Injury Determinations for Humpback Whales and Other Cetaceans Reported to NOAA Response Networks in the Hawaiian Islands During 2019

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Reports of injured and dead cetaceans in the U.S. Exclusive Economic Zone around the Hawaiian Islands (Hawaiian EEZ) are received each year by the Pacific Islands Region Marine Mammal Response Network (PIR-MMRN), which is coordinated by the NOAA Fisheries Pacific Islands Regional Office (PIRO), and the Hawaiian Islands Entanglement Response Network (HIERN), which is coordinated by the NOAA Hawaiian Islands Humpback Whale National Marine Sanctuary. Most of the injury reports involve humpback whales that are entangled in fishing gear or marine debris or have been struck by or otherwise injured by contact with a vessel. However, occasionally, reports of other cetacean species are received.

This data report provides a summary of the determinations of injury severity for cetaceans in the Hawaiian EEZ reported injured by human causes to PIR-MMRN and HIERN during 2019. These determinations are based on injury reports that are opportunistic and not a part of a quantifiable and directed sampling scheme. Thus, the resulting determinations of serious injury[1] (or any reported mortalities) cannot be used to estimate undocumented mortality and serious injury (M&SI) from the same source. However, these serious injuries and mortalities can serve as minimum estimates of M&SI by source and should be included in the stock assessment reports (SARs) required by the U.S. Marine Mammal Protection Act.

Previous summaries of injury determinations for cetaceans in the Hawaiian EEZ reported injured by human causes to PIR-MMRN and HIERN were previously published as NOAA Technical Memorandums (Bradford and Lyman 2015, 2018, 2019, 2020). The last year of published injury determinations for cetaceans reported to these response networks was 2018 (Bradford and Lyman 2020). To further increase efficiency and data access, starting with injury determinations from 2019, these summaries will be published as annual data reports with supporting data files (CSV). These data reports will only note any changes in the methodology described in previous Technical Memorandums and will provide a more concise summary of results.

No changes in methodology were required to process the response network reports from 2019. The PIR-MMRN database was accessed, and cetacean records in and around the Hawaiian EEZ during 2019 (n = 39) were extracted and reviewed to identify reports of cetaceans injured by human causes. The identified PIR-MMRN reports were supplemented with 12 confirmed injury reports from 2019 maintained in the HIERN database. Further supplementing the reports compiled from the network databases was an account of an injured bottlenose dolphin provided by R. Baird of the Cascadia Research Collective (CRC), which should have been incorporated into the PIR-MMRN database.

[1] A serious injury is an injury that is more likely than not to result in mortality (NOAA Fisheries Policy Directive PD 02-238).

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In total, 13 reports of cetaceans with human-caused injuries in the Hawaiian EEZ from 2019 were identified for injury determination. The reports consist of 5 humpback whales involved in vessel collisions, 7 humpback whales entangled in presumed or confirmed fishing gear, and 1 bottlenose dolphin hooked and entangled in fishing gear. Following discussions about questions raised in the injury determination review process, the independent reviewers (A. Henry, Northeast Fisheries Science Center, for the humpback whales; K. Forney, Southwest Fisheries Science Center, for the bottlenose dolphin) agreed with the preliminary determinations made by the authors. Details of the reports and the resulting injury determinations are provided in the files "PIR.HI.RN.2019_HW-ves.csv," "PIR.HI.RN.2019_HW-ent.csv," and "PIR.HI.RN.2019_OC-inj.csv," respectively.[2] A key to the column headings of each CSV file is shown in Table 1, Table 2, and Table 3, respectively, at the end of this document.

The 5 humpback whale vessel collisions led to 2.2 serious injuries for comparison to the potential biological removal (PBR) value reported in the SARs (note that some large whale injury categories involve prorating injuries as proportionally serious; NMFS 2012). The 7 humpback whale entanglements led to 6 serious injuries for consideration with the list of fisheries (LOF) and for comparison with PBR. The hooked and entangled bottlenose dolphin (from the Oahu stock) led to 1 serious injury for consideration with the LOF. Note that this dolphin is the same individual previously reported non-seriously injured by a gunshot wound in 2018 (Bradford and Lyman 2020), after follow-up observations indicated survival of the dolphin (Harnish et al. 2019). Similarly, follow-up observations from CRC of this individual in good body condition in March and April of 2021, even though the injury site was not visible, led to the non-serious injury determination associated with the hooking and entanglement in 2019. Although HIERN attempts to cross-match the injured humpback whales that were adequately photo-identified within its database, this dolphin is the first individual known to be injured by human causes more than once in the full injury determination record (Bradford and Lyman 2015, 2018, 2019, 2020).

Of the 7 humpback whale entanglements, gear type was identified in 2 cases, involving commercial pot gear from British Columbia (n = 1) and Alaska (n = 1). The British Columbia gear was linked to a crab fishery, while the Alaska pot gear was linked to either the cod or king crab fishery. Although a concerted effort was made to review the photographed and collected gear, limitations in staff resources and a lack of information from other regions did not allow as complete a review as might otherwise be possible. The best assessment of available gear and photographs suggests additional effort in identifying the specific crab fishery associated with the British Columbia pot gear entanglement is warranted, but there is limited possibility of further classification from additional review effort for any of the other humpback whale entanglement cases. Gear type and fishery are currently unknown in the case of the hooked and entangled bottlenose dolphin, but additional effort to identify these characteristics is warranted.

During 2019, there were no PIR-MMRN stranding records where a confirmed human-caused injury was determined to be the cause of death. However, there is 1 stranding record from this period where a human-caused injury was documented but determined not to be the cause of death, and another record where a potential human-caused injury was determined to be the cause of death (K. West, University of Hawaii at Manoa, personal communication). The first case was a pygmy killer whale that was part of a

[2] In the NOAA Institutional Repository, these data files are under Supporting Files.

mass stranding event and had a short piece of fishing line in its stomach. The second case was a spinner dolphin that died from an infection related to an abdominal puncture that was consistent with a stab wound, but the nature of the wound could not be confirmed.

Acknowledgments

We thank PIR-MMRN and HIERN staff and volunteers, as well as the whale researchers, non-profit groups, and other ocean users who report and respond to dead and injured cetaceans in the Pacific Islands Region. Kristi West and her Marine Mammal Stranding Program associates tirelessly conduct necropsy and follow-up work that is critical for understanding the factors contributing to cetacean mortality. Robin Baird and his CRC colleagues and associated network have diligently made sure that sightings of injured cetaceans do not fall through the cracks and are accruing important known outcome data for small cetaceans with human-caused injuries. Aliza Milette-Winfree of PIRO provided access to the PIR-MMRN database and helpfully fielded questions about its contents. Rachel Finn, working for the Hawaiian Islands Humpback Whale National Marine Sanctuary, assisted with compiling data associated with the HIERN database. Staff from the NOAA Fisheries Alaska Regional Office and from Fisheries and Oceans Canada in the Pacific Region assisted with aspects of the gear and fishery identification for the humpback whale entanglements. Allison Henry and Karin Forney reviewed the humpback and other cetacean injury determinations, respectively. The Pacific Scientific Review Group and PIRO performed an additional review of the full set of injury determinations. This report was improved by reviews from Erin Oleson and Nancy Young.

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Keys to the column headings of the CSV supporting data files

Table 1. Key to the column headings of the file "PIR.HI.RN.2019_HW-ves.csv," which contains injury determinations for humpback whales reported to be involved in vessel collisions in Hawaiian waters during 2019.

Column heading	Explanation
ReportDate	Date of injury report (m/d/yyyy)
AgeClass	Age class of injured whale
VesselLength	Length of vessel involved in collision, in ft
VesselSpeed	Speed of vessel involved in collision, in kn
EventSummary	Summary of reported injury event
ObservedInjury	Description of injuries observed on whale
InjuryCategories	Relevant injury categories from NMFS (2012)
InjuryDetermination	Injury determination using established criteria (NMFS 2012)
ForPBR	Value to be applied in PBR comparison

Table 2. Key to the column headings of the file "PIR.HI.RN.2019_HW-ent.csv," which contains injury determinations for humpback whales reported to be entangled in presumed or confirmed fishing gear in Hawaiian waters during 2019.

Column heading	Explanation
ReportDate	Date of injury report (m/d/yyyy)
AgeClass	Age class of injured whale
EventSummary	Summary of reported injury event
InjuryCategories_initial	Relevant injury categories from NMFS (2012) prior to follow-up
InjuryDetermination_initial	Initial injury determination using established criteria (NMFS 2012)[1]
ForLOF	Value to be used in LOF consideration
ResponseOutcome	Outcome of any response or other follow-up activities
InjuryCategories_follow-up	Relevant injury categories from NMFS (2012) after follow-up
InjuryDetermination_follow-up	Follow-up determination using established criteria (NMFS 2012)[1]
ForPBR	Value to be applied in PBR comparison
GearType	Type of gear involved in entanglement
Fishery	Specific commercial fishery linked to entanglement
FisheryReview	Details of the fishery review and potential for further classification

[1] An injury determination of serious followed by an asterisk indicates that the basis of the determination was the significant health decline caused by the injury.

Table 3. Key to the column headings of the file "PIR.HI.RN.2019_OC-inj.csv," which contains injury determinations for cetaceans other than humpback whales reported to be injured in Hawaiian waters during 2019.

Column heading	Explanation
ReportDate	Date of injury report (m/d/yyyy)
Species	Species of injured cetacean
Stock	Stock of injured cetacean
AgeClass	Age class of injured cetacean
EventSummary	Summary of reported injury event
InjuryCategories_initial	Relevant injury categories from NMFS (2012) prior to follow-up
InjuryDetermination_initial	Initial injury determination using established criteria (NMFS 2012)
ForLOF	Value to be used in LOF consideration
ResponseOutcome	Outcome of any response or other follow-up activities
InjuryCategories_follow-up	Relevant injury categories from NMFS (2012) after follow-up
InjuryDetermination_follow-up	Follow-up determination using established criteria (NMFS 2012)
ForPBR	Value to be applied in PBR comparison
FisheryReview	Details of the fishery review and potential for further classification