

Search for Solutions: Lessons Learned

Section 7.a. includes both the Atlantic Pelagic Longline Take Reduction Team's consensus recommendations in the form of a draft Plan as well as the final rule that implemented the Plan in the Federal Register. Section 7.b. includes a summary of existing measures from other Take Reduction Plans, including both regulatory and non-regulatory elements of Plans. These elements include changes to fishing gear and practices (e.g., pingers, sinking groundline), triggers/consequence measures (i.e., if bycatch rates reach a certain threshold, additional measures come into effect), safe handling techniques, outreach and education, research priorities, etc.

Section 7.c. includes two documents developed through the Western Pacific Regional Fishery Management Council's Marine Mammal Advisory Committee (MMAC). The first document is a suite of recommendations from the MMAC, while the second is a list of possible mitigation measures developed by NMFS Pacific Islands Regional Office for the MMAC to use during discussions in 2007.

Section 7.d. includes three reports from workshops on depredation held in 2002, 2006, and 2007. The 2006 workshop builds off the progress made at the 2002 workshop; similarly, the 2007 workshop is a continuation of the discussions at the 2006 workshop.

Reports from Workshops Addressing the Depredation Issue

Section 7.e. includes several relevant scientific papers on acoustic research on depredation.

Mooney et al. (2009) conducted an echolocation experiment with a captive false killer whale and an acoustic device to deter whales and reduce depredation. The acoustic device, *Long-line Saver* device, produced a series of complex, broadband signals at high intensity levels. The echolocation capability of the false killer whale was initially reduced from 96% correct to 46% correct. However, the animal improved echolocation capabilities quickly, therefore behaviorally adapted, and improved to 85% within three experimental sessions.

Thode et al. (2007; 7.e.ii.) conducted acoustic recordings of longline fishing encounters with sperm whales in Alaska. They placed acoustic recorders anchored near longline gear deployments and found that sperm whales changed normal behavior associated with timing of cavitation noises from the ship propeller. Cavitation noise had a significant broadband acoustic signature that would be detected kilometers away and was the best candidate for acoustic cues for whales. The authors present possible strategies for avoiding depredation, including: reducing cues/noise levels that would reduce number of whales hearing the sounds; vessels listening for whales in an area; and producing "fake cues".

McPherson et al. (2003; 7.e.iii.) conducted an experiment to assess the effectiveness of possible acoustic and mechanical depredation mitigation devices. They obtained acoustic data from toothed whales in the Coral Sea, but did not identify which species of whales were responsible for depredation events. Logistic trials with Coral Sea tuna longline fishery were

conducted to assess feasibility of deployment and anticipated longevity of gillnet bycatch mitigation. The authors note future work is needed.

Moreno et al. 2009 (7.f.) reports on a new fishing technique to eliminate depredation by killer whales and sperm whales in the Chilean Patagonian toothfish fishery, which was adapted from modified artisanal trotline fishery and includes a net sleeve placed on secondary vertical lines. The results included a reduction in seabird mortality and depredation of catch.

The TEC, Inc. report (7.g.i.) describes informal dockside interviews conducted with 22 Hawaii-based longline captains and vessel owners. The interviews revealed that some feel depredation is increasing, while some did not cite the possibility that there are more whales or increased learning of behavior. Additionally, some feel depredation occurs in warmer waters and closer to islands and seamounts. Interviewees reported using various avoidance or deterrence techniques to reduce depredation such as turning off lights and engines, and using chemical, acoustic, pyrotechnic and mechanical deterrents. All interviewees concluded that whales are too smart and will adapt to any deterrent. The report included recommendations for more research, data, and information.

Section 7.g.ii. includes a reference list of additional papers on depredation.