Reliability of eyewitness reports of large whale entanglement

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ABSTRACT

Entanglement is a potential management concern for large whales in many areas of the world, but the frequency and details are often poorly known. Here we evaluate the reliability of eyewitness entanglement reports for stand-alone insight into these questions. Reports were evaluated for large whale species in two regions (the US East Coast and Hawaii), each with a formal reporting network and disentanglement response program. Reports were provided by fishers, recreational boaters, commercial whale watching vessels, whale researchers and shore observers. In both areas, eyewitnesses were questioned with a series of non-leading questions designed to confirm the entanglement, the species in question and other details prior to mounting a disentanglement effort. Disentanglement provided data to directly evaluate the accuracy of the information received. Fewer than half of reported cases in both areas actually involved entangled cetaceans. However, for those that were confirmed there was a low species error rate, even on the US East Coast (8.6%) where multiple large whale species are found. Only 28.9% (n=13) of East Coast entanglements were anchored in place by gear, whereas none of the Hawaii cases were anchored. When the set location of gear was known, US East Coast humpback whales were found closer to the site of entanglement (mean=7-nm, std=13.63-nm) than right whales (mean=290-nm, std=386.05-nm). However, most humpback whales reported entangled at Hawaii were >2000 miles away from where the gear was set. Whereas only 26.5% of US East Coast entanglements were considered life threatening at the time of disentanglement, 90.5% of Hawaii entanglements met this criteria. This was likely due to the fact that some animals had been disentangled and more minor entanglements had been shed by the time of arrival on the breeding ground. Overall, these results indicate that careful questioning can produce reliable information on whether a whale is truly entangled and the species affected. However, even with screening, eyewitness reports were not reliable sources of information on the site of entanglement. Although errors in descriptions of gear can also cause an overestimate of the total number of reports, this is likely to be balanced by the fact that reports typically underestimate the true number of entanglements. Preferential use of eyewitness reports from fishermen and whale experts will reduce, but not eliminate eyewitness error. Finally, there are substantial differences between species within the same response region, and for the same species in different regions. Thus, caution should be used when extrapolating characteristics of entanglement between species and areas.

INTRODUCTION

Entanglement in fishing gear is a management concern in many areas of the world. However, the frequency of entanglement, by species, fishery type and area, is often poorly known. This is particularly true for large whales because these species are more likely break free from the entanglement site unobserved and still carrying life-threatening gear. For such events to be detected and documented, the animal has to be re-encountered by a member of the on-water community. However, the ability of an eyewitness to provide an accurate description of an entanglement event likely depends on their knowledge of whales, fishing gear or entanglement specifically. In this paper, we used data obtained from two established entanglement reporting and response networks in the United States to evaluate the reliability of reports and to make recommendations to improve inferences made from such data.

METHODS

The accuracy of entanglement reports was investigated using data from the US East Coast and the Hawaiian Islands, two areas with well-established reporting and disentanglement networks. The Provincetown Center for Coastal Studies has disentangled large whales on the US East Coast since the 1980s and co-ordinates the Atlantic Large Whale Disentanglement Network (ALWDN) on behalf of the National Marine Fisheries Service (NMFS). The ALWDN was formally established in 1997 and encompasses approximately 700 individuals and 20 first response teams along the East Coast of North America. The Hawaiian Islands Disentanglement Network (HIDN) was initiated in 2002 and includes over 80 individual participants throughout the main Hawaiian Islands. The Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) coordinates this subset of the NMFS Pacific Islands Marine Mammal Response Network. Both programs have federal authorization to disentangle cetaceans through the NMFS Marine Mammal Health and Stranding Response Program.

At both sites, reports of entangled whales were received at constantly manned and advertised toll-free numbers or relayed via the US Coast Guard. Eyewitnesses were then interviewed to determine the likelihood of a true entanglement, to clarify its configuration and the species involved, to describe the condition and behavior of the animal, and to elicit other information that could aid in a subsequent rescue. The interviewer used a standard

form and "non-leading" questions designed to elicit accurate information regardless of observer knowledge of whales and gear (Appendix A).

For the US East Coast, we limited analysis to year-round reports of humpback whales (*Megaptera novaeangliae*) or North Atlantic right whales (*Eubalena glacialis*). In Hawaii, humpback whales are the only commonly seen baleen whale species, and only during winter months. Reports were received from shore, vessels and aircraft and categorized as coming from the fishing industry (including airborne spotters), whale experts (researchers or naturalists), or other segments of the coastal and on-water community (beachgoers, recreational boaters, harbor masters, Coast Guard, shipping crew, etc.).

Entanglements that were assessed as likely life-threatening typically prompted a disentanglement response. Entanglements were considered life-threatening when one or more body part had a complete wrap of rope that was likely to severely injure the animal or to substantially hinder feeding, reproduction or movement. Disentanglement activities typically provide the most accurate information on the entanglement (also see SC/59/BC1) and so we focused on these cases whenever possible to evaluate the accuracy of screened entanglement reports. However, there were cases in which responses could not be launched, as when weather conditions were poor or when the report came from outside the regional response range. In some of those cases, the accuracy of screened reports could still be evaluated based on photo or video documentation.

Observers were asked to describe entangling gear rather than to speculate on fishery type. Therefore, screened eyewitness descriptions of the gear were considered inaccurate if the entangled animal would likely have been mistaken for a new case if re-sighted by another observer. Reports were judged based on the accuracy of facts such as gear color, the number or type of attached buoys, amount of trailing line, presence or absence of net, and the nature of the attachment on the whale.

When marked gear was removed from an entangled whale during a disentanglement, NMFS attempted to track its owner through licensing or registration databases. The owner was then interviewed to determine where the gear was most recently set, when it might have been lost and how it was rigged. These, or other reliable information on gear set location, were used to determine the minimum entanglement duration and gear displacement. Displacement was calculated as the shortest distance between where the gear was lost and where it was subsequently reported. This did not reflect the actual distance traveled by the whale, which was likely greater. Furthermore, set locations were generally approximations. When gear was reportedly set in the same general area in which it was found, the displacement distance was considered to be zero. We also used gear set location data to determine whether apparent "anchoring" by gear could occur beyond the site of entanglement. Anchoring was inferred when whales were immobile for extended periods of time or apparently constrained to move in a circle.

RESULTS

Fewer than half of the reports received in each region actually involved entangled cetaceans (Table 1). There was no significant difference in false reports between the US East Coast (54.9%, n=188) and Hawaii (51.5%, n=35), despite differences in on-water communities and awareness training history. False reports were typically sightings of cetaceans that were not entangled. More than half of observer errors for humpback whales were due to white flippers that appeared to be green when viewed through the water. Other causes of confusion included general proximity to gear, light reflecting off the body of the whale, unusual behavior or a calf mistaken for a buoy. However, in some cases there was no cetacean involved. Objects mistaken for entangled whales included human swimmers, water splashing over rocks and debris. The fishing and whale communities occasionally provided false reports, but most errors came from other members of the on-water community and shore observers. Similarly, inexperienced observers made more errors with respect to gear type and configuration (58.3%, n=5) than did fishermen (33.3%, n=5) or whale experts (17.2%, n=5). However, the report screening process produced few errors in large whale species identification. No errors occurred in Hawaii, an area in which humpback whales are virtually the only large baleen whale. The error rate remained low (8.6%, n=35) on the US East Coast where several large whale species occur.

When the true set location of gear was known, US East Coast humpback whales were found closer to the likely site of entanglement (mean=7-nm, std=13.63-nm) than right whales (mean=290-nm, std=386.05-nm). In the 22 humpback whale cases in which the owner was located, the maximum gear displacement was 44 nautical miles. By contrast, only three of ten entangled right whales on the US East Coast were found in the same general area where the gear was set and their maximum displacement was 1040-nm. However, the greatest average displacement distances in this study involved entangled humpback whales reported at Hawaii. Only three of seven were first seen in the general vicinity of where the gear was set. The remainder had traveled >2000-nm from their Alaskan feeding ground before detection in Hawaii. Thus, there were substantial differences in gear displacement between species within the same response region, and for the same species in different regions.

A total of 28.9% (n=13) of US East Coast entanglements were confirmed to be anchored in place by gear, compared to 40.0% (n=18) reported as having been anchored. Confirmed cases primarily involved humpback whales; the three reports of anchored right whales were found to be inaccurate. However, none of the Hawaiian humpbacks were reported as anchored. Furthermore, the greatest documented gear displacements for East Coast humpbacks (33-nm and 44-nm) involved animals that were anchored at first report. Thus, even animals that appeared to be immobile at first report did not necessarily become entangled at that site.

Approximately one-quarter (26.5%, n=91) of humpback whale entanglements on the US East Coast were considered life threatening at the time of disentanglement, whereas 90.5% (n=19) of Hawaii entanglements met this criteria. This difference likely reflects the fact that US East Coast animals were reported closer in time and place to the initial entanglement event. In the North Pacific, humpback whales had a greater opportunity to shed minor entanglements or to be disentangled at high latitudes prior to being encountered on the Hawaiian breeding ground.

DISCUSSION

Careful screening of eyewitness reports can produce reliable information on whether an entanglement has occurred and the species involved, even in regions with a wide range of cetacean species, fisheries and reporting networks. However, even with careful screening, eyewitness reports were not necessarily good indicators of the site of the original entanglement, nor gear and entanglement configuration. Disentanglement efforts provide the most reliable information in such cases because experienced observers can closely assess the entanglement and because removed gear can be identified to a specific fishery or fisher in some cases. Preferential use of eyewitness reports from fishers and whale experts will reduce, but not eliminate, these latter types of errors.

Given the paucity of information on where whales become entangled, it is common to focus attention on the site of the first entanglement report. However, this study indicates that such data are unlikely to provide useful information, even when the animal appears to be anchored. In this study, there were substantial differences in gear displacement between species in the same response region, and for the same species in different regions. Furthermore, likelihood that an entanglement that is detected will be life threatening appears to vary by area. Given these results, caution should be used when extrapolating characteristics of entanglement between species and areas.

Although screening can successfully identify valid reports of entanglement, these still comprise an unknown fraction of actual entanglement cases, because not all entanglements are witnessed. The fraction of entanglements that are reported at least once has been estimated to be less than 10% for humpback whales on the US East Coast, based on entanglement scar evidence (Robbins and Mattila, 2001). A highly visible telemetry buoy inscribed with the Network phone number is occasionally attached to entangling gear when there is a need to postpone the disentanglement to a later date. Yet, even animals known to have subsequently traversed highly trafficked areas are rarely reported again to the relevant Network (PCCS, unpublished data). Thus, the number and annual variation in reports should be treated with caution, and at most a bare minimum. We recommend that reporting data be used to identify areas where entanglement is potentially a concern and then use alternate approaches, such as scar studies, to determine the extent of the problem.

ACKNOWLEDGEMENTS

The authors thank the Atlantic Large Whale Disentanglement Network, the Hawaiian Islands Disentanglement Network and the NMFS Marine Mammal Health and Stranding Program. Data obtained during disentanglements were collected under NOAA enhancement permit 932-1489. Data on gear involved in Hawaii entanglements was provided by Aleria Jensen (NMFS, Alaska Region).

References Cited

Robbins, J. and Mattila, D.K. 2001. Monitoring entanglements of humpback whales (*Megaptera novaeangliae*) in the Gulf of Maine on the basis of caudal peduncle scarring. Unpublished report to the Scientific Committee of the International Whaling Commission: SC/53/NAH25.

Atlantic Large Whale Disentanglement Network, Preliminary Report Form

1. Recorder name:

_____

Date of report:

_____

Time of report:

_____

Location:

_____º_____"____N

_____º_____"____W

2. Are you still with the animal?
O**Yes** O**No**

Is the animal alive?
O**Yes** O**No**

Kind of animal? whale, turtle, not sure - or species:

_____

Do you see or hear breathing?
O**Yes** O**No**

Is it struggling to breathe?
O**Yes** O**No**

3. Name of reporting vessel:

_____

Homeport:

_____

Type of vessel:
O fishing O whale-watch O private sail
O private power O other_____

Vessel cell phone:

_____

Observer name and home phone:

_____

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4. Give the ETA of first response (if known) to the reporting vessel. Strongly encourage vessel to stand by.

How long can you remain with the animal?_____

Are other vessels nearby that might assist? O**Yes** O**No**

Vessel names:_____

Did you, or can you, get photos or video? O**Yes** O**No**

This is very important for identification and assessment.

What format? O**still** O**video** O**digital**

If you can't take a photo, please try to make a drawing that shows distinct characteristics, injuries and the entangling gear.

For safety sake, do not approach within 100 feet.

5. Describe briefly what you see/saw. Include color, shape, size, marks, scars, etc.
If body part is not visible, write "N/A"

overall size:_____

head: _____

back (fin?):_____

tail:_____

flippers:_____

other:_____

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6. If animal is not in sight, how long since last sighting?

_____

If the animal dives, how long-
how often?

_____/_____

Does it, or did it, appear to be anchored? O**Yes** O**No**

If moving, est. speed and direction:_____

7. Describe the gear (net, rope, buoys, colors, length of trailing lines, etc.):

Where on the body; how on the body (head, tail, flipper, visible wraps?)

8. Are there visible injuries?
O**Yes** O**No**

Fresh blood? O**Yes** O**No**

Where?_____

Scars / chafing? O**Yes** O**No**

Appears thin / emmaciated?
O**Yes** O**No**

Skin is smooth and healthy?
O**Yes** O**No**

if no,
explain:_____

Call the PCCS Hotline: 1-800-900-3622 **Fax form to 1-508-487-4495**

____ _____ _____ _____ _____