Reducing the Risk of Vessel Strikes to Endangered Whales in the Santa Barbara Channel

Photo Credit: John Calambokidis, Cascadia Research

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Advisor: Christopher Costello

Clients: Sean Hastings, Channel Islands National Marine Sanctuary
Monica DeAngelis & Tina Fahy, National Marine Fisheries Service

Whales and Ships Often Co-Occur

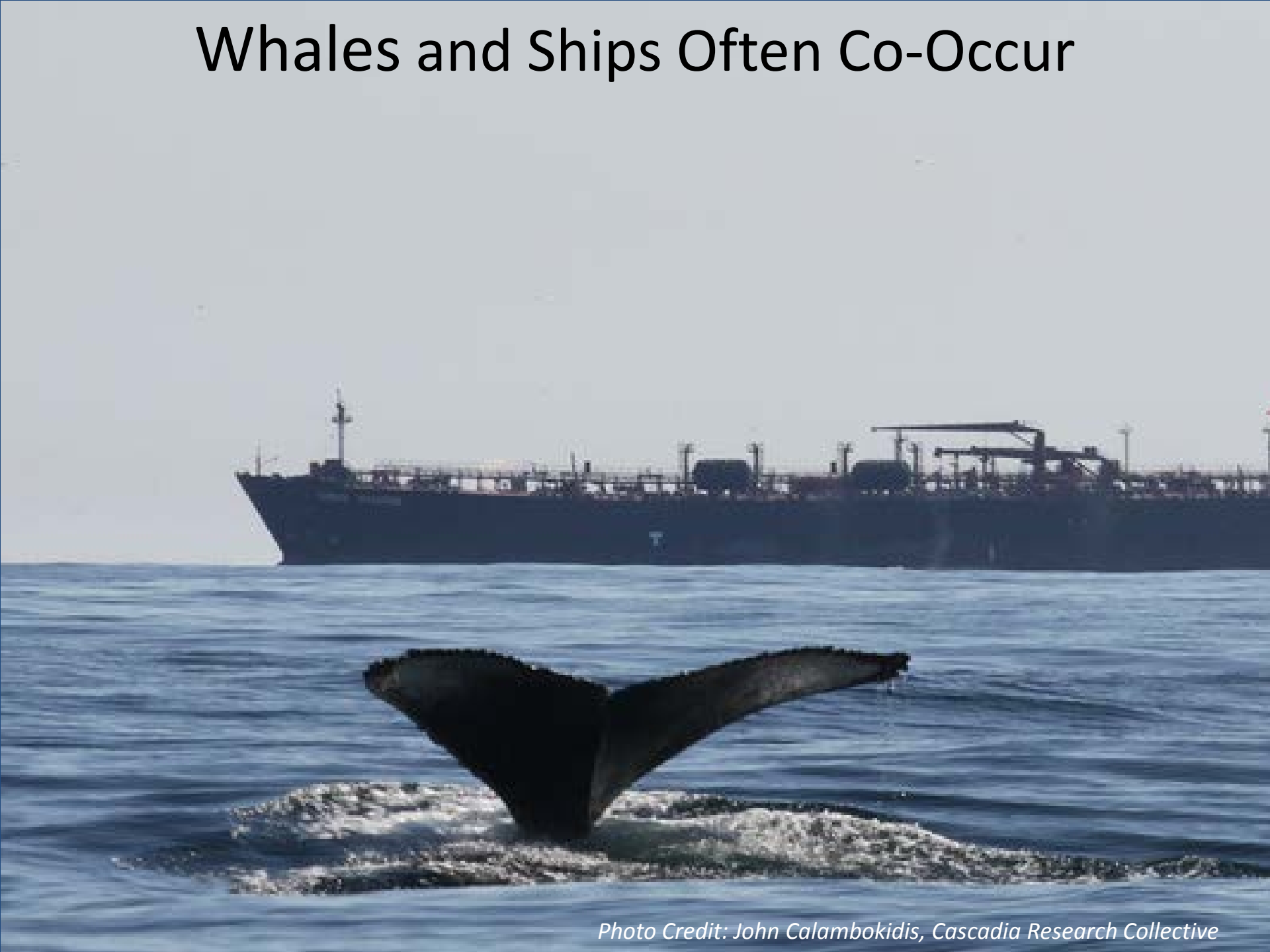
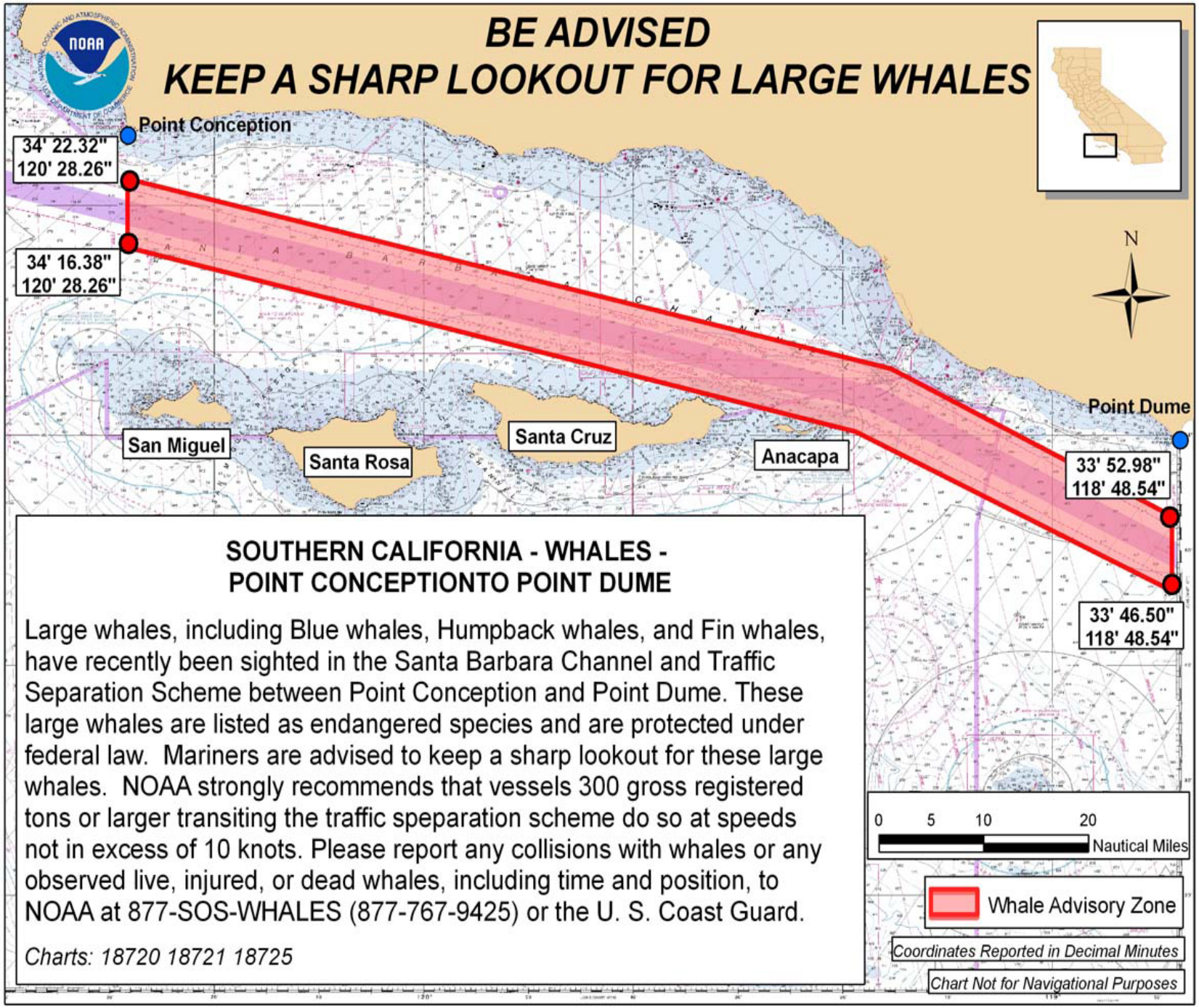


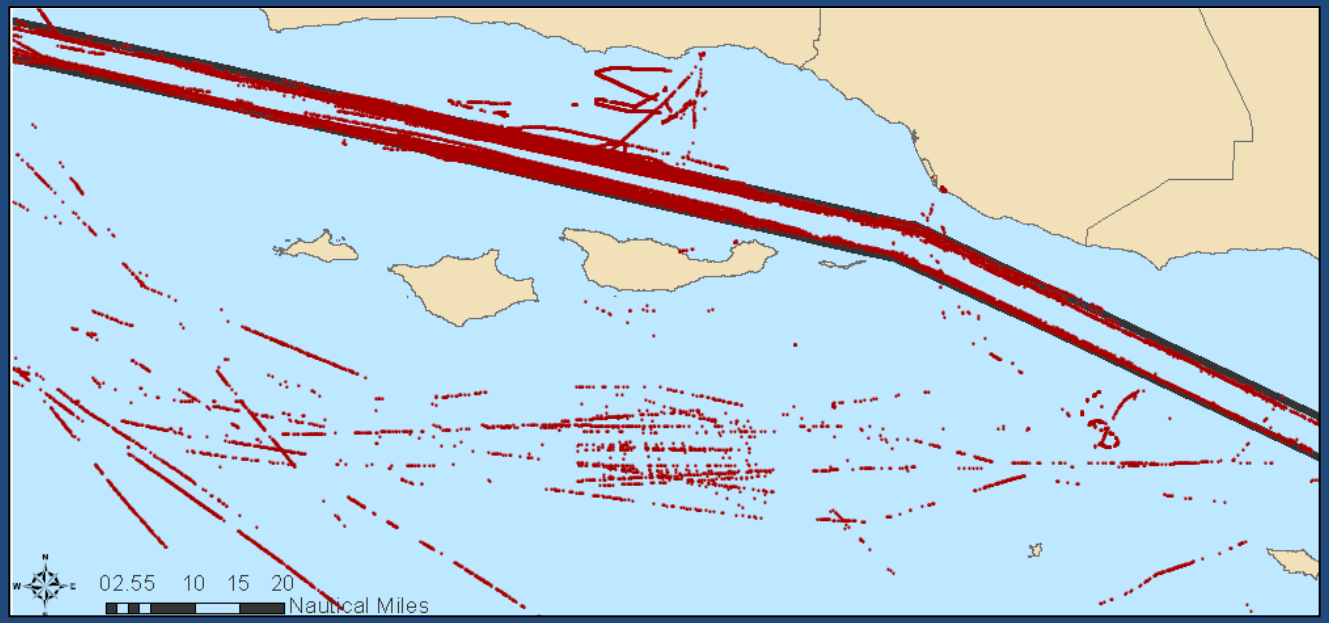
Photo Credit: John Calambokidis, Cascadia Research Collective

Current Management Strategy

Photo Credit: John Calambokidis, Cascadia Research Collective

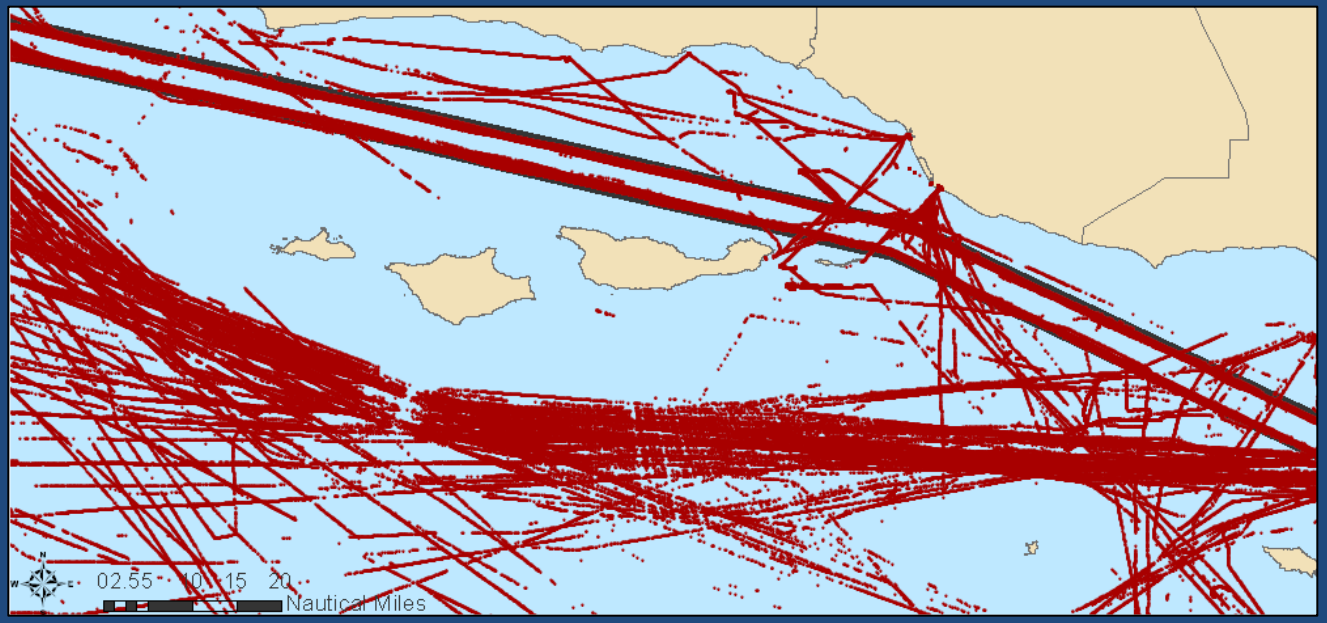

BE ADVISED
KEEP A SHARP LOOKOUT FOR LARGE WHALES
Point Conception
34' 22.32"
120' 28.26"
34' 16.38"
120' 28.26"
San Miguel
Santa Rosa
Santa Cruz
Anacapa
Point Dume
33' 52.98"
118' 48.54"
33' 46.50"
118' 48.54"
N
SOUTHERN CALIFORNIA - WHALES -
POINT CONCEPTIONTO POINT DUME
Large whales, including Blue whales, Humpback whales, and Fin whales, have recently been sighted in the Santa Barbara Channel and Traffic Separation Scheme between Point Conception and Point Dume. These large whales are listed as endangered species and are protected under federal law. Mariners are advised to keep a sharp lookout for these large whales. NOAA strongly recommends that vessels 300 gross registered tons or larger transiting the traffic speparation scheme do so at speeds not in excess of 10 knots. Please report any collisions with whales or any observed live, injured, or dead whales, including time and position, to NOAA at 877-SOS-WHALES (877-767-9425) or the U. S. Coast Guard.
Charts: 18720 18721 18725
0 5 10 20
Nautical Miles
Whale Advisory Zone
Coordinates Reported in Decimal Minutes
Chart Not for Navigational Purposes

Vessel Traffic in the Region

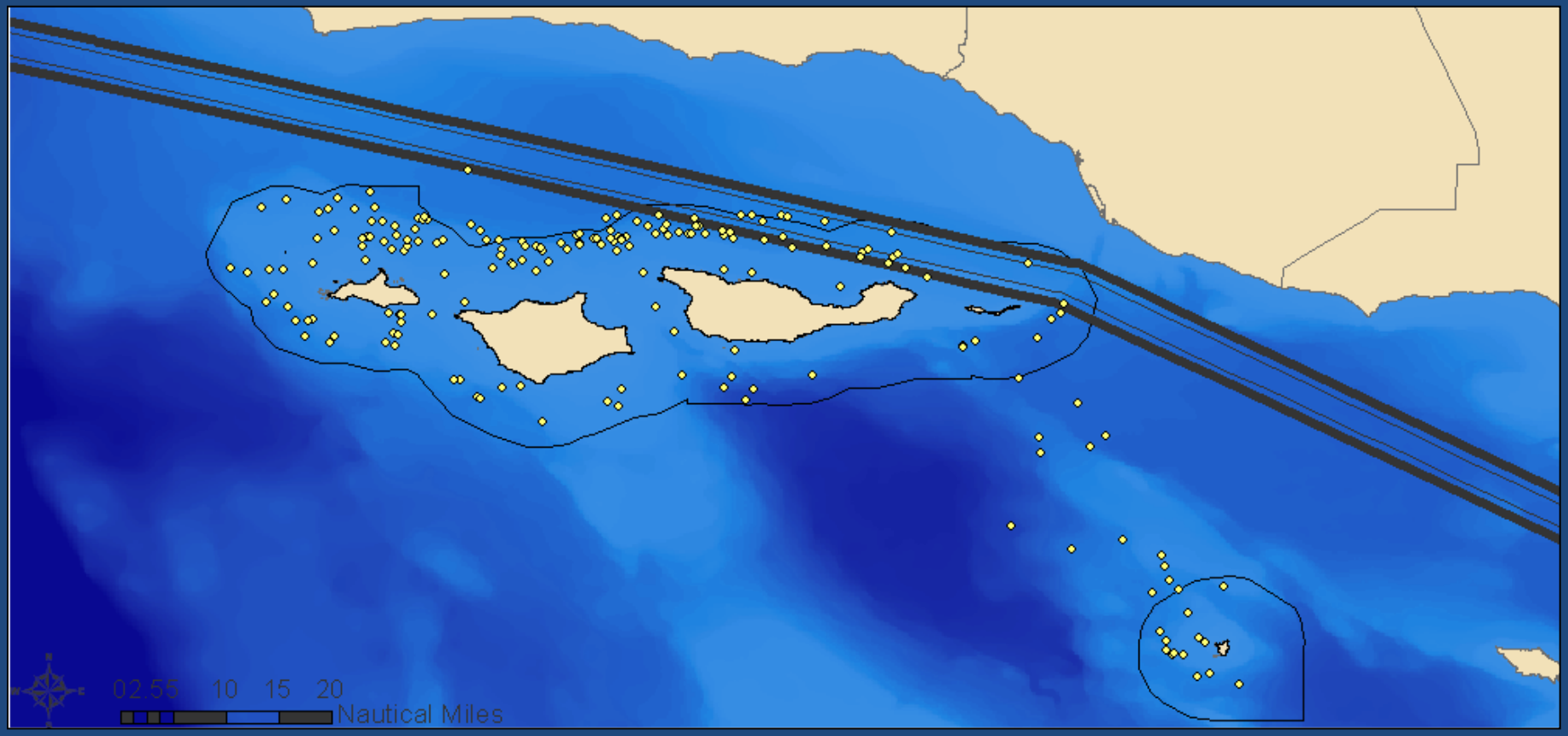


June 2009

September 2009

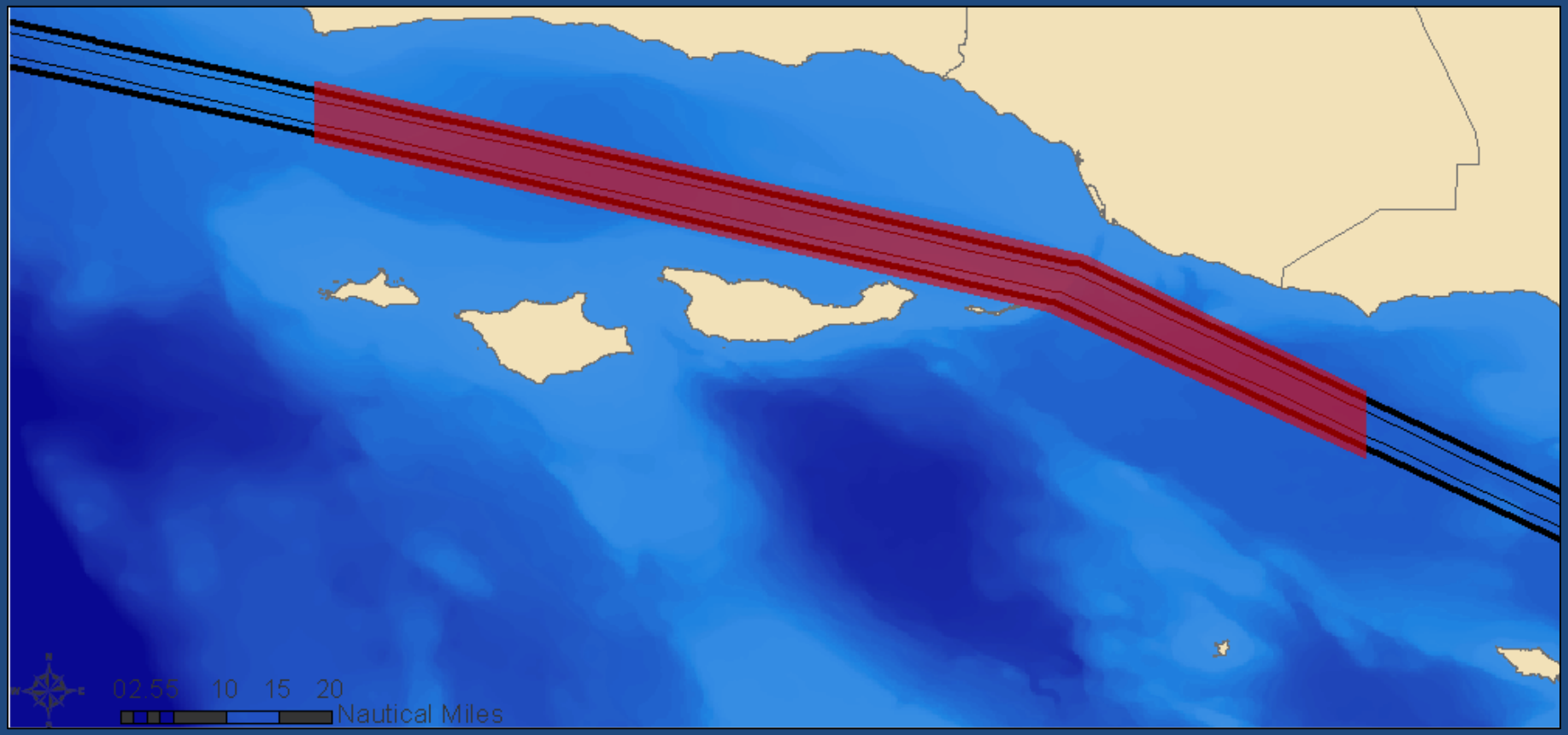


Whale Observations in the Region



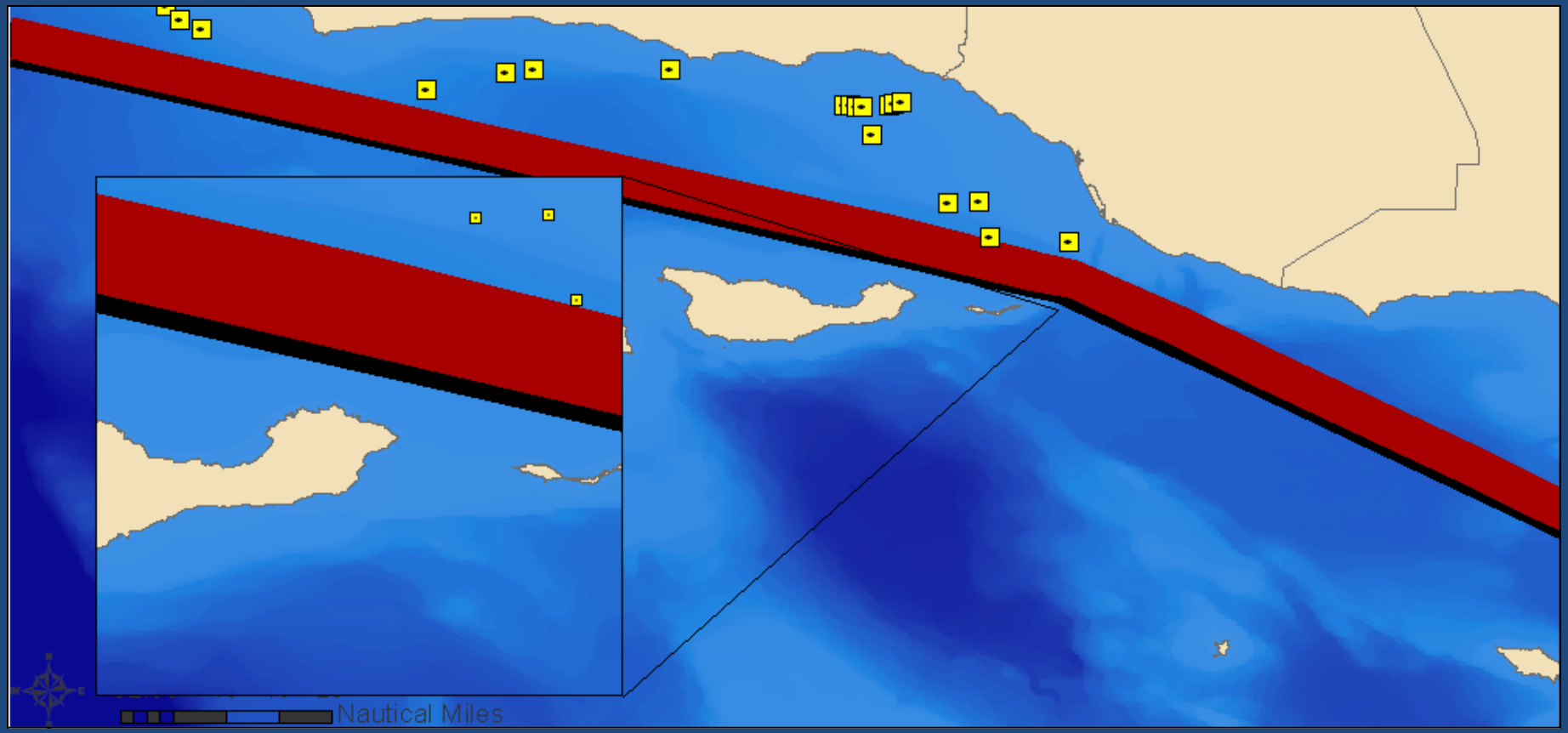
Sanctuary observations of blue, fin and humpback whales from 1997-2010

Management Options 1 & 2: Year-Round and Seasonal Speed Reduction



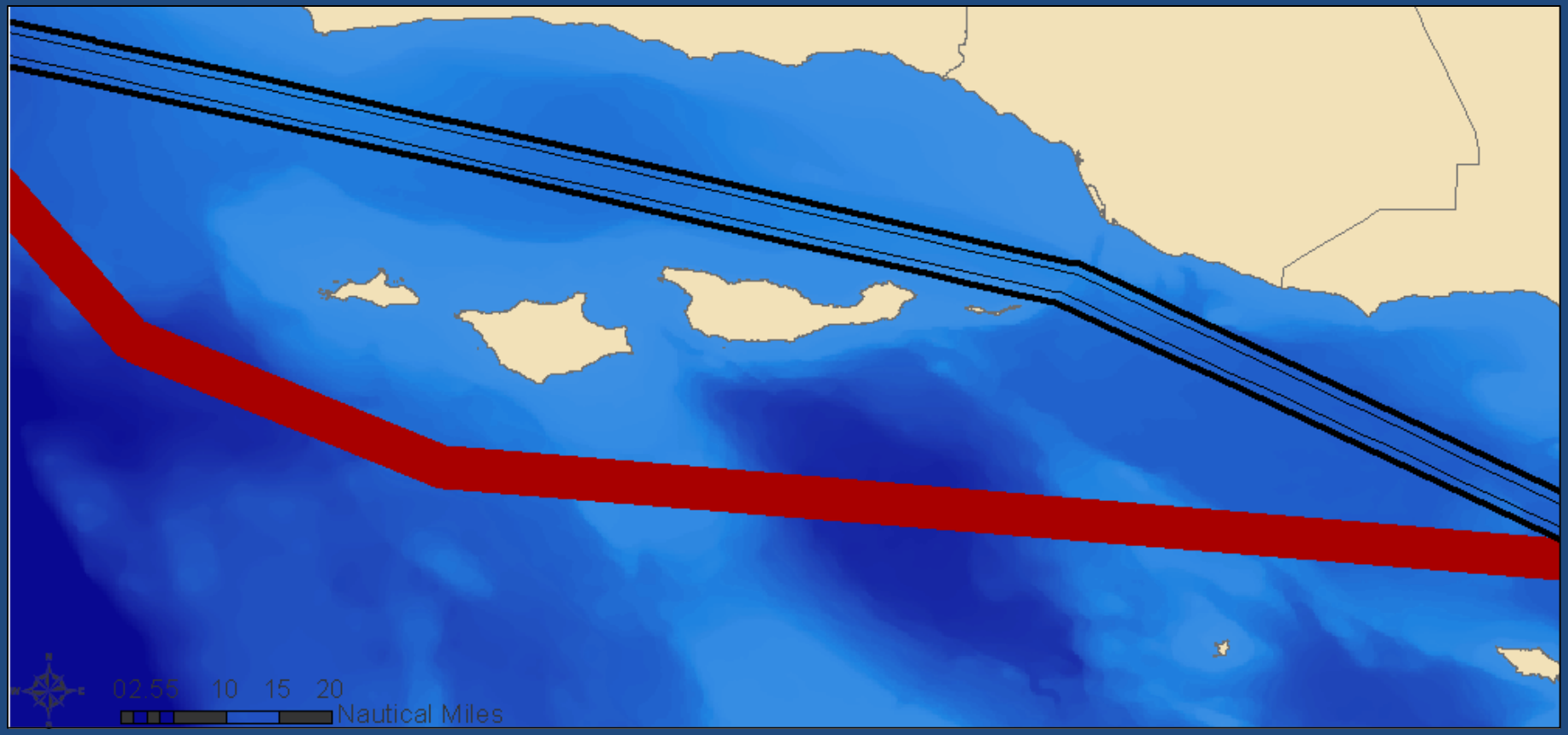
Speed reduced to 10 knots

Management Option 3:
Narrow Vessel Traffic Lanes



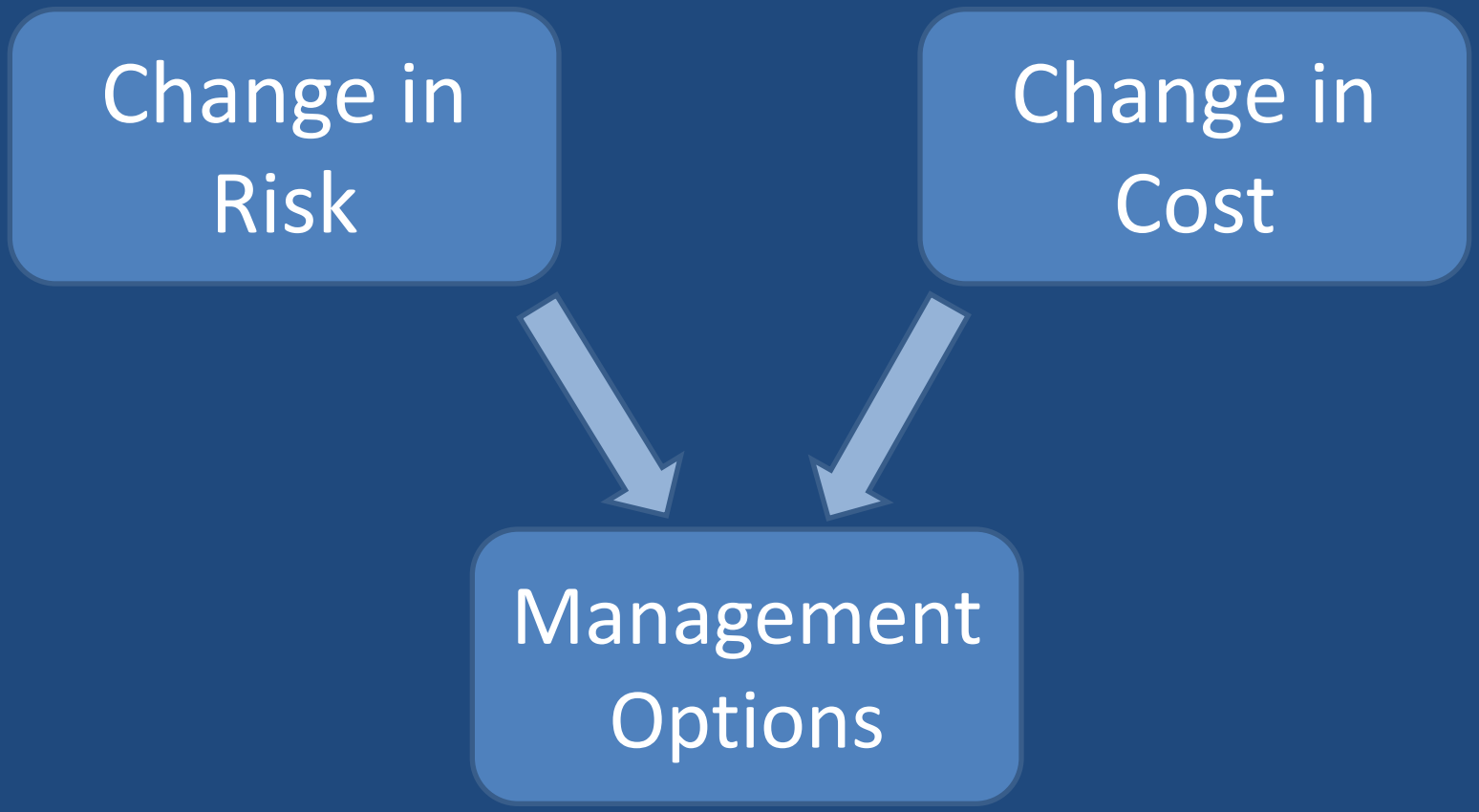
Narrow separation between traffic lanes by 0.65 nautical miles
Decrease transit distance by 0.07 nautical miles

Management Option 4:
Shift Vessel Traffic Lanes South

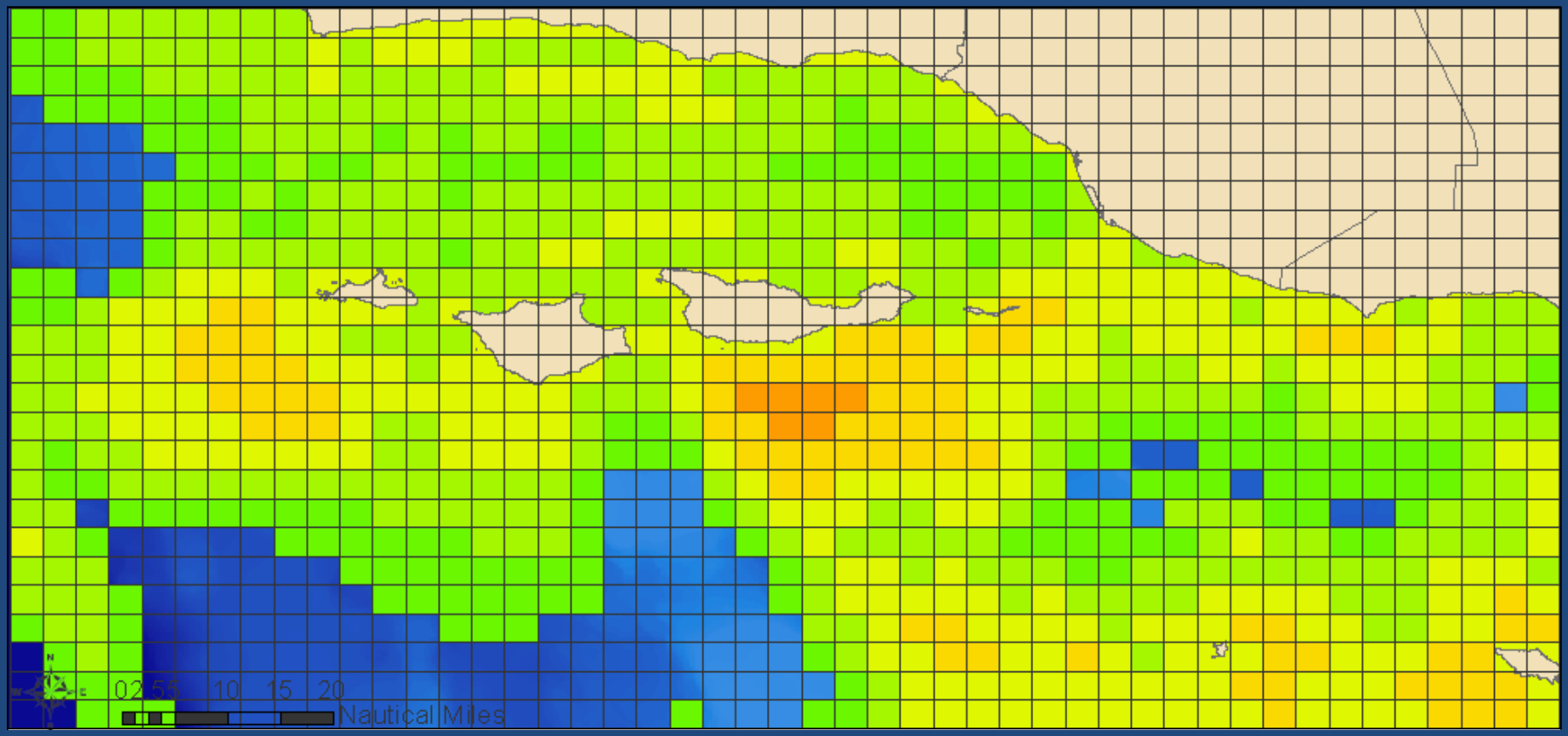


Increase transit distance by 13.8 nautical miles

Evaluating Management Options

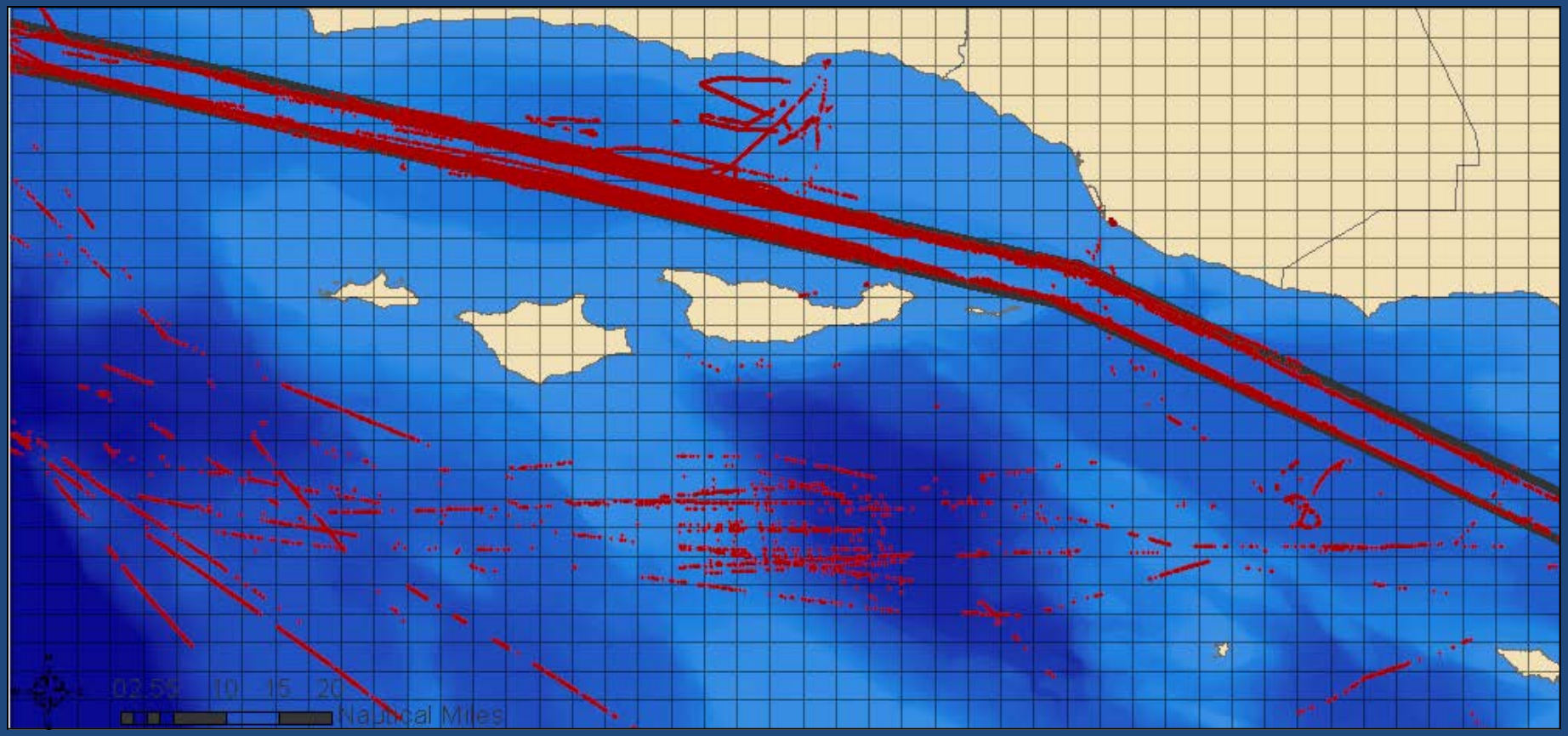


Analyzing Whale Distribution



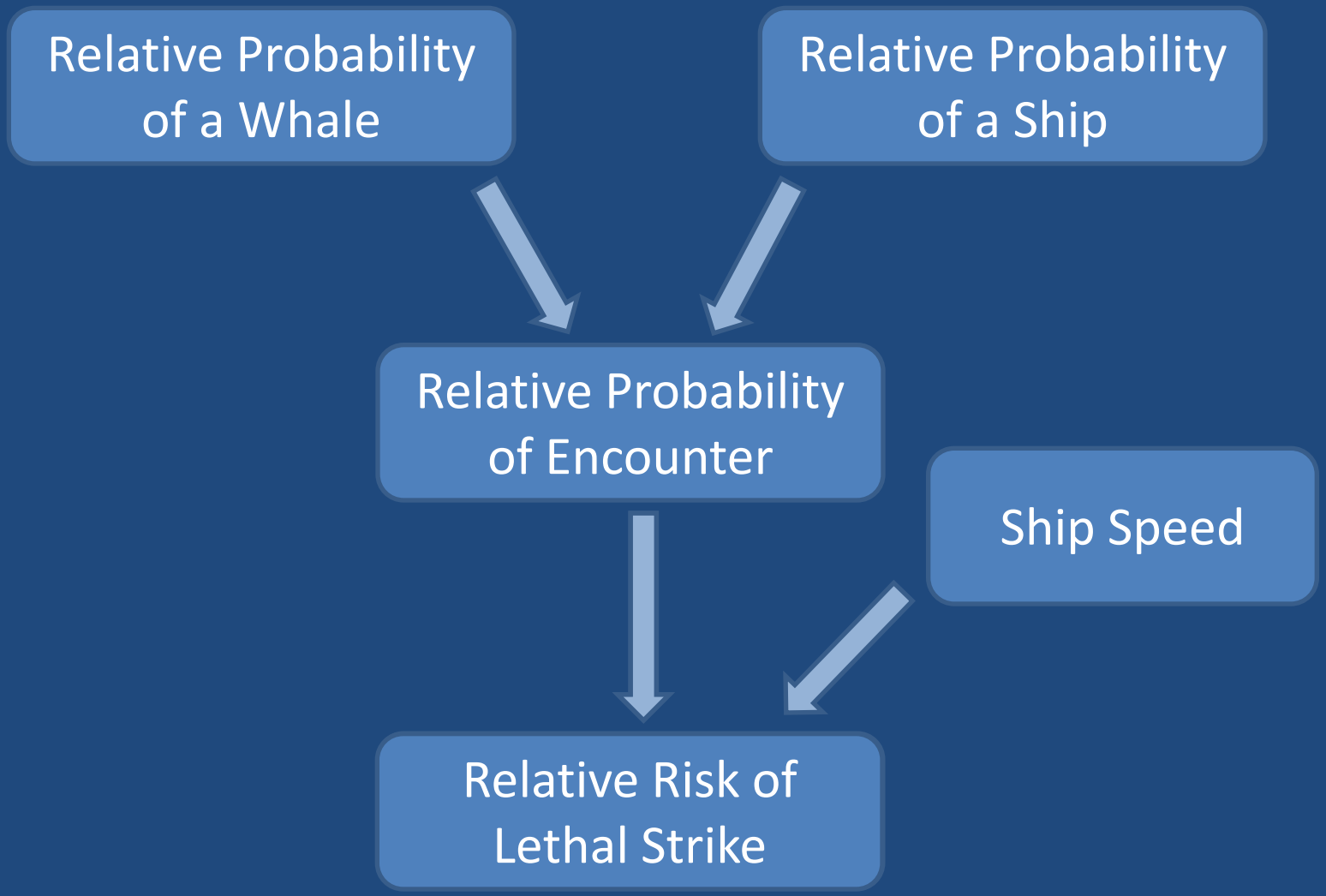
Sanctuary observations of blue, fin and humpback whales from 1997-2010

Representative Vessel Traffic in the Region

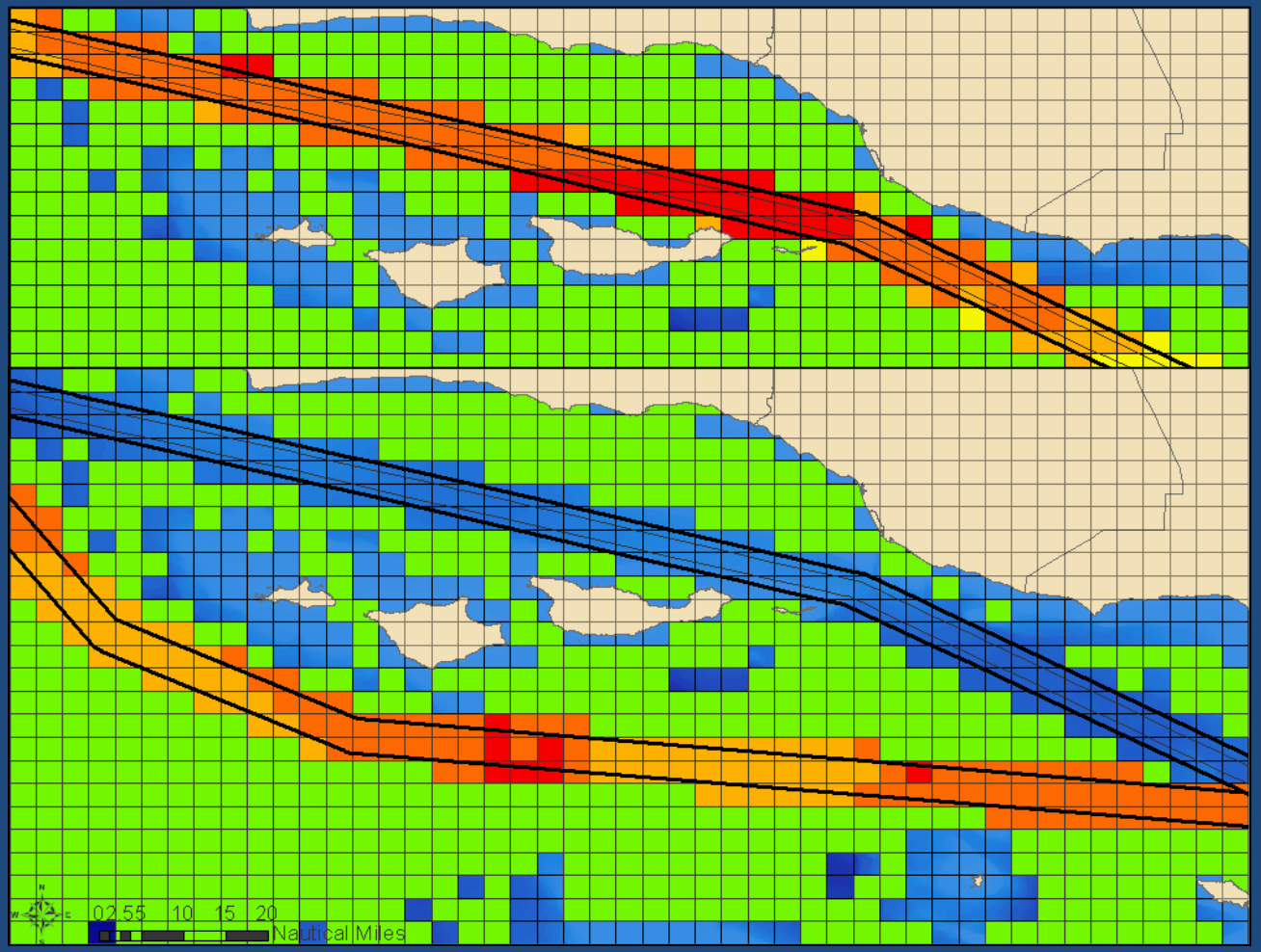


Vessel traffic before low-sulfur fuel regulation

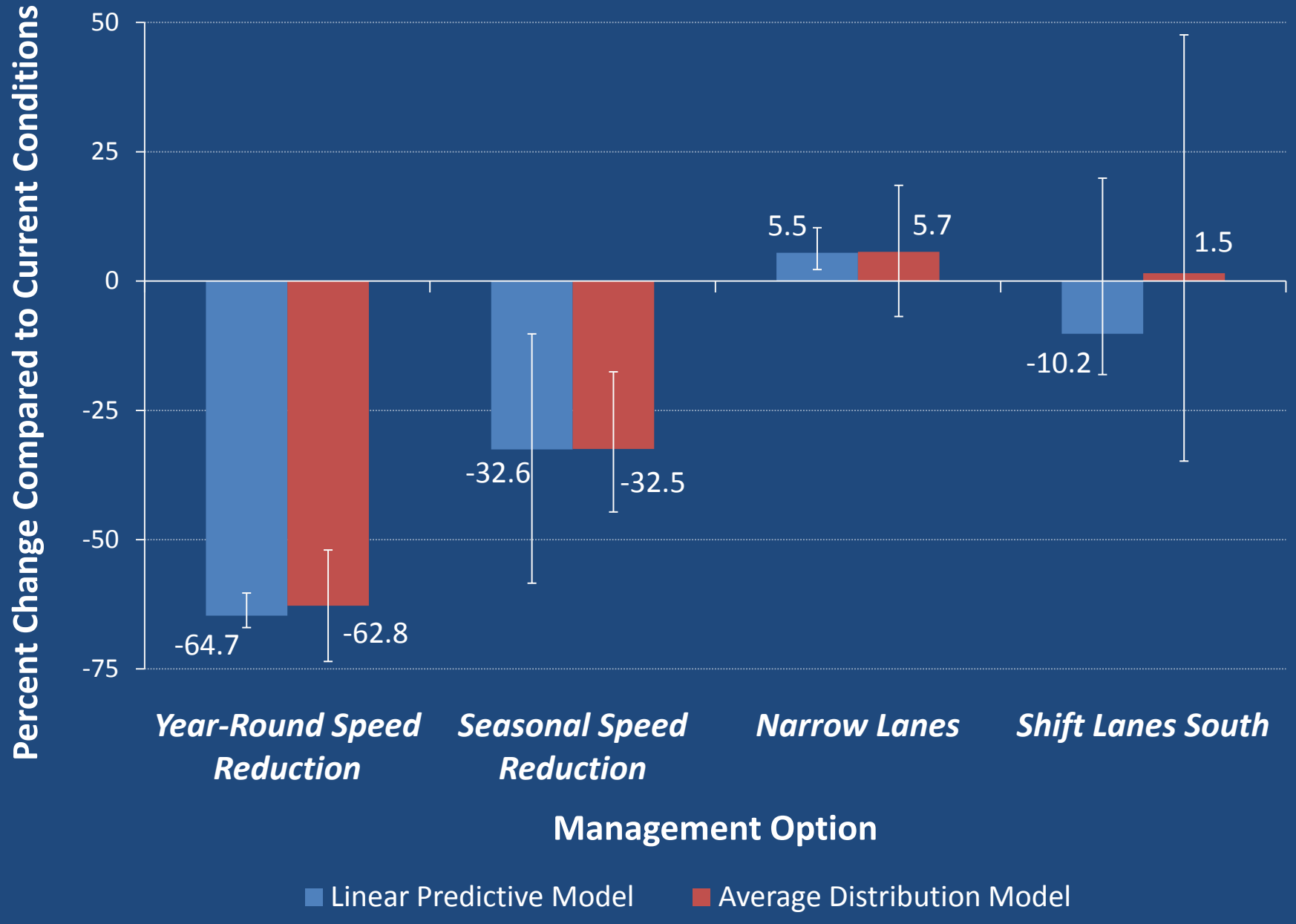
Determining Relative Risk of a Lethal Strike



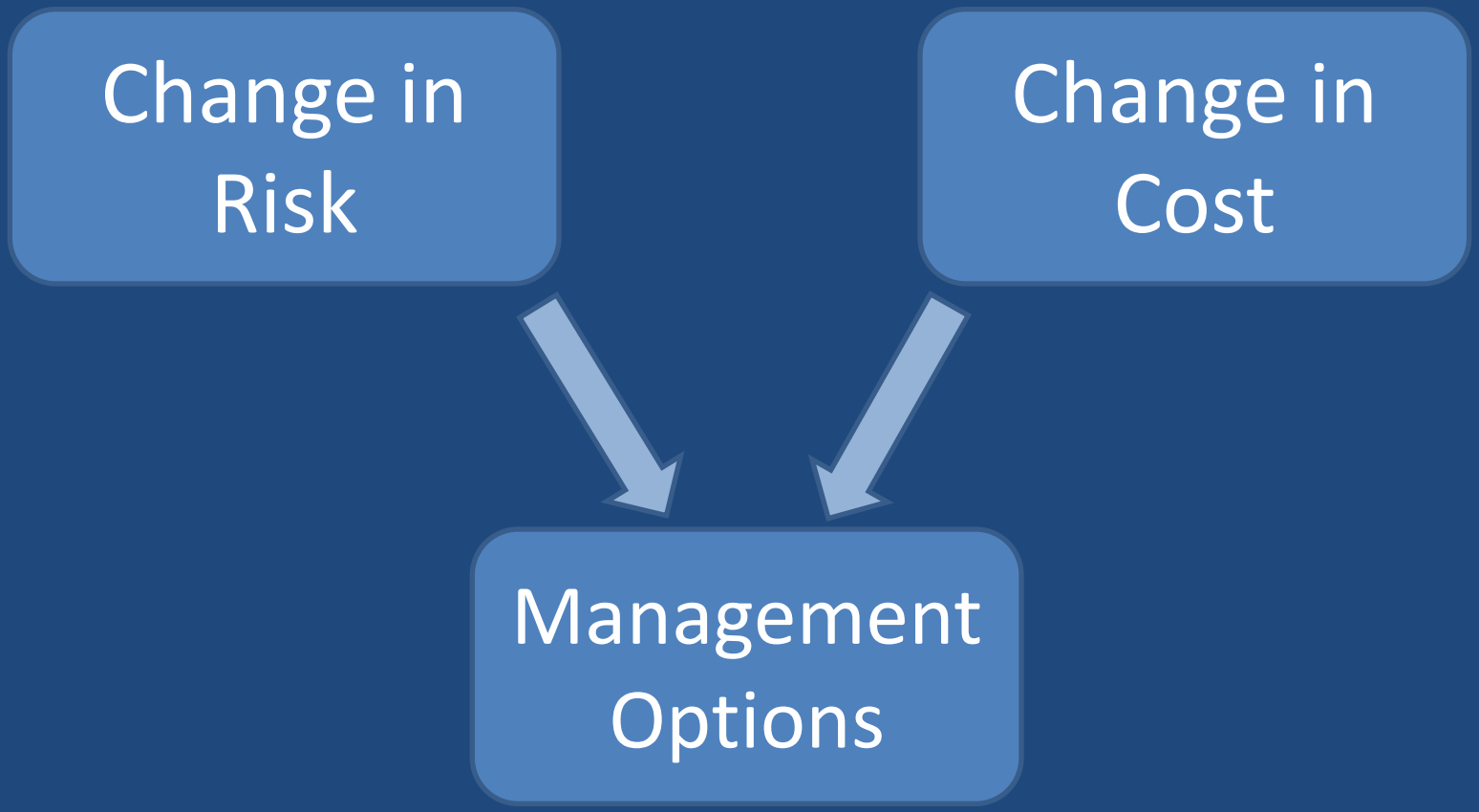
Change in Relative Risk of a Lethal Strike



Percent Change in Relative Risk of a Lethal Strike



Evaluating Management Options



Costs of Management to the Shipping Industry

Costs of Management to the Shipping Industry

Change in Total Cost = Change in Voyage Cost + Change in Operating Cost + Cost of Delay from Navy Operations + Alpha

Change in an individual ship's costs resulting from management of vessel strikes

Costs of Management to the Shipping Industry

Change in Total Cost = Change in Voyage Cost + Change in Operating Cost + Cost of Delay from Navy Operations + Alpha

Change in fuel cost

Change in lubricant cost

Costs of Management to the Shipping Industry

Change in Total Cost = Change in Voyage Cost + Change in Operating Cost + Cost of Delay from Navy Operations + Alpha

Crew overtime cost

Repair and maintenance cost

Costs of Management to the Shipping Industry

Change in Total Cost = Change in Voyage Cost + Change in Operating Cost + Cost of Delay from Navy Operations + Alpha

Cost of Delay From Navy Operations

Costs of Management to the Shipping Industry

Change in Total Cost = Change in Voyage Cost + Change in Operating Cost + Cost of Delay from Navy Operations + Alpha

Additional costs

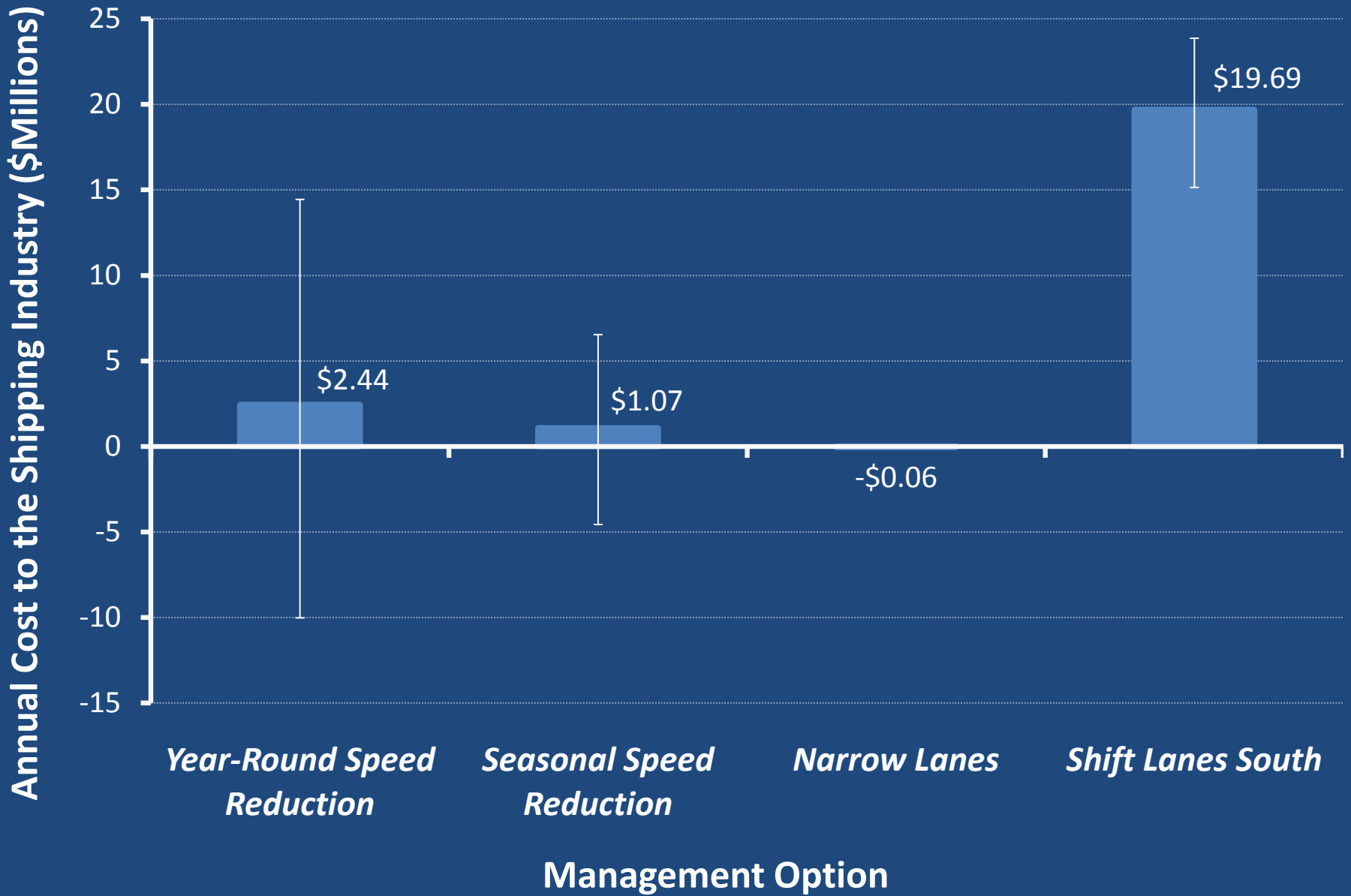
Improves accuracy of cost estimate

Costs of Management to the Shipping Industry

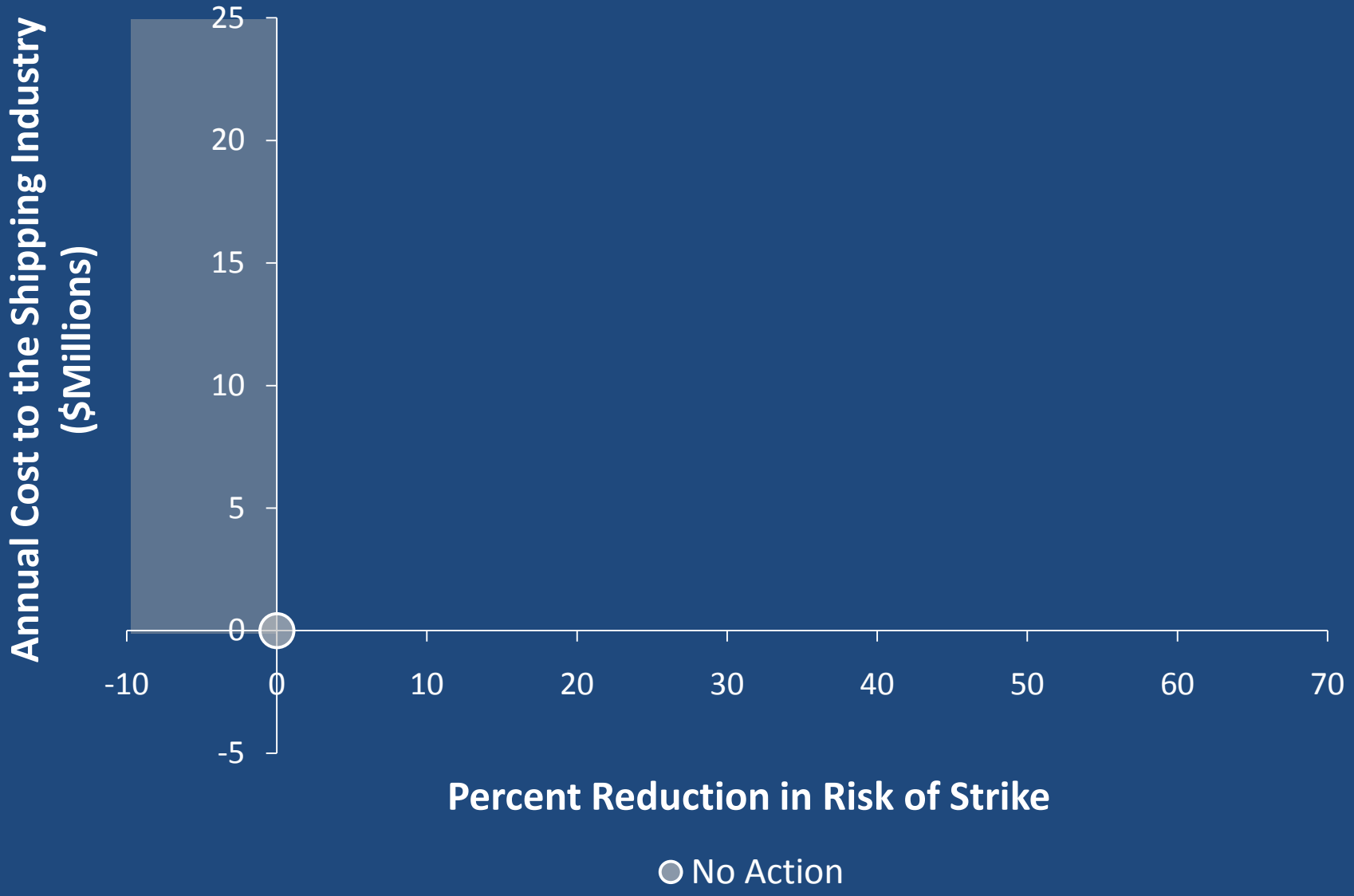
Change in Total Cost = Change in Voyage Cost + ~~Change in Operating Cost~~ + Cost of Delay from Navy Operations + Alpha

Operator behavior: Making up time elsewhere

Anticipated Annual Cost of Management to the Shipping Industry



Cost to the Shipping Industry and Percent Change in Risk of Strike for Management Options



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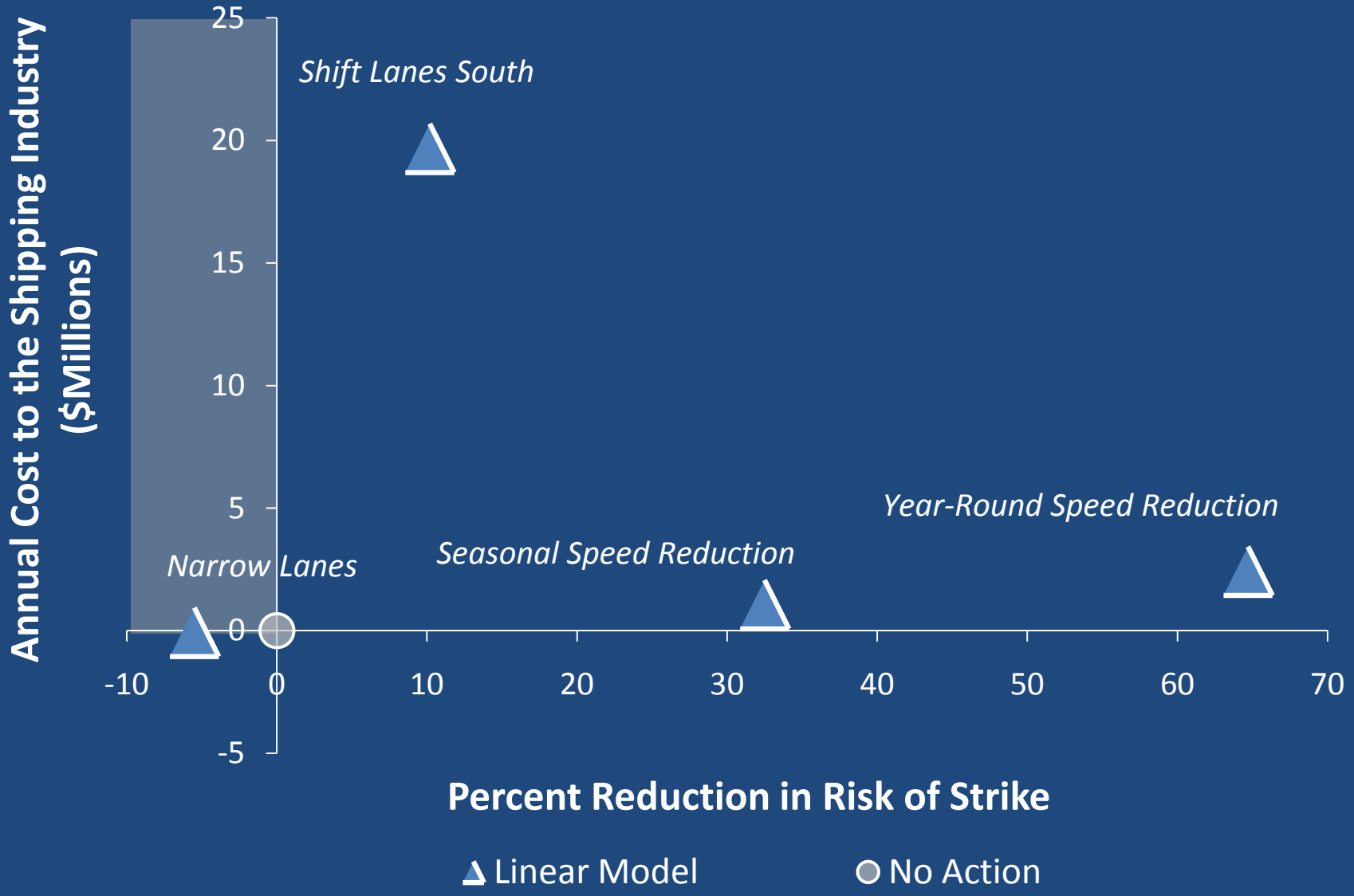

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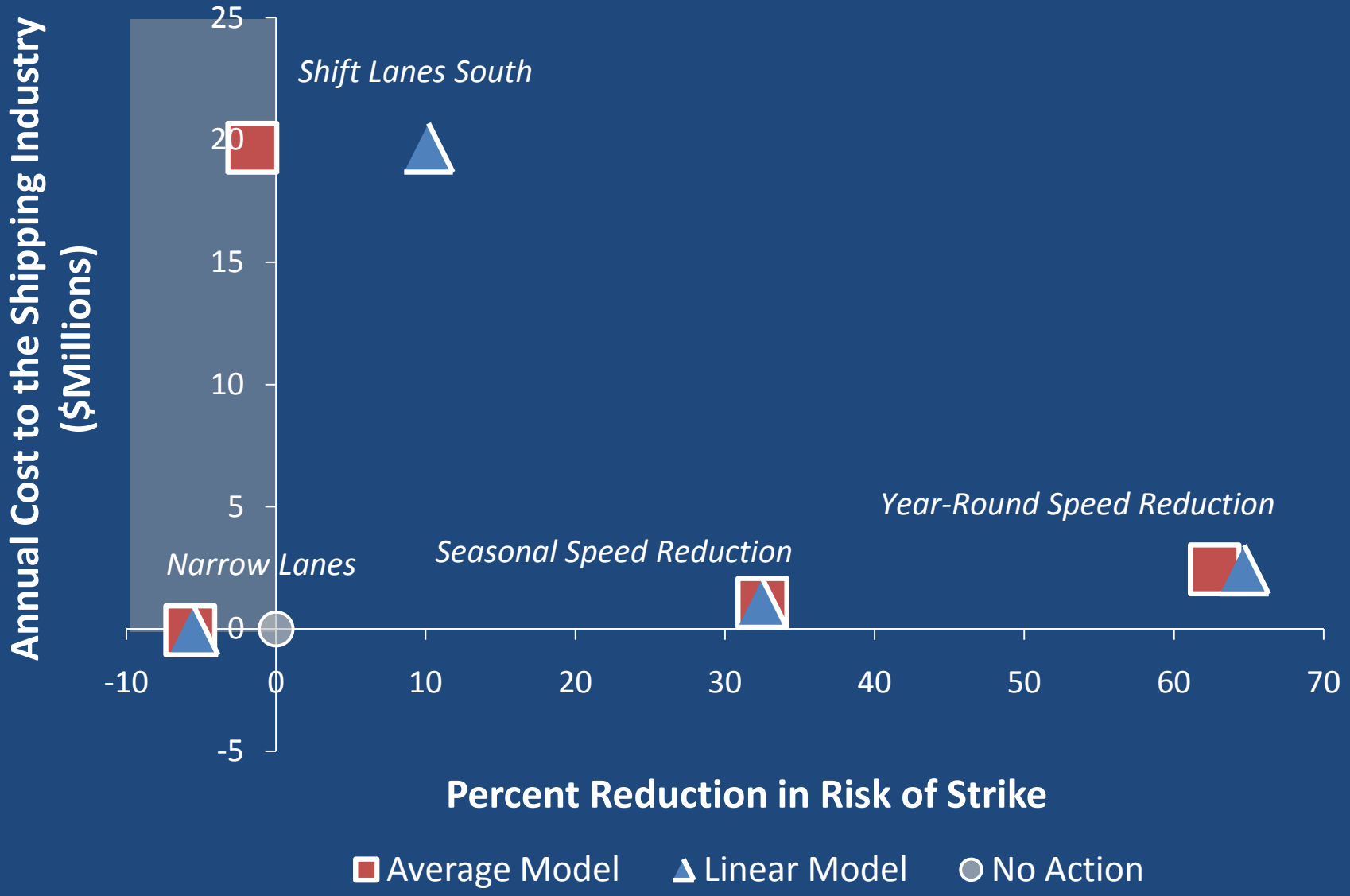

Project Conclusions

Photo Credit: NOAA Photo Library

Recommendations

Risk Analysis

- Region-wide, systematic whale observation data
- Explore use of other variables for predicting whale distribution
- Robust set of AIS data
- Consider spatial resolution

Economic Analysis

- Modifications to existing model:
  - Management options being considered
  - Ship traffic in this region

Photo Credit: John Calambokidis, Cascadia Research

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Final report available online at:
http://fiesta.bren.ucsb.edu/~whales/

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