Point Blue Publication Brief

Quantifying whale deaths and strategies to decrease vessel collisions off the Bay Area

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Recent estimates of blue and humpback whale death on the U.S. West Coast from ship strikes showed the region adjacent to the San Francisco Bay Area has some of the highest mortality, especially within the shipping lanes. Since 2015, voluntary vessel speed restrictions (VSR) in these areas have been implemented to decrease whale mortality.

To better understand fine-scale patterns of mortality, assess the VSR's effectiveness in 2015-17, and recommend ways to save more whales, we improved upon a quantitative strike mortality model to calculate mortality on a per-transit basis. We used re-sampling to compare active vs. inactive VSR periods while controlling for confounding variables such as whale distribution and simulated potential management strategies and cooperation levels.

We estimate that in our study region an average of 2.7 blue and 7.0 humpback whales die from ship strikes during May-July and September each year (Figure 1). Half of blue and 1/3 of humpback strike deaths occur in relatively small areas extending beyond the shipping lane ends (Figure 2).

Predicted total strike mortality has shown a steady increase over the study period years for humpbacks, but not for blue whales, largely due to changes in abundance in the study region (Figure 3).

Vessel cooperation during VSR has been 30-40% since 2014, leading to 16% and 13% fewer blue and humpback whale deaths, respectively. Simulations show that increasing cooperation with lane speed limits would further decrease mortality by approximately 23-24%.

To address ship strike mortality, we recommend the establishment of seasonal speed management areas at the ends of each lane and increasing speed limit cooperation to greater than 80%. Port incentive programs or mandatory regulations could help achieve the necessary cooperation.

Main Points

- Voluntary speed reductions have led to 13-16% reductions in deaths.
- Half of blue whale and 1/3 of humpback mortality occur in the areas just beyond the shipping lane ends.
- Significantly higher cooperation with a 10-knot speed limit both in the lanes and for new management areas at the lane ends will be necessary to achieve strong decreases in whale strike mortality.

Rockwood, R.C., J. Adams, M. Carver, J. Calambokidis, D. Lipski, G. Silber, J. Jahncke. 2018. Quantifying whale strike deaths and exploring strategies to decrease vessel collisions off the San Francisco Bay Area. Publication in review by NOAA. Last update: 10/16/2018

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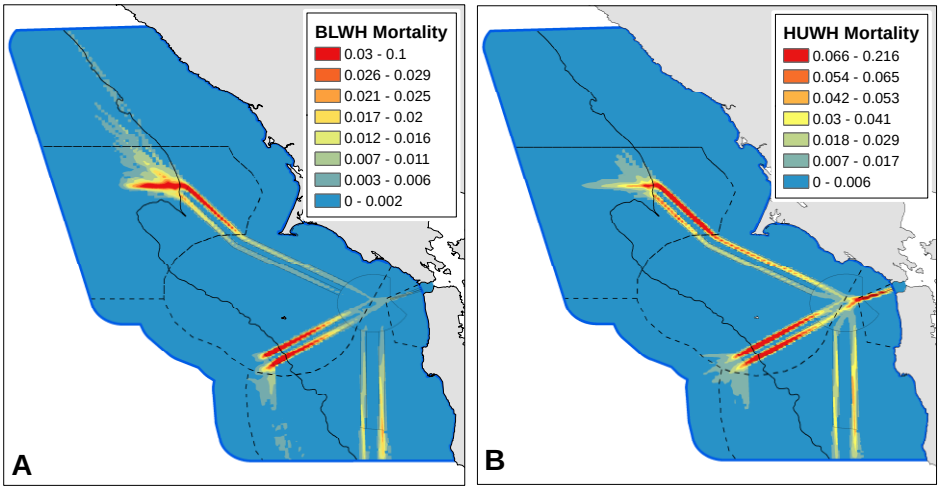

Figure 1. Mean modeled strike mortality 2012-2017 for blue whales (left) and humpback whales (right). Warmer colors represent higher risk. Note that mortality ranges are different for each panel.

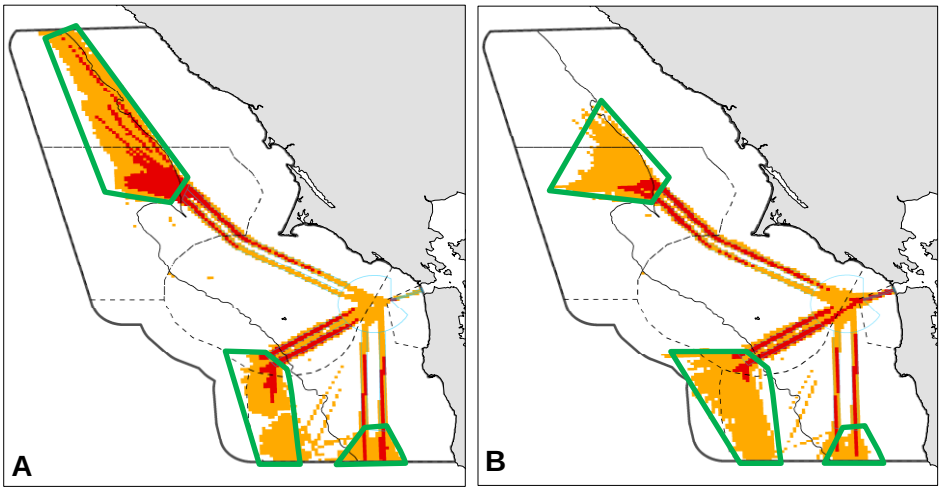

Figure 2. Areas of highest predicted mortality for blue (left) and humpback (right) whales. Orange areas are grid cells with mortality above the mean while red is mortality in the top 10 percent. Green polygons represent potential seasonal management areas that could further decrease whale mortality in the region.

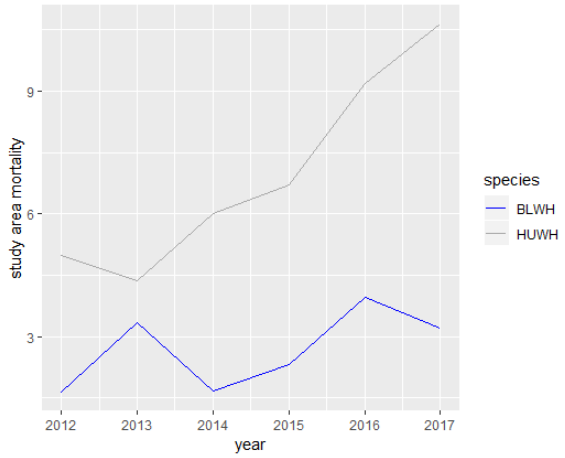

Figure 3. Annual predictions of total study area strike mortality for blue whales (blue line) and humpback whales (grey line).