2010-2011 Bren Group Project Proposal
Boats, Whales, & the Santa Barbara Channel:
An economic analysis & policy options for reducing the risk of vessel strikes to endangered whales

Bren Student Proposers
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Problem Statement
From September to November 2007, at least four blue whales were confirmed to have been struck and killed by marine vessels, likely in the Southern California Bight, which includes the Santa Barbara Channel. NOAA’s National Marine Fisheries Service (NMFS—see Appendix 1) declared this an Unusual Mortality Event (UME), and called for an immediate response. After the mortalities in 2007, NOAA recommended that commercial vessels voluntarily reduce their speed to 10 knots while traveling through the Channel to reduce the risk of striking and killing a whale. These voluntary speed reduction requests continued in the summer and fall of 2008 and 2009, but vessel monitoring data suggests that ships have not slowed to the recommended speeds (Abramson et al. 2009). The challenge in implementing an appropriate prevention strategy is that blue, fin, humpback, and other large whales often co-occur with the heavily used international shipping lanes that run through the Channel.

Prior to the events of 2007 there was a maximum of three documented blue whale fatalities in a given year off the California coast. Because of the UME, the Channel Islands National Marine Sanctuary (CINMS) has prioritized the development of long-term management measures to reduce ship strikes to endangered whales in the Channel region. The Bren School will be integral to the decision-making process by providing NMFS and CINMS with analyses of the economic implications of proposed management options that best meet the agencies’ goals and mandates.

Project Objectives
The objectives of this study are to help CINMS move forward with actions recommended by its Sanctuary Advisory Council (SAC) to reduce the threat of ship strikes. The project will:

1. Collect and synthesize ship and ship traffic information in the Southern California Bight, including characteristics of ships (i.e. maximum speed, size, acoustic output). Summarize differences in ship behavior or trends during different months of the year.

2. Synthesize relevant information, including associated costs, from existing scientific literature on vessel strikes to large whales, along with voluntary measures and regulatory responses to reduce the threat of ship strikes.

3. Quantify the costs to commercial ships over the next 25 years (in set increments i.e. annually, 5, 10, 15, years etc.) if the current scheme is altered by:
   - A reduction of speed in the Channel at different distance increments.
   - A shift in the location of shipping lanes to the north or south of the current shipping lane.

4. Develop a Cost Benefit Analysis of implementing the following options, if possible at varying levels of impact (reduction in ship strikes by 1, 2, or 3 statistical whales per year):
   - Voluntary versus mandatory speed reductions
   - Spatial and/or Dynamic Management Areas
   - Areas To Be Avoided
   - Other options not already considered in the SAC’s recommendations.
**Project Significance**

The Santa Barbara Channel experiences some of the highest densities of commercial maritime traffic in the world. Annually, 6,500 large vessels travel through the Channel, and maritime commerce is expected to double over the next 15 years, increasing the already significant threat of ship strikes to whales in this area (Silber et al. 2009). NMFS and CINMS are proposing to sponsor this Bren School Group Project to help achieve their stated objectives of deciding how to best reduce the threat of commercial ships striking and killing endangered whales. The ultimate goal of this project is to reduce the number of whales killed in the Channel by accidental collisions with ships without causing unnecessary economic impediments to the shipping industry. Additionally, the methods and models developed for this study can be expanded in the future to guide management decisions in other areas along the west coast where vessel collisions may occur.

**Background Information**

CINMS was designated by NOAA for the protection of the Santa Barbara Channel Islands’ natural and cultural resources under the National Marine Sanctuary Act. NMFS is responsible for implementing the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). Together, CINMS and NMFS are considering the socio-economic effects, feasibility, and appropriateness of implementing the management recommendations outlined by the SAC.

In developing its recommendations, the SAC evaluated case studies in the Stellwagen Bank National Marine Sanctuary (SBNMS) and other areas. The SBNMS case study focused on the reduction of the threat of ship strikes on North Atlantic right whales and determined that SMAs and DMAs imposed minimal economic and logistical impacts on the commercial shipping industry and resulted in reduced threat of ship strikes. The recent actions of NMFS to analyze alternatives, resulting in the designation of SMAs, DMAs and ATBAs along the eastern seaboard in major habitat areas of the critically endangered North Atlantic right whale may have transferability to the Santa Barbara Channel.

**Approach & Available Data**

Evaluation of potential management alternatives will require analysis of commercial vessel behavior in the Santa Barbara Channel. Existing vessel tracking information from the Automatic Information System (AIS) will be incorporated into a model that demonstrates general vessel behavioral trends. CINMS and NMFS will provide access to AIS data, as well as aerial and vessel whale monitoring data from the Sanctuary Aerial Monitoring and Spatial Analysis Program (SAMSAP). They will also provide training and support in working with ShipPlotter, the AIS program used for real time ship tracking.

Most of the data supplied by CINMS and NMFS will be in a base format, usually either simple text files, or semi processed as .csv or other spreadsheet and GIS compatible file structures. A majority of the data analysis for the project will use ArcGIS, Excel, or Access, with some information being analyzed using Matlab as well.

Collaboration between Bren students and members of the shipping industry will be critical for evaluating the costs of potential management options to the industry. A comprehensive analysis of costs (including labor, fuel, reduced efficiency, etc.) will be conducted with assistance from shipping industry groups and CINMS.

NOAA will assist the students with setting up meetings with key stakeholders including the Sanctuary Advisory Council, whale researchers, the Pacific Merchant Shipping Association, Southern California Marine Exchange, and other related shipping industry trade groups and regulatory bodies, such as the U.S. Coast Guard.
**Deliverables**
A final report and presentation to NMFS and CINMS will include:
- Analysis of the costs and benefits of various management options to achieve NOAA's goals.
- Analysis of voluntary versus regulatory management options.
- Information to identify incentives that NOAA can use to encourage mandate compliance.
- The ship and ship traffic information collected, including the models for ship behavior.
- A description and review of the current literature available on vessel strikes and whales, along with voluntary measures and regulatory responses to reduce the threat of ship strikes.

**Stakeholders**
NOAA's National Marine Fisheries Service
NOAA’s Channel Islands National Marine Sanctuary
International Maritime Organization
Shipping Industry along the West Coast of the United States
Local whale watching businesses

**Clients**
*NOAA’s Channel Islands National Marine Sanctuary*
Sean Hastings, Resource Protection Coordinator (Sean.Hastings@noaa.gov)

*NOAA’s National Marine Fisheries Service (NMFS), Southwest Regional Office*
*Protected Species Management Division*
Tina Fahy (Christina.Fahy@noaa.gov) & Monica DeAngelis (Monica.DeAngelis@noaa.gov)

**Advisory Panel/Collaborators**
Captain Richard McKenna, Southern California Marine Exchange
T.L. Garret, Pacific Merchant Shipping Association

**Commitment by the Clients**
Please see the attached letters from Chris Mobley, Sanctuary Superintendent, indicating the commitment by CINMS and the attached letter from Chris Yates indicating the commitment by the NMFS Southwest Regional Office.

**Financial Deliverables and Internship Opportunities**
Standard Group Project funding from the Bren School will be sufficient to cover administrative costs of the project (conference calls, possible travel to NMFS office, etc). NOAA’s Channel Islands National Marine Sanctuary in Santa Barbara will host 1 to 2 graduate student interns with office space. Stipends may also be available. NOAA’s National Marine Fisheries Service Southwest Regional Office in Long Beach may also host a graduate student intern with office space and a possible stipend.
References


## Appendix 1  List of Acronyms

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AIS</td>
<td>Automatic Information System</td>
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<tr>
<td>ATBA</td>
<td>Areas To Be Avoided, <em>an existing NOAA management strategy</em></td>
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<tr>
<td>CINMS</td>
<td>Channel Islands National Marine Sanctuary</td>
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<tr>
<td>DMA</td>
<td>Dynamic Management Area, <em>an existing NOAA management strategy</em></td>
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<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
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<td>MMPA</td>
<td>Marine Mammal Protection Act</td>
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<td>NMFS</td>
<td>National Marine Fisheries Service</td>
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<td>NOAA</td>
<td>National Oceanographic and Atmospheric Administration</td>
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<td>SAC</td>
<td>Sanctuary Advisory Council</td>
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<td>SAMSAP</td>
<td>Sanctuary Aerial Monitoring and Spatial Analysis Program</td>
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<td>SBNMS</td>
<td>Stellwagen Bank National Marine Sanctuary</td>
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<tr>
<td>SMA</td>
<td>Spatial Management Area, <em>an existing NOAA management strategy</em></td>
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<tr>
<td>UME</td>
<td>Unusual Mortality Event</td>
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