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# Vessel Strike Reduction: What does Mitigation Really Mean?

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### Abstract

Vessel strikes are recognized as a leading cause of injury and mortality to cetaceans internationally. The risk of collisions is likely to increase as whale populations recover, changes in climate result in habitat shifts, and the sizes and/or speeds of vessels continue to increase. As a result, the need for increased mitigation measures may be necessary to further protect species and passengers that may be impacted by collisions. However, to date, there appears to be no clear definition of what measures constitute mitigation. Is being aware of the risk sufficient, or must mitigation result in a measurable action to reduce risk?

### Introduction

A cursory review of vessel strike literature indicates that the term “mitigation” is not used consistently (Van der Hoop *et al.* 2013, Carrillo and Ritter 2010, Panigada *et al.* 2006) or, in some cases, not defined at all (Vanderlaan *et al.* 2009, Vanderlaan and Taggart 2007, Laist *et al.* 2001).

Russell *et al.* (2001) suggested that mitigation included three components: mariner education; technology to enhance whale detection; and rerouting vessels and/or reducing vessel speed. However, the Report of the Joint IWC-ACCOBAMS Workshop on Reducing Risk of Collisions between Vessels and Cetaceans (IWC 2011) lists a number of possible ship strike mitigation measures including: vessel re-routing; speed restrictions; mandatory ship reporting systems; dedicated onboard observers; real-time alerts to vessels; and detection systems. This same report also stated that “the Workshop agreed that mandatory ship reporting systems (MSRS) are an important outreach and education tool, but do not, in themselves, constitute mitigation measures.” This begs the question - what is mitigation?

### Discussion

The Oxford dictionary<sup>1</sup> defines mitigation as “*the action of reducing the severity, seriousness, or painfulness of something*”. Using this definition, the results of the action must have a measurable impact by demonstrating that a reduction of vessel strikes has occurred.

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<sup>1</sup> [http://www.oxforddictionaries.com/us/definition/american\\_english/mitigation](http://www.oxforddictionaries.com/us/definition/american_english/mitigation)

When considering vessel strikes there appears to be a variety of actions that can be taken with the objective of reducing the risk to large whales. However, it is not clear that the effectiveness of all of these activities can be measured. Alternately, in some cases where the efficacy can be determined, they have been ineffective in reducing strikes and therefore may not be accurately considered as mitigation measures.

According to Knowlton and Brown (2007) educational efforts are “probably” helpful but their effectiveness is limited. Similarly, they indicated that while technological solutions could theoretically provide near real time data to the ship’s crew, these solutions have been met with only limited success. Even in cases where compliance can be monitored, actions which did not require a change in behavior from the vessel operator were met with limited success. For example, compliance with the US Mandatory Ship Reporting System can be measured; yet Van der Hoop *et al.* (2013) were not able to detect a reduction in the local intensity of vessel strike mortalities between 1979 and 2009, concluding that measures taken during that period (including the mandatory ship reporting system) had not been as successful at reducing risk.

It is worth considering that the limited success of these measures may be the result of the lack of enforceable required actions associated with them. This is supported by advice provided by the shipping industry during stakeholder meetings designed to reduce ship strikes to critically endangered North Atlantic right whales. Here, the industry advised that “voluntary measures will not work, and any changes to shipping operations must be regulated” (Knowlton and Brown, 2007).

Data support that regulatory measures which require rerouting or speed reduction are effective. Silber *et al.* (2014) described a general decrease in vessel speeds between 2009 and 2013 after the implementation of mandatory vessel speed restrictions. Lagueux *et al.* (2011) found similar results in showing that compliance with mandatory vessel speed restrictions was significantly higher than with voluntary restrictions (75% compliance versus 16%, see also McKenna *et al.* 2012). Both computer-based modeling (Conn & Silber 2013) and the analysis of lethal vessel strikes (Laist *et al.* 2014) were able to confirm a reduction in the mortality risk for North Atlantic right whales in seasonal management areas during seasonally-implemented speed reduction regulatory periods.

However, even regulatory measures can require extensive notification and/or enforcement programs to enhance compliance. Silber *et al.* (2014) reported less than 5% of full compliance with a ship speed restriction prior to the implementation of enforcement and

monitoring efforts. The authors determined that “citations/fines appeared to have the greatest influence on improving compliance“, followed by outreach efforts.

## Summary

Ship strikes are both an animal welfare concern and conservation threat to cetaceans and may also potentially result in property damage and human injury and mortality (Neilson et al. 2012). As such, mitigation measures for this threat must be developed. While education/outreach, research, and whale detection are important tools to raise awareness, there is limited evidence that these measures reduce the risk of collision. Regulatory measures to reduce vessel speed in whale habitats have been proven to be effective but only with associated enforcement and monitoring. Therefore, the question of what constitutes mitigation remains. Is a uniform definition of vessel strike mitigation necessary to effectively diminish this threat?

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