

## APPENDIX MS2013-07: ASSESSING THE RISK OF SHIPS STRIKING LARGE WHALES IN MARINE SPATIAL PLANNING

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## SUMMARY

Marine spatial planning provides a comprehensive framework for managing multiple uses of the marine environment and has the potential to minimize environmental impacts and reduce conflicts among users. An example of the connections between users of the marine environment and the possibility for conflict recently occurred in Southern California when the California Air Resources Board implemented the ‘Ocean-Going Vessel Fuel Rule’. The fuel rule required large, commercial ships to use cleaner-burning fuels when traveling close to the mainland coast. Before implementation of the rule, a majority of ships traveled through the traffic separation scheme adopted by the International Maritime Organization in the Santa Barbara Channel. Following implementation, a higher proportion of ships began traveling south of the northern Channel Islands to reduce the time spent using more expensive fuels. This shift resulted in increased shipping traffic in military ranges and raised concerns for maritime safety; it also raised concerns about the risk of ships striking large whales.

Spatially explicit assessments of the risks to key marine species from human activities are a requirement of marine spatial planning. We assessed the risk of ships striking humpback (*Megaptera novaeangliae*), blue (*Balaenoptera musculus*), and fin (*B. physalus*) whales in alternative shipping routes derived from patterns of shipping traffic observed before and after implementation of the fuel rule. Specifically, we developed whale-habitat models and assumed ship-strike risk for the alternative shipping routes was proportional to the number of whales predicted by the models to occur within each route. This definition of risk assumes all ships travel within a single route. We also calculated risk assuming ships travel via multiple routes. We estimated the potential for conflict between shipping and other uses (military training and fishing) due to overlap with the routes. We also estimated the overlap between shipping routes and protected areas.

The route with the lowest risk for humpback whales had the highest risk for fin whales, and vice versa. Risk to both species may be ameliorated by creating a new route south of the northern Channel Islands and spreading traffic between this new route and the existing route in the Santa Barbara Channel. Creating a longer route may reduce the overlap between shipping and other uses by concentrating shipping traffic. Blue whales are distributed more evenly across our study area than humpback and fin whales; thus, risk could not be ameliorated by concentrating shipping traffic in any of the routes we considered. Reducing ship-strike risk for blue whales may be necessary because our assessment of the potential number of strikes suggests that they are likely to exceed allowable levels of anthropogenic impacts established under U.S. laws.

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- Appendix example: Holland, D. and S. Kasperski. 2014. Fishery income diversification and risk for fishermen and fishing communities of the US West Coast and Alaska—updated to 2012. Appendix HD-1 to: Breslow, S., and 20 others. Human Dimensions of the CCIEA. In: Harvey, C.J., N. Garfield, E.L. Hazen and G.D. Williams (eds.). The California Current Integrated Ecosystem Assessment: Phase III Report. Available from <http://www.noaa.gov/iea/CCIEA-Report/index>.