beach travel in designated shipping lanes through the Santa Barbara Channel. Air emissions from these vessels are a significant source of air pollutants in Ventura and Santa Barbara counties, including ozone-forming nitrogen oxides, sulfur dioxide, greenhouse gases, diesel particulate matter, and other toxic air pollutants that are hazardous to human health. Fatal ship strikes on endangered whale species, including blues, fins, and humpbacks, which feed and travel in and around the shipping lanes seasonally, are another impact of ocean going vessels. Within the Channel, pollution and endangered whale concerns from ship traffic may start to become more pronounced. Annual transits are expected to increase to pre-recession numbers as a result of more stringent North American Emissions Control Area fuel requirements that took effect on January 1, 2015. Ozone pollution concerns will also be heightened with a stricter federal ozone standard on the horizon.

Goals for the Vessel Speed Reduction (VSR) Trial Program

Slowing ships down reduces the chances that a ship strike on a whale will be fatal, and substantially reduces air emissions. Overall goals of the Vessel Speed Reduction Trial were to:

- assess potential air quality and whale protection benefits from a voluntary speed reduction program in the Santa Barbara Channel
- test the shipping industry's willingness to participate in this kind of a program
- refine data collection and tracking mechanisms
- lay the foundation for establishing a larger-scale program in the future

Program Implementation

Ships selected for the VSR Trial reduced average speeds to 12 knots or less (from typical speeds of 14-18 knots) as they traveled between Point Conception and the Ports of Los Angeles and Long Beach. Companies with participating vessels that achieved the reduced speed through the Channel received a \$2,500 incentive per enrolled transit. The companies also received recognition for participation in the VSR Trial through a public relations campaign by the partners.

The VSR Trial was developed and implemented by staff from the partner agencies and organizations. The National Marine Sanctuary Foundation served as a fiscal agent for receiving funds and making incentive payments. Funding was provided by the Santa Barbara Foundation, the Santa Barbara County Air Pollution Control District, and the Ventura County Air Pollution Control District. Payments were provided to the shipping lines upon verification of the ships' speeds through the Channel by using Automatic Identification System monitors that received vessel speed and location data from transponder signals emitted by ships as they transited the Channel.

We received enrollment forms from eight different shipping companies for 89 transits. After we determined eligibility to participate, seven of the eight shipping companies enrolled, including: COSCO, Hapag-Lloyd, K Line, Maersk Line, Matson, Mitsui O.S.K. Lines, and United Arab Shipping Company. During the enrollment period, we received more applications for eligible transits (40) than we could incentivize. In total, 35 transits were enrolled in the VSR Trial and 27 of these qualified for an incentive payment, with a total incentive payout amount of \$67,500. We calculated a 5.1-knot average reduction from baseline speeds for the 27 eligible transits.

The VSR Trial achieved a 50 percent reduction in nitrogen oxide and greenhouse gas emissions in the reduced speed zone. No known ship strikes on whales by participating vessels occurred. The VSR Trial's design, enrollment process, and data collection/processing mechanisms were refined throughout, and a solid foundation is in place for establishing a larger-scale program.

Given the success of the VSR Trial, the next step is to explore ways to expand the program in the future to include more vessels and possibly a larger geographical scope on a long-term basis.

1. VESSEL SPEED REDUCTION TRIAL PROGRAM OVERVIEW

Currently, approximately 2,500 large container ships go to and from the Ports of Los Angeles and Long Beach (Ports) each year via designated shipping lanes through the Santa Barbara Channel. The engines on these ships emit large amounts of air pollutants that can impact onshore air quality. For instance, ship emissions in the Channel account for more than 50 percent of smog-forming nitrogen oxides (NO_x) in Santa Barbara County¹ (see Appendix B: Figure 1), and more than 25 percent in Ventura County² (see Appendix B: Figure 2). Smog contains ozone, which causes respiratory problems and affects lung development in children. The Channel is also a seasonal feeding ground and migration path for endangered whale species, including hundreds of blue, fin, and humpback that feed and travel in and around the shipping lanes, making them vulnerable to ship strikes (see Appendix B: Figure 3).

In 2014, Channel Islands National Marine Sanctuary (CINMS or Sanctuary), the Santa Barbara County Air Pollution Control District (SBCAPCD), and the Environmental Defense Center (EDC) launched a new trial incentive program (VSR Trial) to slow ships down in the Santa Barbara Channel, in an effort to reduce air pollution and increase protection of endangered whales.

Slowing ships down reduces engine load and fuel consumption, substantially lowering the amount of air pollution. Researchers at the University of California at Riverside measured stack emissions of ships in transit, and quantified an approximate 50 percent reduction in emissions when speeds were reduced to 12 knots from regular cruising speeds. The study, titled “Greenhouse Gas and Criteria Emission Benefits through Reduction of Vessel Speed at Sea,” was published in 2012.³ In addition, this slower speed also greatly reduces the chances that a ship strike on a whale will be fatal.⁴

Ships selected for the program reduced average speeds to 12 knots or less (from typical speeds of 14-18 knots), as they traveled between Point Conception and the Ports from July through November 2014, with most of the transits occurring between July to October. This time period coincides with the busiest whale season and the prime period for high levels of ozone air pollution. We chose 12 knots to be consistent with the Ports’ slow speed incentive programs that have a 12 knot limit (described in more detail below) so the ships could maintain a constant speed to/from the Ports. Companies with participating vessels that transited the Channel at the reduced speed received a \$2,500 incentive per enrolled transit. In addition to the financial incentive, we conducted a public relations campaign to draw recognition to the shipping companies that participated.

Shipping lines had to meet two criteria for pre-enrollment in the VSR Trial: 1) transit the Channel at an average baseline speed of 14 knots or greater during the 6 months prior to the VSR

¹ <http://www.ourair.org/air-pollution-marine-shipping/>

² <http://www.arb.ca.gov/ei/emissiondata.htm>

³ Khan, M., Agrawal, H., Ranganathan, S., Welch, W., Miller, J., & Crocker III, D. 2012. Greenhouse gas and criteria emission benefits through reduction of vessel speed at sea. *Environmental Science & Technology*. 46: 12600-12607.

⁴ Vanderlaan, A., & Taggart, C. (2007). Vessel collisions with whales: the probability of lethal injury based on vessel speed. *Marine Mammal Science*. 23(1): 144-156.

Trial (to achieve at least a 2 knot speed reduction and thus a measurable reduction in emissions); and 2) already be enrolled in the Ports' programs, so as to not create competition between the incentive programs. CINMS and SBCAPCD confirmed eligibility by calculating average baseline speeds across the 6 months prior to the VSR Trial using speed data from the Automatic Identification System (AIS). AIS is an automatic tracking system used on ships that transmits data to base stations located on land. Enrollment in the Ports' Vessel Speed Reduction programs was confirmed by viewing operator summaries available on the Ports' websites.

The VSR Trial was modeled after similar successful programs at the Ports of Los Angeles and Long Beach, where 90 percent of shipping lines participate. The Ports' programs were first established in 2001, with a Memorandum of Understanding between the Ports, U.S. Environmental Protection Agency, California Air Resources Board, South Coast Air Quality Management District, Steamship Association of Southern California, and Pacific Merchant Shipping Association. The goal of the programs is to reduce NO_x emissions from ocean going vessels by reducing vessel speeds to 12 knots or less as they approach or depart the Ports, starting at either 20 or 40 nautical miles from Point Fermin in San Pedro, CA (see Figure 1.1: VSR Trial Location).⁵ Unlike the Santa Barbara Channel Program, the Ports' programs only objective is to decrease air emissions; they were not implemented with the intention to reduce threats to whales. It is important to note that a larger-scale Channel program could effectively create a continuous slow speed corridor nearly three times the span of the Ports' existing speed reduction zone.

1.1 VSR Trial Goals

The Santa Barbara Channel VSR Trial's goals were to:

- assess potential air quality and whale protection benefits from a voluntary, incentive-based speed reduction program in the Santa Barbara Channel
- test the shipping industry's willingness to participate in this kind of a program
- refine data collection and tracking mechanisms
- lay the foundation for establishing a larger-scale program in the future

1.2 Air Quality Background

Air pollution is hazardous to human health. It also diminishes the yield and quality of many agricultural crops, reduces atmospheric visibility, degrades soils and materials, and damages native vegetation. State and national ambient air quality standards are established to protect public health and welfare, and minimize the effects mentioned above. These standards pertain to pollutants in ambient air, the air that people breathe outside of buildings as they go about their daily activities.

The federal government has established National Ambient Air Quality Standards to protect public health. There are state and national standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead. Santa Barbara County does not meet the state ambient air quality standard for ozone. Moreover, Ventura County does not meet the state or the federal ozone standards. Based on the amount of NO_x emissions from shipping activities

⁵ <http://www.portoflosangeles.org/environment/ogv.asp>

in the Santa Barbara Channel, the Ventura County Air Pollution Control District joined the VSR Trial program in September 2014.

Large container ships transiting the Santa Barbara Channel (with approximately 2,500 transits per year) are a significant source of air pollution in Santa Barbara and Ventura Counties. In addition to NO_x, Channel ship traffic is a significant source of other air pollutants such as sulfur dioxide, greenhouse gases, diesel particulate matter, black carbon, and other toxic air pollutants. Nitrogen oxides and the other air pollutants from ships in the Santa Barbara Channel are carried onshore into Santa Barbara and Ventura counties by prevailing winds.

Nitrogen oxides from ocean going vessels transiting the Santa Barbara Channel constitute over 54 percent (see Appendix B: Figure 1) of the nitrogen oxide emissions in Santa Barbara County, and nearly 30 percent in Ventura County (see Appendix B: Figure 2). As onshore NO_x emissions decrease in other sectors as a result of federal, state, and regional clean air initiatives, shipping emissions in the Santa Barbara Channel will represent an ever-increasing share of NO_x emissions in the two counties. In addition, in November 2014, the U.S. Environmental Protection Agency proposed tightening the federal ozone standard, making it even more important to find ways to achieve NO_x emissions reductions in the shipping sector.

The Santa Barbara County Air Pollution Control District first identified the contribution of marine shipping emissions to Santa Barbara County's air emissions in its 1994 *Clean Air Plan*, and has been working on initiatives to reduce these emissions ever since. Throughout 2008 and 2009, the District was a party in actions challenging the U.S. Environmental Protection Agency (EPA) to adopt standards for the control of air pollution from Category 3 marine vessel diesel engines under the federal Clean Air Act. Category 3 engines are large marine diesel engines used for propulsion on oceangoing vessels such as bulk carriers, cruise ships, tankers, and container ships.

The EPA ultimately adopted these standards and subsequently led a successful effort asking the International Maritime Organization to designate North America as an Emission Control Area (ECA), applying fuel and engine standards to ships traveling up to 200 nautical miles off the coast of North America. The California Air Resources Board (ARB) also issued a regulation that became effective before the ECA regulations, requiring ships traveling within 24 nautical miles of the California coast to use lower-sulfur fuel. The use of lower-sulfur fuels in ship engines significantly reduces emissions of particulates, sulfur, and air toxics, but does not significantly reduce NO_x emissions in the current fleet of ships. Under the ECA, standards for cleaner ship engines will result in NO_x reductions, but only in new ship engines. This means that NO_x reductions will be achieved from the shipping sector, but only slowly, over many years, as these new engines enter service. In the meantime vessel speed reduction (VSR) can produce substantial NO_x emission reductions in the Santa Barbara Channel and elsewhere in a near-term timeframe.

VSR produces immediate reductions in air pollutants, including NO_x. When cruising speeds are lowered, the load on an engine decreases, resulting in decreases in both fuel use and emission rates. The load curve is a steep curve (following the "propeller law"), and when speeds are much less than the maximum rated vessel speed, engine loads and emissions decline considerably. A 2012 University of California, Riverside study measured transit emissions from ship stacks

before and after slow down (from cruising speed down to 12 knots), and documented NOx reductions on the order of 55 percent.

1.3 Whale Conservation

About 30 species of cetaceans (whales, dolphins, and porpoises) have been observed in the Santa Barbara Channel, making it one of the most biodiverse regions in the world for cetaceans. Several endangered species are seasonal residents in and around the Channel, including blue, fin, and humpback whales throughout the summer months (see Appendix B: Figure 3).

The term "ship strike" refers to the act of a boat or ship hitting, or striking, a marine mammal. Ship strikes often go undetected by the crews of large ships, and some whale species sink immediately after they die, meaning that ship strikes by these large vessels are likely underreported.⁶ The number of whale strikes each year in the Channel region and California is difficult to determine. The large whales are negatively buoyant, which makes them great divers, but when they die from natural causes, ship strikes, or other factors, they may sink or drift away out of sight.⁷ Even when whale carcasses are discovered, the cause of death may be indeterminate, unless scientists are able to perform a necropsy (an autopsy on animals).⁶

In the fall of 2007, four blue whale fatalities due to vessel strikes were confirmed in the Santa Barbara Channel.⁸ This was an unusually high number of strikes in a short period of time, leading the National Marine Fisheries Service to declare it an Unusual Mortality Event (UME). The sanctuary, and its federal advisory council, embarked on developing an action plan in 2008 to guide a multi-agency effort on an annual basis. The plan, titled "Prevention and Emergency Response Plan for Reducing Ship Strikes on Blue Whales and Other Large Cetaceans in the Santa Barbara Channel and Channel Islands National Marine Sanctuary," is designed for use by NOAA and the U.S. Coast Guard to guide actions aimed at reducing ship strike risks, and responding to whale strandings.⁹ Reducing vessel speeds and exploring incentive-based approaches to do so were options described in the plan to reduce ship strike risks.

Aside from blue whales, several other species of baleen whales are also seriously threatened with extinction, and ship strikes are likely a significant source of mortality.⁸ Data from the California Marine Mammal Stranding Network shows a total of 212 large whale strandings were reported in California between 2001 and 2010.¹⁰ The cause of death is not known for all of them, though fatal collisions with ships are a likely factor in approximately 48 of these deaths. As stated above, it is very likely that more whales are hit by ships but are never seen and/or reported.

⁶ Douglas, A. B., Calambokidis, J., Raverty, S., Jeffries, S. J., Lambourn, D. M., & Norman, S. A. (2008). Incidence of ship strikes of large whales in Washington State. *Journal of the Marine Biological Association of the United Kingdom*. 88(6): 1121-1132.

⁷ Allison, P., Smith, C., Kukert, H., Deming, J., & Bennet, B. (1991). Deep-water taphonomy of vertebrate carcasses: A whale skeleton in the bathyal Santa Catalina Basin. *Paleobiology*, 17(1): 78-89.

⁸ Berman-Kowalewski, M., Gulland, F., Wilkin, S., Calambokidis, J., Mate, B., Cordaro, J., Rotstein, D., Leger, J., Collins, P., Fahy, K., & Dover, S. 2010. Association between blue whale (*Balaenoptera musculus*) mortality and ship strikes along the California coast. *Aquatic Mammals*. 36(1): 59-66.

⁹ http://channelislands.noaa.gov/management/resource/ship_management.html.

¹⁰ Large whale strandings recorded by the California Marine Mammal Stranding Network (2001- 2010).

1.4 VSR Trial Funding

In March 2014, the Santa Barbara Foundation initially contributed a \$20,000 planning grant to fund the VSR Trial; the SBCAPCD later committed up to \$40,900, in phases, starting in June 2014. Additionally, in September 2014, the Ventura County Air Pollution Control District (VCAPCD) joined the VSR Trial, committing an additional \$30,000, bringing the total amount of VSR Trial available funding to \$90,900. As a result of the matching funds, we were able to incentivize as many as 32 transits¹¹.

The National Marine Sanctuary Foundation served as the fiscal agent for the grant and Air District funds. Incentive payments of \$2,500 per one-way transit were distributed by the NMSF to companies with participating ships that pre-enrolled, and were verified to have traveled at an average speed of 12 knots or less through the Santa Barbara Channel. Of the \$90,900 in funding, \$80,000 was available for 32 participating vessels, and up to \$10,900 was available for NMSF overhead costs (12 percent of total program costs).

1.5 VSR Trial Location

Participating vessels agreed to maintain speeds at or below 12 knots between Point Conception, Santa Barbara County and the boundary of the Ports' VSR zone, located 40 nautical miles from Point Fermin in Los Angeles County (see Figure 1.1: Santa Barbara Channel VSR Trial location). The VSR Trial included vessels going northbound and southbound in the Santa Barbara Channel, in shipping lanes officially designated by the International Maritime Organization (IMO). The VSR Trial's zone covered approximately 100 nautical miles.

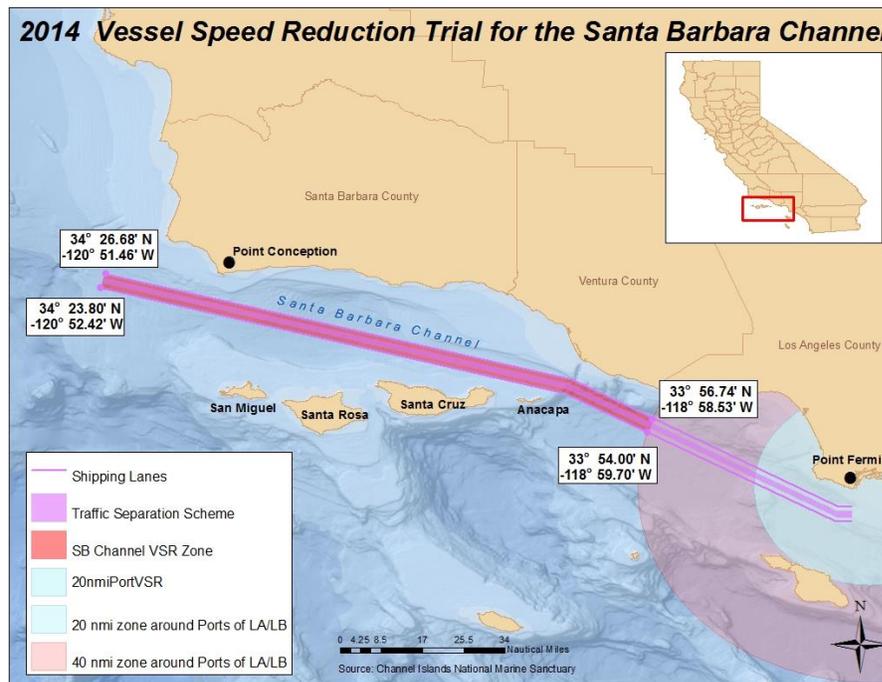


Figure 1.1: Santa Barbara Channel VSR Trial Location.

¹¹ As noted in the executive summary and listed in Table 3.1 below, a total of 35 ship transits were enrolled. Funding was only available for 32 transits, but when 3 of the first round of enrolled ships did not slow to 12 knots or less, an additional 3 ship transits were solicited and added to the total pool.

2. IMPLEMENTATION AND METHODOLOGY

2.1 Outreach to the Shipping Industry

The VSR Trial partners, with support from the Marine Exchange of Southern California and the Pacific Merchant Shipping Association (PMSA), hosted several meetings and conversations with shipping industry representatives from Maersk Line, Matson Navigation Company, Hapag-Lloyd, K Line, APL, NYK Line, Chevron Shipping Company, Crowley Petroleum Services, and the Ports of Los Angeles/Long Beach, to solicit their input on VSR Trial parameters.

CINMS has been in discussions with the shipping industry regarding options to slow vessel speeds in the Channel for the past several years. The project team held the first formal meeting for this initiative on March 27, 2014, at the Marine Exchange of Southern California in San Pedro, CA. We invited a broad range of shipping representatives using previously known contacts, and the Ports' online directories. At our request, the Pacific Merchant Shipping Association also reached out to its members, which include the majority of shipping companies calling at the Ports. During this initial meeting, we discussed with shipping representatives the VSR Trial's purpose, along with the proposed timeframe, location, monitoring and verification mechanisms, financing, and potential challenges. We incorporated input from the meeting in development of the program.

On June 6, 2014, CINMS, the SBCAPCD, EDC, and the NMSF officially announced that the voluntary VSR Trial Incentive Program for the Santa Barbara Channel was open for registration until June 30, 2014. In total, eight different shipping lines submitted enrollment forms for a total of 89 ship transits in the VSR zone, of which 40 transits met the VSR Trial requirements and were eligible for the program. Ultimately, seven shipping lines enrolled and participated in the VSR Trial: COSCO, Hapag-Lloyd, K Line, Maersk Line, Matson, United Arab Shipping Company, and Mitsui O.S.K. Lines. Not all enrolled vessels qualified for an incentive payment, so we extended the deadline until November 2014 to allow companies to enroll additional transits.

Several additional shipping lines initially expressed interest in the VSR Trial, but ultimately did not enroll in the program, and some of the companies in the program only enrolled a small number of transits. Their reasons for not participating in the program, or not enrolling more vessels, included the following:

- The VSR Trial partners' suggestion not to speed up elsewhere to make up time for reduced speeds in the Channel;
- Vessels that already go slow (i.e. average baseline speeds below 14 knots) were not eligible to participate;
- Delays and/or congestion at ports were expected to interfere with transit times, making faster speeds necessary to make up time;
- Some companies viewed the incentive amount as insufficient to compensate for delays and increased vessel crew time costs; and
- There was a willingness to slow down, but not to 12 knots, which would not have been eligible for an incentive payment.

We contacted all shipping companies that submitted enrollment forms for vessels that appeared to be ineligible to participate, and requested additional data to determine eligibility. In total, 40 vessel transits were ineligible due to not having average baseline speeds in the Santa Barbara Channel greater than 14 knots, and an additional 9 were ineligible for not providing transit dates during the enrollment process.

2.2 Media and Community Outreach

The project team coordinated a public relations campaign to promote the shipping industry's participation in the VSR Trial, resulting in wide regional, national, and international print, radio, web, and television media coverage.

On August 4, 2014, we issued a news release titled "Slowing ships down for cleaner air and whale protection: Six global shipping companies to participate in trial incentive program for Santa Barbara Channel," and on September 9, 2014, we issued a second release titled "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" (see Appendix C: Example Documents). Articles on the VSR Trial also appeared in online and print media outlets, including the *Los Angeles Times*, *Associated Press*, and *Reuters* wire services.¹²

On September 10, 2014, EDC, SBCAPCD, CINMS, and the University of California at Santa Barbara (UCSB) Bren School of Environmental Science and Management presented a community forum in Santa Barbara that was attended by over 75 community members, and included the following:

- An announcement by the VCAPCD that it was joining the partnership team and contributing \$30,000 to the VSR Trial;
- Perspectives from shipping industry representatives (from Maersk Line and Pacific Merchant Shipping Association);
- A presentation on current whale research in the Santa Barbara Channel;
- The launch of a new smart phone app, "Whale Alert," that allows the public to report whale sightings along the California coast;
- A presentation of a study by a University of California at Riverside researcher that documented air pollution reductions when ships slowed down to 12 knots;
- A panel discussion moderated by the UCSB Bren School of Environmental Science and Management's Dean, that included staff from CINMS, EDC, SBCAPCD, and the Pacific Merchant Shipping Association, and a question and answer session.

The community forum, and the addition of the VCAPCD to the VSR Trial partnership, generated additional media coverage.

The project team utilized various social media outlets to post updated information and promote public events that discussed the VSR Trial. Several email listserves were utilized to disseminate information, including the CINMS Public listserv, CINMS Advisory Council listserv, Whale Advisory Listserv, the SBCAPCD Marine Shipping Solutions Group email list, and others. In

¹² Articles can be provided upon request.

addition, EDC hosted a webinar on October 22, 2014, for its donors and membership community. More than 100 people registered for the webinar, and 40 people participated. On November 10, 2014, the non-profit ocean campaign partnership Thank You Ocean released a podcast highlighting the VSR Trial, which was dispersed across various ocean-based social media sites on a regional and national level. Lastly, we utilized our social media accounts on Facebook and Twitter to promote the VSR Trial and keep the public apprised of updates.

2.3 Enrollment Documents

We emailed three documents to shipping industry representatives at the start of the open enrollment phase: a cover letter, registration form, and Letter of Understanding (LOU) (see Appendix C: Example Documents).

The cover letter detailed the VSR Trial's purpose, goals, and eligibility requirements. It also specified an expectation that ship operators would make every effort to avoid speeding up outside the VSR zone to "make up time," to avoid shifting the threats to air quality and whales elsewhere. The letter also encouraged participating shipping companies to provide fuel records or other data to help determine if the ships were able to avoid speeding up outside the zone, and, if possible, to report the number, location, and species of any whales sighted during each transit.

The vessel registration form included sections on vessel operator contact information, payment information for the NMSF, and vessel information, which included vessel name, IMO number, transit date(s), starting port of call, and ending port of call.

The LOU outlined the conditions of participating in the VSR Trial. The NMSF agreed to distribute \$2,500 in incentive funds per transit no later than January 1, 2015, for enrolled vessels that were verified to meet the criteria described in the LOU. The initial registration deadline was June 30, 2014; the registration deadline was subsequently extended until the end of November 2014.

2.4 Tracking Vessel Speeds

Vessel speed data were collected from the Automatic Identification System (AIS). Large vessels are required by law to carry AIS transmitters that emit a VHF radio signal with a variety of data, including the ship's position and speed, to a series of land-based receiving stations. CINMS maintains a digital AIS receiver on Santa Cruz Island (33° 59.667' N, 119° 37.941' W) that records transmissions from vessels as they pass through the Santa Barbara Channel, and/or south of the Channel Islands. The receiver on Santa Cruz Island has strong coverage from Point Conception toward the Ports, and has consistent coverage on the south side of the islands to approximately 33° N.

AIS data are stored on a CINMS computer on Santa Cruz Island using a program called ShipPlotter, which decodes the raw National Marine Electronics Association (NMEA) transmission data, and stores all the transmissions for each day in a log file. Using a Virtual Network Computing (VNC) link, log files are transferred over a wireless router to a cloud drive so CINMS and partners are able to access data for analysis. From there, data are stored in a SQL data catalogue prior to analysis. Individual ship trips are exported from the catalogue using the ship's Mobile Maritime Service Identity (MMSI) identification number (a unique nine-digit

identification number assigned to each vessel) with a date boundary of 4 days prior to and after the intended date of slow travel. Data are cleaned and cut spatially to obtain vessel tracks in the VSR zone for each ship. AIS data were uploaded from the CINMS computer on Santa Cruz Island, and were shared among partners. Raw ShipPlotter data was stored on a Google Drive so CINMS and SBCAPCD staff could both access and analyze the data, however, CINMS and SBCAPCD maintained separate SQL databases and developed independent analysis methodologies. By using different approaches to assess cooperation, and comparing numbers, we were able to have high confidence in the results. Independent verifications of vessel transits were completed at the end of each month, once data was available on the drive folder.

Transit speeds are calculated by averaging the speeds from the transmission data (a point transmitted every 2-15 seconds) from all the detections that occurred in the VSR zone. CINMS and SBCAPCD independently computed average transit speeds for vessels, and cross-compared to ground truth the calculations. Average speeds at 12 knots or less qualified for the incentive, while those traveling at speeds greater than 12 knots did not qualify. Ship trips and speeds from the VSR Trial were also plotted in ArcGIS to qualitatively identify if a spatial trend in speeds existed along the VSR route.

2.5 Incentive Payments

Incentive funds were transferred by the Santa Barbara Foundation, SBCAPCD, and VCAPCD to the NMSF prior to December 2014. After the conclusion of the VSR Trial, CINMS and SBCAPCD staff confirmed with the NMSF which vessels qualified for an incentive. The NMSF then mailed a cover letter in mid-December 2014 to each participating shipping company, outlining the transit dates and calculated speeds for their vessels that qualified for an incentive payment, and included checks for the total incentive amount each shipping company was eligible to receive (see Appendix C: Example Documents).

2.6 Calculating Emissions

Computations of NO_x emission reductions in the Channel during the VSR Trial were based on emission factors documented by the ARB, the propeller law, and ship transit speeds obtained from AIS data. For a large ship in cruising mode, the following equation applies:

$$E = (EF) \cdot (Hrs) \cdot P \cdot \% Load$$

where:

E = emissions for a single transit across the 114 statute mile (~100 nautical mile) VSR zone

EF = NO_x emission factor (assumed $17.0 \frac{g}{kw \cdot hr}$)

Hrs = transit time (hours) in Channel across the 114 mile VSR zone (transit speed dependent)

P = main engine power (37,265 kw average assumed for a container ship)

$\% Load$ = propeller law cubic function: $\left(\frac{actual\ transit\ speed}{maximum\ rated\ speed}\right)^3$; maximum rated speed from Marine Exchange of Southern California data.

For each of the 27 transits that met the 12 knot limit during the VSR Trial, we computed emissions for the VSR zone based on the equation above. We determined the average VSR transit speed from AIS data for each transit (transit speed is the primary input to compute % load and transit time in the equation). We determined baseline emissions for the VSR zone for each of the ships in the VSR Trial using a baseline period from January 1, 2014, to June 30, 2014, (which reflects typical speeds before the VSR Trial). For each ship, we computed baseline emissions in accordance with the equation above for each transit in the baseline period, and then used the average over all transits to derive the baseline emissions value. We then computed emission reductions resulting from the VSR program transits on a transit-by-transit basis by subtracting the VSR computed transit emissions from the baseline emissions values for the applicable ship. We determined total reductions for the VSR Trial by summing the reductions for the 27 VSR transits.

We computed greenhouse gas (GHG) emission reductions in the Channel during the VSR Trial adhering to the methodology specified above for NO_x. Carbon dioxide (CO₂) and methane (CH₄) emissions were accounted for in the GHG calculations, and used to derive carbon dioxide equivalent (CO₂e). A global warming potential of 25 was applied to methane, and the emission factors assumed were 588 grams per kilowatt-hour for CO₂, and 0.07 grams per kilowatt-hour for CH₄.

2.7 Determining Whale Protection Benefits

Current cetacean research indicates that slowing down vessels reduces the risk a ship strike on a whale will be fatal. Slower speeds may or may not give whales additional time to move out of a ship's path; current research is insufficient to make this determination at this time. It is difficult to quantitatively determine the reduction in risk to whales from the VSR Trial due to limitations with available data and existing models. As a result, the VSR Trial partners sought to determine if vessel speeds in the Channel can be reduced by a voluntary, incentive-based VSR program since slower speeds are assumed to decrease the chances a ship strike will be fatal.

CINMS also gathered whale sighting data, recorded by trained volunteers on whale watching excursions, to keep track of whale species, abundances, and locations during the VSR Trial. In addition, CINMS maintained contact with the California Marine Mammal Stranding Network and Channel Islands Cetacean Research Unit throughout the VSR Trial, to remain apprised of any whale strandings and suspected ship strikes.

3. RESULTS

The VSR Trial yielded the following results:

3.1 Evaluating the Shipping Industry's Willingness to Participate

We view the high level and meaningful engagement with the shipping industry in the design, enrollment, and execution of the VSR Trial as a successful demonstration of the shipping industry's willingness to participate in a voluntary, incentive-based VSR program. We received enrollment forms from eight different shipping companies for 89 transits. After the partners determined eligibility to participate, seven shipping companies enrolled, including: COSCO,

Hapag-Lloyd, K Line, Maersk Line, Matson, Mitsui O.S.K. Lines, and United Arab Shipping Company.

Of the 89 transits, 40 met the eligibility criteria for the VSR Trial; we had funding to incentivize 35 transits. Of the 35 transits enrolled in the VSR Trial, 27 qualified for an incentive, with a total incentive payout amount of \$67,500.

During this period, we were also contacted by additional shipping companies that expressed interest in the program.

3.2 Air Quality and Whale Protection Benefits

Vessel Speed Reduction Analysis

A total of 27 vessels transited the Channel at 12 knots or less, and were therefore eligible to receive an incentive payment. We calculated a 5.1 knot average reduction from baseline speeds for these vessels. Seven enrolled vessels were not eligible to receive an incentive due to average speeds in excess of 12 knots, although we calculated a 0.48 knot average speed reduction for these vessels. One vessel was not eligible for an incentive since its route was modified, and it did not transit the Channel.

The maximum average reduction in speed, among all 34 vessels that transited the Channel, was 8.6 knots. Five vessels had VSR Trial speeds that were higher than baseline average speeds, with the highest increase in speed being 3.5 knots. For a summary of speeds of enrolled vessels in the VSR Trial, see Table 3.1.

Trip ID	Shipping Company	Vessel Name	IMO #	Channel Transit Date	Baseline Speed	Mean VSR Speed
1	Matson	Mahi Mahi	7907996	7/11/2014	18.62	11.78
2	K Line	Verrazano Bridge	9292175	7/14/2014	16.16	7.59
3	United Arab Shipping Company	Xin Da Yang Zhou	9337949	7/23/2014	15.01	10.39
4	COSCO	Cosco Indonesia	9448786	7/24/2014 & 7/25/2014	15.13	11.45
5	Mitsui OSK Lines (MOL)	Matrix	9424924	7/28/2014	15.30	17.69
6	COSCO	Cosco Thailand	9448798	7/30/2014	15.58	11.45
7	K Line	Vincent Thomas Bridge	9292266	8/4/2014	13.98	10.07
8	Maersk Line	Gerd Maersk	9320245	8/7/2014	17.55	11.56
9	Hapag Lloyd AG	Seaspan Hamburg	9224300	8/7/2014	15.34	9.44
10	Matson	Mahi Mahi	7907996	8/8/2014	18.62	11.61
11	COSCO	Cosco Indonesia	9448786	9/7/2014	14.00	11.16
12	COSCO	Cosco Asia	9345403	8/26/2014 & 8/27/2014	15.58	10.62
13	Maersk Line	Maersk Altair	9342499	8/26/2014	17.13	10.78
14	Mitsui OSK Lines (MOL)	Mol Modern	9475636	8/25/2014	15.08	11.26
15	United Arab Shipping Company	Xin Da Yang Zhou	9337949	9/4/2014 & 9/5/2014	15.01	9.15
16	Hapag Lloyd AG	Santa Ricarda	9227314	8/14/2014 & 8/15/2014	16.89	9.72
17	K Line	Vincent Thomas Bridge	9292266	9/9/2014	13.98	10.48
18	Maersk Line	Grete Maersk	9302889	9/11/2014	17.55	12.58
19	Hapag Lloyd AG	Rio de Janeiro Express	9301847	9/12/2014	14.00	10.70
20	COSCO	Cosco Thailand	9448798	9/11/2014	15.58	11.18
21	Hapag Lloyd AG	Seaspan Chiwan	9224312	9/20/2014	16.77	16.80
22	K Line	Verrazano Bridge	9292175	9/21/2014	16.16	7.51
23	Hapag Lloyd AG	Seaspan Chiwan	9224312	10/3/2014	16.77	12.20
24	Hapag Lloyd AG	Seaspan Hamburg	9224300	10/12/2014	15.34	10.65
25	K Line	Vincent Thomas Bridge	9292266	10/13/2014	13.98	17.49
26	United Arab Shipping Company	Xin Da Yang Zhou	9337949	10/22/2014	15.01	10.93
27	COSCO	Cosco Indonesia	9448786	10/17/2014 & 10/18/2014	14.00	10.83
28	Hapag Lloyd AG	Santa Ricarda	9227314	10/22/2014	16.89	11.16
29	Hapag Lloyd AG	Seaspan Hamburg	9224300	10/26/2014	15.34	11.10
30	Maersk Line	Gerner Maersk	9359002	10/20/2014	14.45	14.50
31	Hapag Lloyd AG	Seaspan Felixstowe	9227039	10/26/2014 & 10/27/2014	15.69	10.40
32	COSCO	Cosco Thailand	9448798	10/22/2014 & 10/23/2014	15.58	11.90
33	K Line	Verrazano Bridge	9292175	10/28/2014	16.16	16.31
34	Hapag Lloyd AG	Santa Ricarda	9227314	**did not transit Channel	16.89	N/A
35	K Line	Verrazano Bridge	9292175	12/1/2014	16.16	12.00

Table 3.1: Vessel speed summary. Speeds in red indicate the transit did not qualify for an incentive.

Air Quality

The Vessel Speed Reduction Trial (27 transits through the speed-reduction zone) was successful in reducing emissions of NOx and GHG, as detailed below.

NOx:

Table 3.2 lists the NOx emission reductions per transit, and the total over the 27 transits. The total NOx reduction achieved during the small-scale VSR Trial, considering all 27 transits, was 16.54 tons. This represents a 54 percent reduction in NOx emissions compared to baseline for the participating vessels. On a per transit basis, NOx emission reductions ranged from approximately 0.5 to 1 ton.

Trip ID	Shipping Line	Vessel Name	Channel Transit Date	VSR Speed	Baseline NOx	VSR NOx	VSR NOx Emissions Reduction
				knots	pounds	pounds	pounds (NOx Baseline - NOx VSR)
1	Matson	Mahimahi	07/11/14	11.78	3743.97	1531.27	2212.70
2	K Line	Verrazano Bridge	07/14/14	7.587	1605.69	383.51	1222.18
3	United Arab Shipping Company (UASC)	Xin Da Yang Zhou	07/23/14	10.39	2330.79	958.38	1372.41
4	COSCO	COSCO Indonesia	7/24/2014 & 7/25/2014	11.45	1693.01	1087.57	605.44
5	COSCO	COSCO Thailand	07/30/14	11.45	1851.56	1147.09	704.46
6	K Line	Vincent Thomas Bridge	08/04/14	10.07	2156.37	1081.80	1074.57
7	Maersk Line	Gerd Maersk	08/07/14	11.56	2816.58	1184.10	1632.49
8	Hapag Lloyd AG	Seaspan Hamburg	08/07/14	9.44	2205.20	979.50	1225.70
9	Matson	Mahimahi	08/08/14	11.61	3743.97	1484.87	2259.10
10	COSCO	Cosco Indonesia	09/07/14	11.16	1693.01	1117.46	575.55
11	COSCO	Cosco Asia	8/26/2014 & 8/27/2014	10.62	2532.31	1019.88	1512.44
12	Maersk Line	Maersk Altair	08/26/14	10.78	2460.10	972.11	1488.00
13	Mitsui OSK Lines (MOL)	Mol Modern	08/25/14	11.26	2269.41	1310.86	958.54
14	United Arab Shipping Company (UASC)	Xin Da Yang Zhou	9/04/2014 & 9/05/2014	9.154	2330.79	732.15	1598.64
15	Hapag Lloyd AG	Santa Ricarda	8/14/2014 & 8/15/2014	9.72	2594.01	762.11	1831.90
16	K Line	Vincent Thomas Bridge	09/09/14	10.48	2156.37	999.63	1156.74
17	Hapag Lloyd AG	Rio de Janeiro Express	09/12/14	10.7	2241.68	1253.12	988.56
18	COSCO	Cosco Thailand	9/11/2014 or 9/15/2014	11.18	1851.56	1063.07	788.48
19	K Line	Verrazano Bridge	09/21/14	7.51	1605.69	376.47	1229.22
20	Hapag Lloyd AG	Seaspan Hamburg	10/12/14	10.65	2205.20	1241.43	963.77
21	United Arab Shipping Company	Xin Da Yang Zhou	10/22/2014	10.93	2330.79	956.54	1374.25
22	COSCO	COSCO Indonesia	10/17/2014 & 10/18/2014	10.83	1693.01	649.26	1043.75
23	Hapag Lloyd AG	Santa Ricarda	10/22/2014	11.16	2594.01	1016.76	1577.25
24	Hapag Lloyd AG	Seaspan Hamburg	10/26/2014	11.1	2205.20	1348.56	856.64
25	Hapag Lloyd AG	Seaspan Felixstowe	10/26/2014 & 10/27/2014	10.4	2734.68	1204.41	1530.27
26	COSCO	COSCO Thailand	10/22/2014 & 10/23/2014	11.9	1851.56	1196.26	655.30
27	K Line	Verrazano Bridge	12/1/2014	12	1605.69	958.64	647.05
					Pounds Reduced (total)		33085.40
					Tons Reduced (total)		16.54

Table 3.2: NOx Emissions Reductions

Green House Gas (GHG):

Table 3.3 lists the regional GHG emission reductions per transit, and the total over the 27 transits. The total regional GHG reduction achieved during this small-scale VSR Trial, considering all 27 transits, was 521 metric tons. This represents a 54 percent reduction in GHG emissions compared to baseline for the participating vessels. On a per transit basis, regional GHG emission reductions ranged from 9 to 35 metric tons.

Trip ID	Shipping Line	Vessel Name	Channel Transit Date	VSR Speed	Baseline GHG	VSR GHG	VSR GHG Emissions Reduction
				knots	MTCO2e	MTCO2e	MTCO2e (GHG Baseline - GHG VSR)
1	Matson	Mahimahi	07/11/14	11.78	58.91	24.10	34.82
2	K Line	Verrazano Bridge	07/14/14	7.59	25.27	6.03	19.23
3	United Arab Shipping Company (UASC)	Xin Da Yang Zhou	07/23/14	10.39	36.68	15.08	21.60
4	COSCO	COSCO Indonesia	7/24/2014 & 7/25/2014	11.45	26.64	17.11	9.53
5	COSCO	COSCO Thailand	07/30/14	11.45	29.14	18.05	11.09
6	K Line	Vincent Thomas Bridge	08/04/14	10.07	33.93	17.02	16.91
7	Maersk Line	Gerd Maersk	08/07/14	11.56	44.32	18.63	25.69
8	Hapag Lloyd AG	Seaspan Hamburg	08/07/14	9.44	34.70	15.41	19.29
9	Matson	Mahimahi	08/08/14	11.61	58.91	23.37	35.55
10	COSCO	Cosco Indonesia	09/07/14	11.16	26.64	17.58	9.06
11	COSCO	Cosco Asia	8/26/2014 & 8/27/2014	10.62	39.85	16.05	23.80
12	Maersk Line	Maersk Altair	08/26/14	10.78	38.71	15.30	23.41
13	Mitsui OSK Lines (MOL)	Mol Modern	08/25/14	11.26	35.71	20.63	15.08
14	United Arab Shipping Company (UASC)	Xin Da Yang Zhou	9/04/2014 & 9/05/2014	9.15	36.68	11.52	25.16
15	Hapag Lloyd AG	Santa Ricarda	8/14/2014 & 8/15/2014	9.72	40.82	11.99	28.83
16	K Line	Vincent Thomas Bridge	09/09/14	10.48	33.93	15.73	18.20
17	Hapag Lloyd AG	Rio de Janeiro Express	09/12/14	10.70	35.27	19.72	15.56
18	COSCO	Cosco Thailand	9/11/2014 or 9/15/2014	11.18	29.14	16.73	12.41
19	K Line	Verrazano Bridge	09/21/14	7.51	25.27	5.92	19.34
20	Hapag Lloyd AG	Seaspan Hamburg	10/12/14	10.65	34.70	19.53	15.17
21	United Arab Shipping Company	Xin Da Yang Zhou	10/22/2014	10.93	36.68	15.05	21.62
22	COSCO	COSCO Indonesia	10/17/2014 & 10/18/2014	10.83	26.64	10.22	16.42
23	Hapag Lloyd AG	Santa Ricarda	10/22/2014	11.16	40.82	16.00	24.82
24	Hapag Lloyd AG	Seaspan Hamburg	10/26/2014	11.10	34.70	21.22	13.48
25	Hapag Lloyd AG	Seaspan Felixstowe	10/26/2014 & 10/27/2014	10.40	43.03	18.95	24.08
26	COSCO	COSCO Thailand	10/22/2014 & 10/23/2014	11.90	29.14	18.82	10.31
27	K Line	Verrazano Bridge	12/1/2014	12.00	25.27	15.08	10.18
					MTCO2e Reduced (total)		520.62

Table 3.3: Greenhouse Gas Emissions Reductions

Whale Protection Benefits

No known strikes on whales involving vessels participating in the VSR Trial occurred. It is important to note that reducing vessel speeds cannot guarantee whales will not be struck. Additionally, if no whales are struck in a speed reduction zone, it does not mean the reduced speed is the only factor in play. We can only state with confidence that slowing down vessels reduces the risk a ship strike on a whale will be fatal; therefore, it is difficult to quantitatively determine the reduction in risk to whales from the VSR Trial. To view whale sightings recorded by volunteers on local whale watching trips that occurred during the VSR Trial, see Appendix B: Figure 4.

It should be noted that a fatal strike on a fin whale occurred during the VSR Trial period in July 2014¹³; however, it is thought that the fatal strike did not involve a vessel in the VSR Trial since it occurred when there were no enrolled vessels transiting the Channel.

3.3 Laying the Foundation for a Larger-Scale Program

The VSR Trial’s design, enrollment process, and data collection/processing mechanisms were refined throughout the VSR Trial, thus laying the foundation for establishing a larger-scale VSR program. We demonstrated the technological capability to monitor vessel speeds and model emissions reductions from reduced speeds, and identified areas where data is scarce or can be improved in order to enhance future programs. The participation of seven global shipping

¹³ http://www.vcstar.com/news/outdoors/blunforce-trauma-likely-killed-fin-whale_46696771

companies, along with continual outreach efforts and interest from the media, attracted the attention of several other shipping companies, the Ports of Los Angeles and Long Beach, the public, and elected officials, such as Congresswoman Lois Capps from California's 47th District, and Congressman Alan Lowenthal from California's 24th District. The interest and support among elected officials and the shipping industry is an essential step for identifying sources of long-term funding to expand the program to include more vessels and a larger geographical scope on a permanent basis.

4. DISCUSSION

4.1 Improving Data Collection and Tracking Mechanisms

Automatic Identification System (AIS) Data

Looking forward, a number of federal agencies are working towards solutions to better collect and manage AIS data. Building partnerships with other agencies to enhance the availability of data to CINMS will be critical to tracking the movements of vessels in the Southern California Bight. Currently, CINMS is the only national marine sanctuary that collects its own AIS data and maintains its own station, although only for the Santa Barbara Bight. This is problematic as alterations to shipping behavior in the Santa Barbara Channel likely have implications for other regions in California.

In order to address the geographic gap in data, there are a few avenues to access more data that the partners are actively pursuing. The first method would be to set up a network of additional AIS receivers that are managed by CINMS staff in areas that have little or no coverage. The benefit of this method would be that the data collected will be handled in the same manner. Placement would occur in areas that prioritize the needs of CINMS and their partners, which means it would directly address the gaps in our data.

To supplement our directly collected coastal data, CINMS is working with NMFS, and the Department of Transportation, to query a national AIS data archive for data relevant across the National Marine Sanctuary system. Additionally, we are working to understand the benefits of incorporating satellite AIS data to monitor shipping traffic on the Great Pacific Circle route. Shore based AIS data and satellite AIS data is available from private sector companies and organizations for a fee; understanding these costs will be important as alternatives for collecting AIS data are compared, and a scaled up VSR program is considered.

Building upon the data collection will also require upgrading the system for handling the data. Increasing computing power and software systems will be critical for working with new streams of data. CINMS staff have already begun upgrading codes to include new AIS transmitter types, and have been researching alternative programs to handle the data.

Air Quality Data

SBCAPCD staff are interested in obtaining fuel logs from participating companies to get a more comprehensive understanding of reductions in fuel use and emissions (particularly GHG). We intend to inquire about this information during follow-up surveys with participating shipping

companies. The satellite AIS data, referenced above, could also be used to estimate emissions for participating vessels across their entire voyages, and determine whether vessels are speeding up outside the Channel.

Whale Protection Data

Whale data collection and modeling improvements were minimal during the VSR Trial. CINMS staff did provide transit dates and times to scientists from Cascadia Research Collective, a non-profit scientific and educational organization that routinely conducts cetacean research in the Channel, that were interested in monitoring whale responses to approaching container vessels. Data and analysis from their trips are still being processed and are not available at this time.

Additional research on cetacean behavior is needed in order to accurately assess the whale protection benefits of slowing large container vessels, as they pass through sensitive whale habitats. We welcome additional research that monitors whale responses to vessels, in order to begin quantifying the potential benefits of a larger-scale VSR program.

4.2 Challenges for Shipping Companies in Reducing Speeds

Shipping companies were not always able to reduce speeds of ships enrolled in the program.

Starting in October 2014, and lasting throughout the remainder of the VSR Trial, labor shortages and cargo congestion in the Ports of Los Angeles and Long Beach affected the ability of ships to dock and load/unload cargo. According to an article in the *Los Angeles Times*, the congestion was primarily due to a shortage of trailers used by truckers to haul the cargo containers out of the Ports; other factors included the surge of holiday season cargo, and an increase in cargo containers from larger ships that have come into service in recent years¹⁴. Shipping lines once owned the cargo trailers used by truckers, but a shift to third-party leasing companies operating the trailers occurred mostly over the last year around the Ports, thus weakening the shipping lines' control and coordination over their supply chains. According to the article, the congestion was the worst it has been in a decade. The congestion problem was also noted by several shipping companies in the VSR program.

Ships that were delayed at anchor offshore from the Ports, or ones that had to miss a day(s) of loading and/or unloading due to container terminal congestion, were then delayed departing for other destinations. For example, one shipping representative stated that one of their vessels enrolled in the VSR Trial missed two unloading shifts while docked due to labor shortages. Often times, the vessels are carrying cargo that must be immediately unloaded due to a scheduled distribution. For example, one shipping company referred to memorabilia that was targeted to be distributed at a specific baseball game. Since these vessels had established dock schedules for these other destinations, not to mention cargo their customers expected by certain dates, they increased transit speeds to make up for the delays. Five vessels that enrolled in the VSR Trial, but did not qualify for an incentive, transited in October, coinciding with the Port delays. Furthermore, only one vessel transit was enrolled for November, with the Port delays being given as the main reason for not being able to enroll transits during that time period.

¹⁴ <http://www.latimes.com/business/la-fi-port-congestion-20141025-story.html>

At least one other enrolled vessel did not transit at 12 knots in the VSR zone because they reported delays at other ports, and therefore, did not qualify for an incentive. Although the specific cause of delay was not given, shipping lines did report that factors such as weather can be responsible for major delays, as well as temporary port closures in certain parts of the world, including major ports in China.

According to correspondence with a shipping representative, rerouting ships along the West Coast to avoid port delays is very difficult since the import cargo for Northern California is so small compared to the import cargo for the Ports of Los Angeles and Long Beach. For example, if a vessel were to call at the Port of Oakland first, there would not be enough space to load the vessel with export cargo. Therefore, most vessels exporting to regions such as Asia will typically call at the Ports of Los Angeles and Long Beach first, and then proceed to other West Coast destinations, such as the Port of Oakland. However, AIS data show one of the enrolled vessels did not transit the Santa Barbara Channel, so it is assumed the vessel was rerouted.

5. NEXT STEPS

5.1 Communicating the Success of the VSR Trial Program

The VSR Trial partners will continue to engage shipping industry representatives, the public, CINMS Advisory Council, the County Air Quality Boards and other stakeholders, to spread awareness about the program's design, outcomes, and benefits. The VSR Trial partners also aim to publish their findings in scientific and/or trade journals, to contribute to the growing body of literature on sustainable shipping, marine conservation, and air quality improvement approaches. More regional in scope, our outreach aims to raise awareness on the potential air quality benefits for the general public living in Ventura and Santa Barbara counties; this action will also demonstrate to elected officials, and agencies, that a scaled-up VSR program has the potential to decrease threats to air quality and endangered whales. A range of other audiences, including retailers who influence shipping choices, may be interested in learning about the benefits of this non-regulatory approach that could be implemented in other areas.

5.2 Follow Up with Participating Shipping Companies

We will follow up with participating shipping companies to obtain additional information, as well as their suggestions for any future programs. We will also discuss specific factors that influenced participation, so we can refine program design.

5.3 Developing a Larger-Scale VSR Program

The VSR Trial proved that many systems are in place to verify ship speeds for a larger scale VSR program. Based on AIS data, there are currently approximately 5,000 annual ship transits inside and south of the Santa Barbara Channel Islands (2,500 in each zone). A substantial portion of the 2,500 transits south of the islands may shift inside the Channel as a result of the North American ECA low-sulfur fuel requirements that took effect January 1, 2015. This shift is possible because the ECA low-sulfur fuel zone extends out to 200 miles from the coast, and will include the existing ARB low-sulfur fuel zone. As a result, shipping companies will have to switch to higher priced low-sulfur fuel at the 200-mile point, and the option to reduce

consumption of the higher priced fuel by swinging outside (south) of the ARB compliant fuel zone will no longer be available.

Conservation Benefits

With the above shift in mind, a full-scale VSR incentive program inside the Channel could reduce emissions from potentially up to 5,000 transits a year, or even higher if the economy picks up and transits approach historical highs of 6,000-7,000 inside the Channel. Based on the VSR Trial, NOx reductions averaged approximately 0.6 tons per transit, and GHG reductions averaged 19 metric tons per transit. Thus, based on the VSR Trial's results, and a future annual transit range of 2,500-5,000 in the Channel, the range of NOx reductions projected from a large scale VSR program in the Channel would be on the order of 1,500-3,000 tons/year. Annual GHG emission reductions from a large scale VSR program in the Channel would range from 47,500 - 95,000 MT CO₂e. A further extrapolation indicates a statewide VSR program, that included transits occurring up and down the coast from the northern California border to San Diego, could yield reductions of up to 11,000 tons of NOx per year, and approximately 400,000 metric tons of GHG per year. The NOx emission reductions are particularly significant with the advent of a new potentially more stringent federal ozone standard.

Slower transit speeds would also have the added benefit of lowering threats to endangered whales that feed and travel along the California coast.

Cost

The revenue stream to support a larger-scale program would need to be substantially greater than that of the VSR Trial. **Given the success of the VSR Trial, and magnitude of the air quality and whale protection benefits that could be realized from a larger program, a concerted effort to obtain funding sources for such a program should be a high priority.**

APPENDIX

Appendix A: Acronyms

AIS – Automatic Identification System

ARB – California Air Resources Board

CINMS – Channel Islands National Marine Sanctuary

EDC – Environmental Defense Center

IMO – International Maritime Organization

NOAA – National Oceanic and Atmospheric Administration

NMFS – National Marine Fisheries Service

PMSA – Pacific Merchant Shipping Association

SBCAPCD – Santa Barbara County Air Pollution Control District

TSS – Traffic Separation Scheme

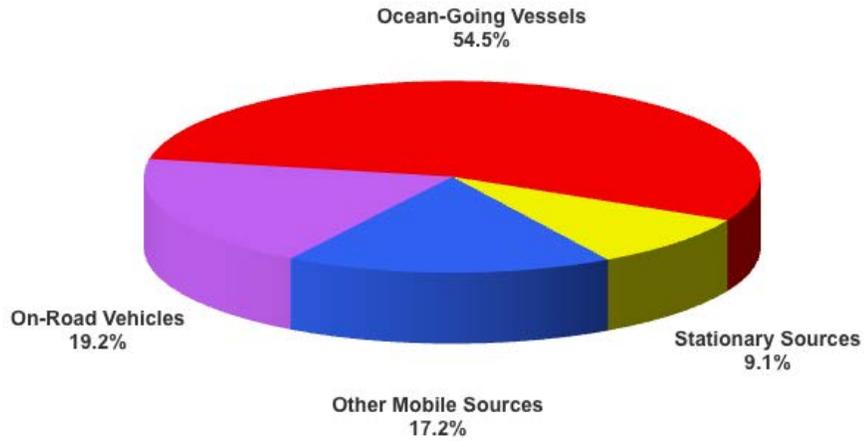
USCG – United States Coast Guard

VCAPCD – Ventura County Air Pollution Control District

VSR – Vessel Speed Reduction

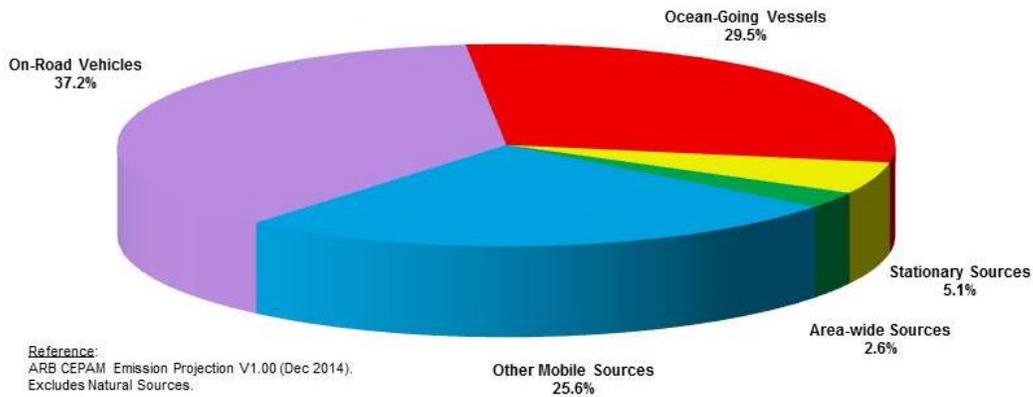
Appendix B: Figures

Santa Barbara County Sources of NOx

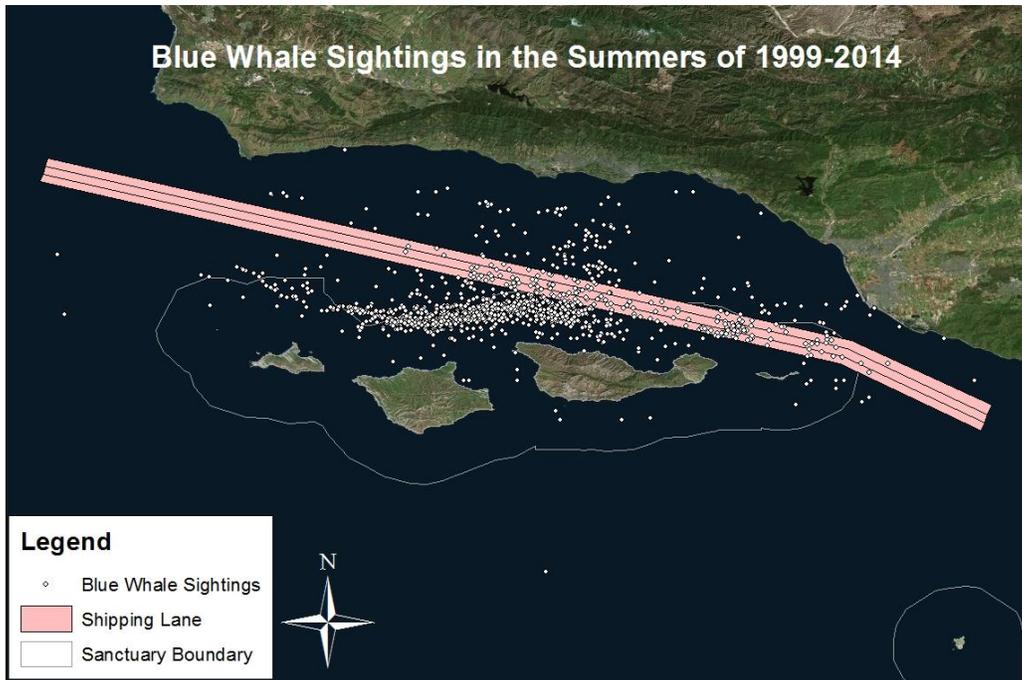


Appendix B Figure 1: Santa Barbara County Sources of NOx

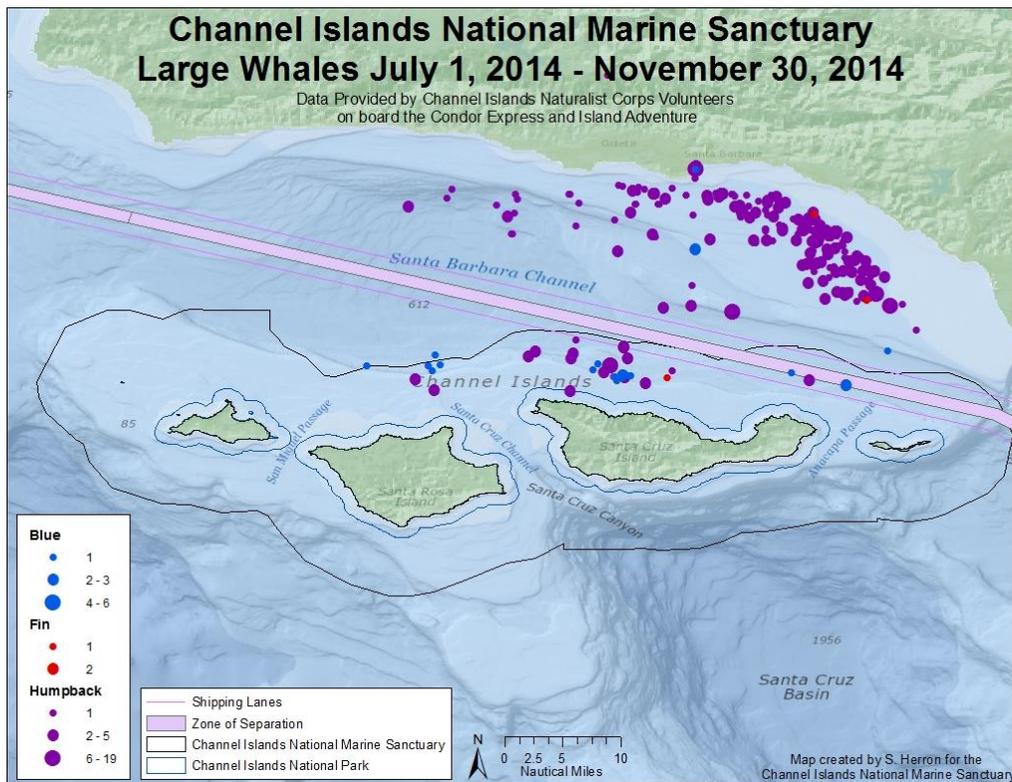
Ventura County Sources of NOx



Appendix B Figure 2: Ventura County Sources of NOx



Appendix B Figure 3: Blue whale sightings in the summers of 1999-2014



Appendix B Figure 4: Sightings of large whales in the Channel from July 1 – November 30, 2014.

Appendix C: Example Documents



FOR IMMEDIATE RELEASE

August 4, 2014

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Slowing ships down for cleaner air and whale protection Six global shipping companies to participate in trial incentive program for Santa Barbara Channel

SANTA BARBARA, Calif. — A coalition of government, non-profit and marine industry groups today announced the launch of a new trial incentive program to slow ships down in the Santa Barbara Channel in an effort to reduce air pollution and increase protection of endangered whales.

Six global shipping companies, COSCO, Hapag Lloyd, K Line, Maersk Line, Matson, and United Arab Shipping Company are participating in the speed reduction incentive program from July through October. Selected ships in their fleet will reduce their speed to 12 knots or less (reduced from typical speeds of 14-18 knots) as they travel between Point Conception and the Ports of Los Angeles and Long Beach. Each company will receive \$2,500 per vessel that passes through the Santa Barbara Channel.

The trial program is modeled after similar, successful programs at the Ports of Long Beach and Los Angeles, where 90 percent of shipping lines participate. The Santa Barbara County Air Pollution Control District, NOAA's Channel Islands National Marine Sanctuary and the Environmental Defense Center worked to develop and implement the program.

Ship strikes are a major threat to recovering endangered whale populations. The ships also emit greenhouse gases and air pollutants, and account for more than 50 percent of ozone-forming nitrogen oxides in Santa Barbara County.

"Few people realize that ships off our coast, especially those moving at faster speeds, are a risk to endangered whales and the quality of the air we breathe," said Kristi Birney of the Environmental Defense Center.

“Reducing ship speeds to 12 knots or less reduces emissions of smog-forming air pollutants that harm our health,” said Dave Van Mullem, director, Santa Barbara County Air Pollution Control District. “We are pleased to be part of this partnership to achieve common goals, and excited about the potential for improving air quality in our county.”

“Slowing ships down reduces the likelihood that a ship strike on a whale will be fatal,” said Chris Mobley, superintendent, Channel Islands National Marine Sanctuary. “We are extremely pleased with the positive response from the shipping industry to test non-regulatory, innovative approaches to protect human health and the marine environment while maintaining vibrant maritime commerce.”

The program has funding to support 16 transits and the initial response has been extremely positive. The coalition received more than 25 ship transit requests to be included in the trial and is seeking additional funding to expand the trial.

“The Pacific Merchant Shipping Association is committed to finding viable science-based solutions to both air quality and whale protection issues,” said TL Garrett, vice president, Pacific Merchant Shipping Association. “Our members are participating in this voluntary program in order to find sustainable strategies to reduce air pollution and greenhouse gas emission while providing enhanced protection for the whales off our coasts.”

Maersk Line representative, Dr. Lee Kindberg, director, Environment & Sustainability, North America, added, “The Santa Barbara Channel program is a logical extension of our other environmental initiatives. We appreciate this opportunity to help demonstrate the environmental and operational impacts of speed reductions in sensitive areas.”

The vessel speed program is supported by local and national foundations. The National Marine Sanctuary Foundation will manage the incentive payments with funding from the Santa Barbara Foundation and the Santa Barbara County Air Pollution Control District. Payments will be provided upon verification of the ships’ speeds through the Channel, using Automatic Identification System monitors that receive speed and location_data from the transponders on ships as they transit.

For additional information, see attached factsheet and map, or visit:

<http://www.OurAir.org>

http://channelislands.noaa.gov/management/resource/ship_strikes.html

http://environmentaldefensecenter.org/learn/current_cases/save_the_whales/index.html

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NOAA’s **Channel Islands National Marine Sanctuary** was designated in 1980 to protect marine resources surrounding San Miguel, Santa Rosa, Santa Cruz, Anacapa and Santa Barbara islands. The sanctuary spans approximately 1,470 square miles, extending from island shorelines to six miles offshore, and encompasses a rich diversity of marine life, habitats and historical and cultural resources.

The **Santa Barbara County Air Pollution Control District** is a local government agency that works to protect the people and the environment of Santa Barbara County from the effects of air pollution.

The **Environmental Defense Center**, a non-profit law firm, protects and enhances the local environment through education, advocacy, and legal action and works primarily within Santa Barbara, Ventura, and San Luis Obispo counties. Since 1977, EDC has empowered community based organizations to advance environmental protection. Program areas include protecting coast and ocean resources, open spaces and wildlife, and human and environmental health. Learn more about EDC at www.EnvironmentalDefenseCenter.org.

The **National Marine Sanctuary Foundation** enhances national marine sanctuaries in their goal to protect essential U.S. marine areas and to ensure a healthy ocean. Through public-private partnerships, NMSF fosters scientific research, funds conservation projects, supports educational programs, and advocates for public policies on behalf of these special places representing the best hope for the ocean and Great Lakes. Learn more at www.NMSFocean.org.



FOR IMMEDIATE RELEASE
September 9, 2014

Contacts:

Mike Villegas, Ventura County Air Pollution Control District, 805-645-1440
Kristi Birney, Environmental Defense Center, 805-963-1622
Mary Byrd, Santa Barbara County Air Pollution Control District, 805-961-8833
Sean Hastings, Channel Islands National Marine Sanctuary, 805-729-5598
Katie Zacharkiw, National Marine Sanctuary Foundation, 301 608-3040

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

VENTURA, Calif. — The Ventura County Air Pollution Control District (VCAPCD) Board approved today the VCAPCD's participation in a coalition of four government, non-profit and marine industry groups in their trial incentive program underway in the Santa Barbara Channel since July 1st. The program will slow down cargo ships to reduce air pollution and increase the protection of endangered whales.

At its September 9, 2014 meeting, the VCAPCD Board approved \$30,000 in funding for the effort, increasing the program's total funding to \$90,000. Large marine cargo ships transiting the Santa Barbara Channel (approximately 2,500 per year), as well as those docking at Port Hueneme, are a significant source of air pollution in Santa Barbara and Ventura counties. Air emissions from ocean going vessels transiting the Santa Barbara Channel constitute approximately one quarter of the ozone-forming nitrogen oxide emissions in VCAPCD's jurisdiction. Channel ship traffic is also a significant source of other air pollutants such as sulfur dioxide, greenhouse gases, diesel particulate matter, and other toxic air pollutants.

Reducing the speed of these vessels from 14 knots or greater to less than 12 knots can significantly cut emissions of several air pollutants that blow onshore into Ventura and Santa Barbara counties, and will reduce the chances that a ship strike on a whale will kill the whale. According to Air Pollution Control Officer Mike Villegas, "By having these ships slow down in the Channel, we will be achieving significant emission reductions and helping to protect public health."

"We welcome the Ventura County Air Pollution Control District to the coalition," said Sean Hastings, Resource Protection Coordinator with the Channel Islands National

Marine Sanctuary. “The ships and whales move and the benefits of slowing ships down can and should be shared with our neighboring counties.”

Six global shipping companies, COSCO, Hapag-Lloyd, K Line, Maersk Line, Matson, and United Arab Shipping Company are participating in the program and have identified ships in their fleets that already have or will transit between Point Conception and the Ports of Los Angeles and Long Beach, from July-October 31, 2014, at speeds of 12 knots or less (reduced from typical speeds of 14 – 18 knots). Participating companies will receive \$2,500 per verified transit through the Santa Barbara Channel.

The trial program, developed and implemented by the Santa Barbara County Air Pollution Control District, NOAA’s Channel Islands National Marine Sanctuary, and the Environmental Defense Center, is modeled after successful speed reduction incentive programs at the Ports of Long Beach and Los Angeles, where more than 90 percent of the shipping lines participate.

Santa Barbara County Air Pollution Control District Air Pollution Control Officer Dave Van Mullem remarked, “We are thrilled that the Ventura County air district is helping to fund the program. The increased funding will help reduce more emissions of smog-forming pollutants that harm our health, and will allow us to gather more data in our trial program.” With the Ventura County air district’s contribution, a total of 32 transits will be incentivized with the program’s total current funding of \$90,000. Santa Barbara County Air Pollution Control District and the Santa Barbara Foundation are also contributing funding, and the National Marine Sanctuary Foundation will manage the incentive payments. Payments will be provided upon verification of the ships’ speeds through the Channel, using Automatic Identification System monitors that receive speed and location data from the transponders on ships as they transit.

“The expansion of the program will provide more data for the development of science-based solutions to both the air quality and whale protection issues,” said TL Garrett, vice president, Pacific Merchant Shipping Association. “Our members are pleased to participate in this voluntary program to advance the science.”

Maersk Line representative Dr. Lee Kindberg, director, Environment & Sustainability, North America, added, “This is exciting news. More transits during the trial period will give us more data, and a better handle on creating a successful program.”

Kristi Birney of the Environmental Defense Center said, “This program offers real benefits on climate issues, endangered species protection, and human health for our entire region. It is wonderful to have both Ventura and Santa Barbara County air districts doing so much for this partnership to slow ships down in the Santa Barbara Channel, improving the air we breathe and protecting the whales we all enjoy spotting off our coast.”

Community Forum in Santa Barbara

On **Wednesday, September 10**, there will be a community forum, ***Protecting Blue Whales and Blue Skies*** held in Santa Barbara. The forum, sponsored by the

coalition and the University of California at Santa Barbara's Bren School of Environmental Science and Management, is free and open to the public and will discuss this unique environmental partnership. It will be held at the **Cabrillo Pavilion Arts Center** at **118 E. Cabrillo Boulevard, Santa Barbara**, from **3 – 5pm**. For more information visit **OurAir.org** or call **805/961-8833**.

For additional information visit:

<http://www.OurAir.org>

http://channelislands.noaa.gov/management/resource/ship_strikes.html

http://environmentaldefensecenter.org/learn/current_cases/save_the_whales/index.html

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The **National Marine Sanctuary Foundation** enhances national marine sanctuaries in their goal to protect essential U.S. marine areas and to ensure a healthy ocean. Through public-private partnerships, NMSF fosters scientific research, funds conservation projects, supports educational programs, and advocates for public policies on behalf of these special places representing the best hope for the ocean and Great Lakes. Learn more at www.NMSFOcean.org.

NOAA's Channel Islands National Marine Sanctuary was designated in 1980 to protect marine resources surrounding San Miguel, Santa Rosa, Santa Cruz, Anacapa and Santa Barbara islands. The sanctuary spans approximately 1,470 square miles, extending from island shorelines to six miles offshore, and encompasses a rich diversity of marine life, habitats and historical and cultural resources.

The **Santa Barbara County Air Pollution Control District** is a local government agency that works to protect the people and the environment of Santa Barbara County from the effects of air pollution.

The **Ventura County Air Pollution Control District** is the local government agency in Ventura County that protects public health and agriculture from the adverse effects of air pollution by identifying air pollution problems and developing a comprehensive program to achieve and maintain state and federal air quality standards.

-End-



Our Vision  Clean Air
And Safer Whales



June 6, 2014

Dear Shipping Representative:

The Santa Barbara County Air Pollution Control District (APCD), the Channel Islands National Marine Sanctuary (CINMS), Environmental Defense Center (EDC) and the National Marine Sanctuary Foundation are initiating a voluntary Vessel Speed Reduction (VSR) Trial Program (VSR trial) for the Santa Barbara Channel off California. The overall goals of the VSR trial are: to determine the potential for air quality and whale protection benefits from a voluntary VSR program in the Santa Barbara Channel; and, to test the shipping industry's willingness to participate in a non-regulatory approach to reduce vessel speed. Similar to the VSR program established by the Ports of Los Angeles and Long Beach, participating vessels will be requested to reduce speed to 12 knots from Point Arguello to the boundary of the Ports' VSR zone (see attached map). The parameters of the VSR trial have been refined based on extensive input from government, non-government, shipping industry and port representatives.

As detailed in the attached Letter of Understanding, the VSR trial will take place from July 1 through October 31, 2014. The Letter of Understanding is between the National Marine Sanctuary Foundation, a supporting foundation that will manage the actual payments for participating vessels, and individual shipping lines. The Santa Barbara Foundation and the APCD have generously granted approximately \$40,000 to offer financial incentives to approximately 16 ships at \$2,500 per vessel transit at or below 12 knots through the Santa Barbara Channel and VSR trial zone. A vessel's speed will be verified via Automatic Identification System (AIS) data. Vessels that have had baseline speeds for the past six months at or above 14 knots when transiting the Santa Barbara Channel are eligible. Vessels must also be participating in the Ports of Los Angeles and/or Long Beach VSR programs (either 20 or 40 nautical miles). In addition to the financial incentive on offer, we intend to work with participating shipping companies on a positive public relations campaign to draw public recognition to the VSR trial. Participation is voluntary and this one-time trial does not commit shipping industry participants beyond the trial period.

While the scope of the trial is limited to the Santa Barbara Channel, air pollution, greenhouse gas emissions and the threat of ship strikes on endangered whales extends beyond this region. In line with the goals stated above, there is an expectation that ships will make every effort to avoid speeding up once outside the VSR zone beyond their average baseline speed to "make up time" as a result of participating in the VSR trial. The VSR trial will be enhanced if a ship over its entire route (e.g., China to Port of LA) does not consume more fuel due to the slowdown in the

Channel. Any fuel records or data you can provide to APCD for a participating ship before and during the trial over the same route would help us determine if the VSR trial is achieving the stated goals. Similarly, documentation of total trip time for the same routes could serve as an indicator of fuel use. Participating vessels are also encouraged to report the number, location, and, if possible, species of any whales sighted, during each transit.

This program is only open for a limited time. Your quick response is needed to confirm your company's opportunity to participate. Please return the completed vessel registration form and signed Letter of Understanding to Sean Hastings with CINMS no later than June 30, 2014. For additional details, comments or questions on the VSR Trial Program please contact:

Sean Hastings
Channel Islands National Marine Sanctuary
University of California, Santa Barbara
Ocean Science Education Building 514, MC 6155
Santa Barbara, CA 93106
Phone: [805-893-6424](tel:805-893-6424)
Fax: [805-568-1582](tel:805-568-1582)
sean.hastings@noaa.gov

Brian Shafritz
Santa Barbara County Air Pollution Control District
Phone: [805-961-8823](tel:805-961-8823)
ShafritzB@sbcapcd.org

We believe by working together we can maintain vibrant maritime commerce and protect human health and the marine environment. We thank you in advance for considering your company's participation in the VSR trial.

Sincerely,

APCD

CINMS

EDC

NMSF

Cc:

PMSA

Enclosures:

Letter of Understanding

Vessel Registration Form

Map of the VSR Zone in the Santa Barbara Channel

VESSEL REGISTRATION FORM
Santa Barbara Channel Vessel Speed Reduction (VSR) Trial Program

Please return with signed Letter of Understanding to Sean Hastings at Channel Islands
National Marine Sanctuary no later than June 30, 2014

Registration Requirements*:

Program is open to any vessel that operated in the Santa Barbara Channel Jan.-June 2014, had an average speed of 14 knots or greater over all transits, participates in the Ports of LA or Long Beach VSR programs (20 or 40 nautical miles) and has signed the Letter of Understanding.

Section 1 – VESSEL OPERATOR CONTACT INFORMATION:

Vessel Operator Name: _____
Business Address: _____
City, State, Country, Zip: _____
Contact Name: _____
Phone Number: _____
Fax Number: _____
Email Address: _____

Section 2 - PAYMENT INFORMATION:

Write “same as above”, or enter different contact below:

Payee Name for Incentive: _____
Business Address: _____
City, State, Country, Zip: _____
Contact Name: _____
Phone Number: _____
Fax Number: _____
Email Address: _____

Section 3 – Vessel Information:**

Vessel 1 Name and IMO#: _____
Transit Date/s between July-Oct. 2014: _____
Starting port of call: _____
Ending port of call: _____

Vessel 2 Name and IMO#: _____
Transit Date/s between July-Oct. 2014: _____
Starting port of call: _____
Ending port of call: _____

Additional Vessels – please list all vessel details on separate sheet



June 6, 2014

SHIPPING LINE: _____

Re: Letter of Understanding (LOU) to participate in the voluntary **Vessel Speed Reduction (VSR) Incentive Trial 2014** for the Santa Barbara Channel

In accordance with the VSR Cover Letter dated June 6, 2014, the above shipping line agrees to participate in the VSR trial program for grant funds administered by the National Marine Sanctuary Foundation. In order to receive incentive funds, the above shipping line agrees to the following:

- 1) Identify on the attached registration form a vessel(s) and transit(s) that will maintain a speed of 12 knots or lower in the VSR Zone as identified in the attached map between the dates of July 1, 2014 and October 31, 2014. A transit is defined as a one-way passage through the VSR Zone from Point Arguello to the 40 nm limit of the Ports of Long Beach and Los Angeles, Vessel Speed Reduction Program.
- 2) The registered vessel(s) participates in the existing Port of Los Angeles or Port of Long Beach VSR program (either the 20 nautical mile or 40 nautical mile program).

The Santa Barbara County Air Pollution Control District (APCD), and the Channel Islands National Marine Sanctuary (CINMS), shall use AIS data to compute and verify the average speed for each transit, and if all criteria are met, transmit to the National Marine Sanctuary Foundation a letter of payment approval with supporting data. After receiving the payment approval letter the National Marine Sanctuary Foundation agrees to:

1. Distribute \$2,500 in incentive funds per verified transit no later than January 1, 2015.

In addition to the incentive payment(s), the above shipping line will be recognized for its participation in the trial program through various media related and project news releases and announcements, to be approved by all parties.

Please return the completed vessel registration form and signed LOU to Sean Hastings at CINMS no later than June 30, 2014. CINMS and APCD will verify the registered ship's eligibility and upon verification forward the LOU and Vessel Registration form to the National Marine Sanctuary Foundation for enrollment.

Sean Hastings
Channel Islands National Marine Sanctuary
University of California, Santa Barbara
Ocean Science Education Building 514, MC 6155
Santa Barbara, CA 93106
Phone: [805-893-6424](tel:805-893-6424)
Fax: [805-568-1582](tel:805-568-1582)
sean.hastings@noaa.gov

Decisions concerning safe navigation and maneuvering of participating vessels remain entirely with ship masters and crew. The APCD, CINMS, Environmental Defense Center, Santa Barbara Foundation and National Marine Sanctuary Foundation are not liable for any loss, damage, or harm resulting from participation in this Vessel Speed Reduction Incentive Trial.

In signing this LOU, the undersigned recognize and accept the roles and responsibilities assigned to each party.

Signature: _____ Date: _____

Jason Patlis
Executive Director
National Marine Sanctuary Foundation

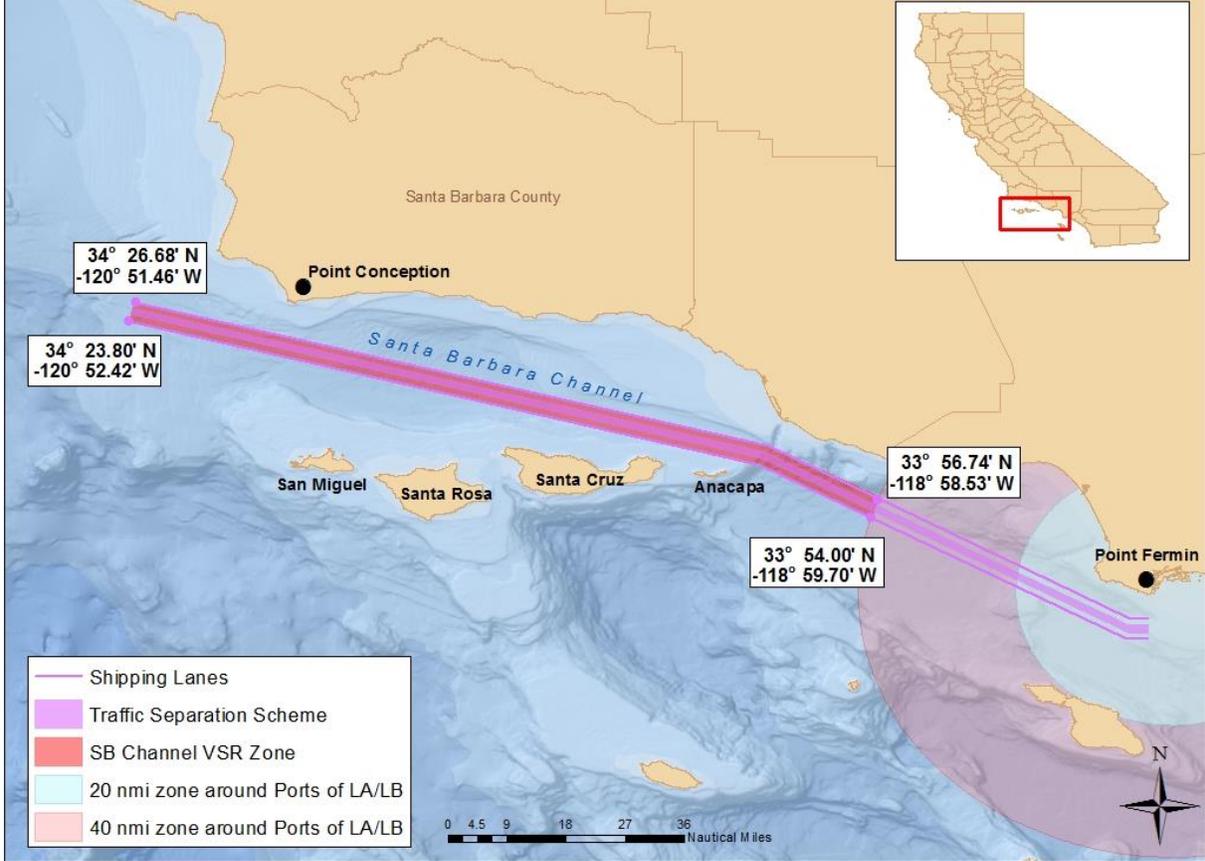
Signature: _____ Date: _____

Name: _____

Position Title: _____

Shipping Line: _____

Vessel Speed Reduction Trial 2014 for the Santa Barbara Channel





July 11, 2014

Subject: Letter of Understanding (LOU) and Clarifying Information on VSR Trial

Dear _____:

The Channel Islands National Marine Sanctuary, Santa Barbara County Air Pollution Control District, Environmental Defense Center, and the National Marine Sanctuary Foundation congratulate (*shipping line*) on successful enrollment in our Vessel Speed Reduction (VSR) Trial Program in the Santa Barbara Channel.

Due to high demand to participate in the VSR Trial Program we can commit to provide financial incentives for only these vessels listed on your Vessel Registration Form:

- (*vessel name*) with a transit on or about x/xx/2014;
- (*vessel name*) with a transit on or about x/xx/2014; and
- (*vessel name*) with a transit on or about x/xx/2014.

Should additional funds become available, these other enrolled vessels and transits on the Vessel Registration Form are pre-qualified and would be eligible to receive financial incentives:

- (*vessel name*) with a transit on or about x/xx/2014; and
- (*vessel name*) with a transit on or about x/xx/2014.

We will be in contact on the status of funding and ability to offer incentives to additional vessels.

We believe by working together we can maintain vibrant maritime commerce and protect human health and the marine environment. We thank you in advance for your company's participation in the VSR trial.

Signature: _____

Jason Patlis, President and CEO
National Marine Sanctuary Foundation

Enclosures:

Signed Letter of Understanding
Vessel Registration Form

Attn: _____
Shipping Company Address



December 8, 2014

Subject: Vessel Speed Reduction (VSR) Trial Program, Santa Barbara Channel

Dear _____:

NOAA's Channel Islands National Marine Sanctuary (CINMS) and the Santa Barbara County Air Pollution Control District (APCD) have processed the Santa Barbara Channel Vessel Speed Reduction Trial AIS data and have confirmed that ___ of _____'s enrolled transits met the 12 knot or less speed requirement. Qualifying vessels and their calculated average speeds in the VSR Zone are given below:

- ___ knots for the *(vessel name)* on x/xx/2014 through x/xx/2014
- ___ knots for the *(vessel name)* on x/xx/2014 through x/xx/2014
- ___ knots for the *(vessel name)* on x/xx/2014 through x/xx/2014

As per the Letter of Understanding, the National Marine Sanctuary Foundation is providing a payment for these qualifying vessels in the amount of \$2,500 per enrolled transit for a total amount of \$_____.

The VSR Trial partners will be following up with a survey and/or meeting request to solicit feedback on the VSR Trial and inquire about interest in future programs.

On behalf of the VSR Trial partners, I thank you for your company's participation in our program.

Sincerely,

Jason Patlis
President and CEO
National Marine Sanctuary Foundation