U.S. Navy Marine Species Monitoring Program

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Please visit the US Navy Marine Species Monitoring Program web portal for additional information on this project – <u>www.navymarinespeciesmonitoring.us</u>

US Navy Marine Species Monitoring Program – Annual Technical Review Meeting San Diego, CA 14-17 March 2016

Analysis of aerial focal follow results associated with SCC training events 2008-14



Location of Submarine Commander Course (SCC) events off PMRF Range, Barking Sands, Kauai



Ship Follow Approach

- Elliptical orbits in front of guided missile cruisers (CGs) or destroyers (DDGs)
- When marine mammals (MMs) sighted within 5km, aircraft ascends to 457 m (1500 ft) and orbits sighting
- Focal follow approach initiated with HD digital video recording
- Observers blind as to MFAS transmission status

Mission

- Detect MMs potentially exposed to MFAS at close range and high levels
- Detect and describe changes in behavior (e.g., respiration rates, surface/down times)

Relevant questions from HRC Monitoring Plan

- Question 1: "Are marine mammals (and sea turtles) exposed to MFAS, especially at levels associated with adverse effects? If so, at what levels are they exposed?"
- Question 3: "If marine mammals (and sea turtles) are exposed to MFAS, what are their behavioral responses to various received levels?"

Combined tracks—SCC training events 2008-14



Question 1: "Are marine mammals (and sea turtles) exposed to MFAS, especially at levels associated with adverse effects? If so, at what levels are they exposed?"

Approach: Received levels for focal animals were calculated (S. Martin, SPAWAR; A. Frankel, MAI) based on locations of ships (PMRF product data), empirical on-off transmission times for MFAS (S. Martin, unpublished PMRF data), published source levels for AN/SQS-53C sonar (Evans & England 2001) and locations of sightings (next slide)

Estimating whale position



Calculated Received Levels (RLs)—Focal follow sessions 2011-14

| Date | Species | Dist (km) | Median RL (min-max) in dB re: 1µPa |
|---------|--------------------|-----------|---------------------------------------|
| 2/18/11 | Humpback | | 134 (132-137) |
| 2/16/12 | Humpback | | 142.5 (138-148) |
| 2/16/12 | Humpback | | 117.5 (104-135) |
| 2/17/12 | Humpback | | 156 (150-161) |
| 2/18/14 | Sperm | 5.923 | 171 (131-173) |
| | | 24.746 | 156 (144-160) |
| 2/19/14 | Sperm | 3.437 | 171 (142-174) |
| 2/19/14 | Sperm | 19.424 | 157 (135-158) |
| | | 13.891 | 161 (115-165) |
| 2/20/14 | Humpback | 16.114 | 162 (147-165) |
| | | 22.793 | 161 (140-162) |
| 2/20/14 | short-finned pilot | 19.302 | 157 (128-164) |
| 2/20/14 | humpback | 21.117 | 160 (138-163) |

Summary of Estimated RL Results

- Median estimates ranged 117.5 to 171 dB re:1µPa
- Max estimates ranged 137 to 174 dB re:1 μ Pa
- Max median exposures involved 2 sperm whales at distances 3.4-5.9 km from ship (both at 171 dB re:1µPa)

Question 3: "If marine mammals (and sea turtles) are exposed to MFAS, what are their behavioral responses to various received levels?"

Approach: Focal follow videos were reviewed and analyzed for quality using a rubric. Those that were designed "good" or better were viewed and transcribed for behavioral detail.

Summary of Focal Follows by Species (2008-14) N = 22

| Species | No. Groups | Group Size (Best Estimate) |
|--|------------|-------------------------------|
| | 6 | 1 |
| Humpback whale (Megaptera | 9* | 2 |
| novaeangliae) | 1 | 3 |
| | 1 | 8 |
| False killer whale (<i>Pseudorca crassidens</i>) | 1 | 12 |
| Short-finned pilot whales | 1 | 17 |
| (Globicephala macrorhynchus) | 2 | 25 |
| Spinner dolphin (Stenella longirostris) | 1 | 80 |

Note: *includes one that became a dyad.

Focal follow video quality



Only 4 videos were judged to be "good" or "excellent." Contributing factors included high BSS (6+) as well as issues with Aero Commander as observation platform

Case Study Approach—Median RL and Behavior by Time



Pod 1 of 16 Feb 2012, first sighted as breaching adult humpback whale. Eventually confirmed as dyad. Initially pod was ca 10.8 km (5.8 nm) from the DDG continuing on parallel NW course. Pod was exposed to 23 MFAS transmissions during 21 min focal period

Conclusions

- Aircraft orbiting Navy ships affords unique opportunity to detect marine mammals at close ranges and potentially high RLs
- This permits determination of MFAS exposure levels with relatively high accuracy
- Due primarily to platform challenges and persistent high sea states, focal follows have not afforded reliable quantifiable behavioral data.