

# NOAA Technical Memorandum NMFS



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## SERIOUS INJURY DETERMINATIONS FOR CETACEANS CAUGHT IN HAWAII LONGLINE FISHERIES DURING 1994-2008

K. A. FORNEY

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U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Southwest Fisheries Science Center

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# **Serious-injury determinations for cetaceans caught in Hawaii longline fisheries during 1994-2008**

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## INTRODUCTION

This document summarizes observer data on the mortality and injury of cetaceans in Hawaii-based pelagic longline fisheries for tuna (deep-set fishery) and swordfish (shallow-set fishery) during the most recent 5-year period (2004-2008) and re-evaluates all 1994-2008 cetacean serious-injury determinations in these two fisheries on a case-by-case basis using the new criteria developed at the 2007 Serious Injury Technical Workshop (Appendix A; reprinted from Andersen et al. 2008). Regulations in place since 2004 require 100% observer coverage for the shallow-set fishery, so the reported cetacean deaths and injuries for 2004-2008 represent the total number of takes in the fishery. Observer coverage for the deep-set fishery is currently required to be at least 20% annually, so the number of reported deaths and injuries for 2004-2008 are a sample of fleet-wide bycatch. Total bycatch estimates by U.S. Exclusive Economic Zone area and cetacean stock area are presented elsewhere (McCracken and Forney 2010).

## METHODS

For annual reporting purposes, and to maintain consistency with bycatch estimation procedures (e.g. Forney and McCracken 2008, McCracken and Forney 2008, McCracken and Forney 2010), marine mammal interactions were considered to have taken place during the calendar year in which the fishing vessel returned to port. Electronic data on marine mammal interactions were extracted from the Pacific Islands Region (PIR) Longline Observer Data System (LODS) using the *Datatrowler* interface. Copies of relevant observer forms, photos and videos that describe marine mammal identification characteristics, the nature of the interaction, details on any injuries sustained by the animals, and the amount and type of gear left on the animal upon release were

also obtained and reviewed. When a cetacean species (or genus for *Kogia* spp.) could not be identified by the at-sea observer, PIR Observer program codes UC (unidentified cetacean), UW (unidentified whale), and UD (unidentified dolphin) were initially recorded by the observer. These codes were combined into a single unidentified cetacean ('UC') category for the this report (Table 1), but candidate species were evaluated based on the observer's descriptions, photographs, sketches, and videos (when available). Animals that were determined to be either false killer whales or short-finned pilot whales were re-assigned species code 'BF' ('blackfish'), and unidentified beaked whales were re-assigned code 'ZU' (Table 2). Geographic locations for all cetacean takes are plotted based on the reported catch location, if available; otherwise the haul begin location is plotted. The EEZ area designations in Table 2 were derived by McCracken and Forney (2010), either as the capture location (if known) or as the modal location of set begin, set end, haul begin, and haul end.

Serious-injury determinations have previously been made (Forney and Kobayashi 2007, Forney and McCracken 2008, McCracken and Forney 2008) using the guidelines developed in Angliss and DeMaster (1998) following a 1997 workshop on determining serious injuries in marine mammals. During 2007, new information on injuries to marine mammals was reviewed at a Serious Injury Technical Workshop, resulting in the development of new criteria (Table 1 in Andersen et al. 2008; included below as Appendix A). Based on these new injury determination criteria, all 1994-2008 cetacean injuries sustained in interactions with Hawaii-based longline fisheries were reviewed to re-assess the severity of injury. The new determinations were compared to those previously obtained using the Angliss and DeMaster (1998) criteria. In cases where a determination could not be made based on the available information, the severity was prorated based on other determinations for that species or species group (see Forney and Kobayashi 2007).

## RESULTS & DISCUSSION

### *Cetacean species observed taken during 2004-2008*

In the deep-set fishery (Figure 1), 48 cetaceans were reported hooked or entangled during 2004-2008 (see Table 1 for scientific names and codes used in figures and tables): 19 false killer whales, 8 short-finned pilot whales, 5 Risso's dolphin, 1 pantropical spotted dolphin, 1 striped

dolphin, 1 common bottlenose dolphin, 1 humpback whale, and 1 Blainville's beaked whale. Eleven additional cetaceans that could not be identified to species were also recorded. Six of these were determined to have been either false killer whales or short-finned pilot whales ('blackfish') based on the available identification characteristics, one was either a blackfish or a Risso's dolphin, and one was an unidentified beaked whale (Table 2). Insufficient information was available to evaluate potential species for the remaining four unidentified cetaceans.

In the shallow-set fishery (Figure 2), 22 cetaceans were hooked or entangled during 2004-2008: 10 Risso's dolphins; 4 common bottlenose dolphins, 2 humpback whales, 1 Bryde's whale, 1 false killer whale; 1 striped dolphin, 1 pygmy or dwarf sperm whale, *Kogia* sp., and 2 unidentified cetaceans. One of the unidentified cetaceans was determined to be either a false killer whale or short-finned pilot whale ('blackfish', Table 2).

#### *Serious-Injury Determinations, 1994-2008*

During the most recent year (2008), one Risso's dolphin and one pantropical spotted dolphin reported were dead upon gear retrieval. The remaining 19 animals taken during 2008 were reported to be alive but injured. Using either set of serious-injury determination criteria (Angliss and DeMaster 1998; Anderson et al. 2008), five animals were determined to be not seriously injured and 14 seriously injured (Table 2). A review of all previous (1994-2007) injury determinations using the Andersen et al. 2008 criteria resulted in a change for 9 of 88 injuries (10.2%). In all cases the revised analysis determined the injury to have been more severe than the original analysis: five injuries changed from not serious to serious, two injuries changed from 'Cannot be determined' (CBD) to serious (shaded cells in Table 2), and two injuries of humpback whales changed from not serious to CBD. The latter two cases were subsequently reviewed by a team of whale experts within the Alaska Scientific Review Group. As a result of this review, the September 2002 interaction was determined to be non-serious, and the February 2004 interaction remained CBD and was prorated as non-serious based on the other deep-set fishery interactions with humpback whales, using the methods described in Forney and Kobayashi (2007). Summaries of cetacean deaths, serious injuries and non-serious injuries during the most recent five complete years (2004-2008) are presented by species, year, and EEZ area in Table 3 (deep-set fishery) and Table 4 (shallow-set fishery) to aid in updating Hawaiian cetacean stock assessment reports.

## ACKNOWLEDGMENTS

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**Table 1.** List of cetacean species codes, common names, and scientific names.

<b>Code</b>	<b>Common Name</b>	<b>Scientific name</b>
BE	Bryde's whale	<i>Balaenoptera edeni</i>
BF	'Blackfish' = PC or GM	
DD	Common dolphin	<i>Delphinus</i> spp.
GG	Risso's dolphin	<i>Grampus griseus</i>
GM	Short-finned pilot whale	<i>Globicephala macrorhynchus</i>
MD	Blainville's beaked whale	<i>Mesoplodon densirostris</i>
MN	Humpback whale	<i>Megaptera novaeangliae</i>
PC	False killer whale	<i>Pseudorca crassidens</i>
PM	Sperm whale	<i>Physeter macrocephalus</i>
SA	Pantropical spotted dolphin	<i>Stenella attenuata</i>
SC	Striped dolphin	<i>Stenella coeruleoalba</i>
SL	Spinner dolphin	<i>Stenella longirostris</i>
TT	Common bottlenose dolphin	<i>Tursiops truncatus</i>
UC	Unidentified cetacean (includes Observer Program codes UC, UW and UD)	
UK	Pygmy or dwarf sperm whale	<i>Kogia</i> sp.
ZU	Unidentified beaked whale	Ziphiid whale

**Table 2.** Comparison of case-specific serious-injury determinations for cetaceans taken in Hawaii-based longline fisheries, 1994-2008, using (A) previous criteria (Angliss and DeMaster 1998) and (B) revised criteria (Table 1 in Andersen et al. 2008, Appendix A). Shading indicates injuries for which determinations differed. CBD=cannot be determined. Prorated injury determinations are from Forney and Kobayashi (2007) and Forney and McCracken (2008). Fishery codes for 1994-2001: T = tuna targeting deep sets, S = swordfish targeting shallow sets, M= mixed type; for 2002-2007: DS = deep-set fishery, SS = shallow-set fishery. Hawaii (P) and Hawaii (I) indicate takes of false killer whales or potential false killer whales that were within the range of the Pelagic Stock or Insular Stock of false killer whales, respectively, as described in Forney et al. (2010). Species codes are defined in Table 1.

Fishery Type	EEZ Area	Trip Arrival Year	Take Date	Species Code	Possible Species Codes	Recorded Animal condition	(A) Previous Determination	(B) Revised Determination	Andersen et al. 2008 Table 1 Criteria	Injury determination criteria / Comments
S	Outside	1995	07-Mar-95	GG	GG	Injured	Serious	Serious	10	Hooked; released with ~20m of line attached
S	Outside	1995	22-Mar-95	GG	GG	Injured	Serious	Serious	7	Hooked in mouth
S	Outside	1995	01-Apr-95	TT	TT	Injured	Serious	Serious	7	Hooked in mouth
T	Outside	1996	28-May-96	UC	BF	Injured	CBD (prorated serious)	CBD (prorated serious)	-	Swam away slowly with hook and some line attached
S	Outside	1996	24-Aug-96	UC	ZU	Injured	Not Serious	Not Serious	26	Hooked in fluke
S	Outside	1997	03-Dec-96	GM	GM	Dead	Dead	Dead	n/a	Line tangled around caudal peduncle
S	Outside	1997	26-Mar-97	GG	GG	Injured	Serious	Serious	1 or 7	Hooked in mouth / hook ingested
S	Outside	1997	14-Mar-97	GG	GG	Injured	Serious	Serious	7	Hooked in mouth
S	Outside	1997	30-Apr-97	SL	SL	Injured	Not Serious	Not Serious	26	Hooked in fluke
M	Hawaii (P)	1997	18-Aug-97	PC	PC	Injured	Serious	Serious	1 or 7	Hooked in mouth / hook ingested
S	Outside	1998	20-Jan-98	UC	GG, TT	Injured	CBD (prorated serious)	CBD (prorated serious)	-	Hooked
S	Hawaii (P)	1998	29-Apr-98	PC	PC	Injured	Serious	Serious	1 or 7	Hooked in mouth / hook ingested
T	Hawaii	1998	15-Nov-98	UC	ZU	Injured	Not Serious	Serious	10	Hooked/Tangled, broke line with gear remaining
S	Outside	1999	31-Jan-99	UC	BF, GG, TT, ZU	Injured	CBD (prorated serious)	CBD (prorated serious)	-	No injury details available
S	Outside	1999	30-Jan-99	TT	TT	Injured	Serious	Serious	1	Hook ingested
S	Outside	1999	08-Feb-99	GG	GG	Injured	Serious	Serious	7	Hooked in mouth
S	Hawaii	1999	22-May-99	PM	PM	Injured	Not Serious	Not Serious	11	Entangled, apparently got free
S	Outside	2000	16-Dec-99	UC	BF, GG	Injured	Serious	Serious	7	Hooked in mouth
S	Outside	2000	31-Jan-00	GG	GG	Injured	Serious	Serious	1	Hook ingested
T	Outside	2000	09-May-00	UC	BF	Injured	Serious	Serious	14	Float line wrapped around tail
S	Outside	2000	16-Jul-00	GM	GM	Injured	Serious	Serious	1 or 7	Hooked in mouth / hook ingested

**Table 2.** (Continued)

Fishery Type	EEZ Area	Trip Arrival Year	Take Date	Species Code	Possible Species Codes	Recorded Animal condition	(A) Previous Determination	(B) Revised Determination	Andersen et al. 2008 Table 1 Criteria	Injury determination criteria / Comments
T	Outside	2000	08-Oct-00	UC	BF, TT	Injured	CBD (prorated serious)	CBD (prorated serious)	-	Hooked
T	Outside	2000	17-Oct-00	GM	GM	Dead	Dead	Dead	n/a	Hooked in mouth
M	Hawaii	2000	13-Nov-00	SL	SL	Injured	Not serious	Serious	7 or 8, (10)	Hooked in head/beak; line cut
S	Outside	2000	15-Dec-00	DD	DD	Injured	Not Serious	Not Serious	26	Line around fluke, released with minimal line attached
T	Hawaii (P)	2001	16-Jan-01	UC	BF	Injured	CBD (prorated serious)	CBD (prorated serious)	-	Hooked
T	Outside	2001	03-Jan-01	PC	PC	Injured	Serious	Serious	7	Hooked in mouth
S	Outside	2001	12-Jan-01	GG	GG	Injured	Serious	Serious	10	Hooked, tangled dropper lines between two adjacent floats, crew cut line
T	Palmyra	2001	06-Feb-01	PC	PC	Injured	Serious	Serious	7?,10	PC 'on hook'; broke dropper line; hook and line attached when broke free
T	Hawaii	2001	01-Feb-01	MN	MN	Injured	Not Serious	Not Serious	11	Entangled in substantial line and & 2 floats; freed itself from gear before swimming away
T	Johnston	2001	01-Mar-01	PC	PC	Injured	CBD (prorated serious)	CBD (prorated serious)	-	Hooked
T	Palmyra	2001	22-Aug-01	GM	GM	Injured	Not Serious	Not Serious	11	Entangled, appeared to break free of line
T	Outside	2001	25-Sep-01	GM	GM	Injured	Serious	Serious	7	Hooked in mouth
T	Outside	2001	26-Oct-2001	UC	BF	Injured	Serious	Serious	14, 10	Entangled in mainline with several floats in sizable tangle; mainline snapped
T	Palmyra	2001	8-Oct-2001	SA	SA	Dead	Dead	Dead	n/a	Line wrapped around beak
DS	Palmyra	2002	15-Feb-2002	PC	PC	Injured	Serious	Serious	10	Hooked ; released by cutting leader line; 3ft mono line, weight, 6" wire leader and hook remained attached
DS	Outside	2002	12-Feb-2002	PC	PC	Injured	Serious	Serious	7	Hooked in mouth
DS	Palmyra	2002	16-Mar-2002	PC	PC	Injured	Serious	Serious	7	Hooked in mouth
DS	Hawaii	2002	4-Apr-2002	MD	MD	Dead	Dead	Dead	n/a	Hooked in fluke
DS	Palmyra	2002	13-Jun-2002	UC	UC	Injured	Not Serious	Not Serious	11	Hooked; swam away with no gear attached
DS	Palmyra	2002	2-Jul-2002	UC	SA, SL, GG, TT	Injured	Not serious	Serious	10,14	Hooked in body/tail & entangled; broke free
DS	Outside	2002	11-Jul-2002	PC	PC	Injured	Serious	Serious	7	Hooked in mouth
DS	Outside	2002	19-Sep-2002	PC	PC	Injured	Serious	Serious	1	Hook ingested

**Table 2.** (Continued)

Fishery Type	EEZ Area	Trip Arrival Year	Take Date	Species Code	Possible Species Codes	Recorded Animal condition	(A) Previous Determination	(B) Revised Determination	Andersen et al. 2008 Table 1 Criteria	Injury determination criteria / Comments
DS	Outside	2002	12-Oct-2002	MN	MN	Injured	Not Serious	CBD / Not serious*	10,14	30' mainline wrapped around fluke; *Andersen et al. 2008 criteria suggest the outcome cannot be determined; however, during additional expert review by three members of the Alaska Scientific Review Group, this was unanimously considered a non-serious injury.
DS	Hawaii	2003	22-Feb-2003	TT	TT	Dead	Dead	Dead	n/a	Entangled; mainline and branchline wrapped around flukes
DS	Hawaii (P)	2003	9-Apr-2003	UC	SA, SL, GG, TT, BF, DD	Injured	Serious	Serious	10	Hooked; released with 10m trailing line on 3m animal
DS	Hawaii (I)	2003	7-Oct-2003	PC	PC	Injured	Serious	Serious	10,14	Released with two 13-m branchlines around body
DS	Hawaii (I)	2003	3-Nov-2003	PC	PC	Injured	Serious	Serious	7	Hooked in mouth
DS	Hawaii (I)	2003	23-Nov-2003	UC	BF	Injured	Serious	Serious	7,10	Hooked in the mouth, released with 20ft trailing line
DS	Outside	2004	21-Jan-2004	PC	PC	Injured	Serious	Serious	10	Hooked in mouth or pectoral fin; released trailing 12m line
DS	Hawaii (P)	2004	13-Feb-2004	PC	PC	Injured	Serious	Serious	7,10	Hooked in mouth (hook embedded next to tooth); released trailing 0.5m line
DS	Outside	2004	16-Feb-2004	MN	MN	Injured	Not Serious	CBD (prorated not serious)**	10,14	Entangled (probably pectorals or flukes); released with line and buoy attached. **Following additional expert review by three members of the Alaska Scientific Review Group, the injury severity remained CBD and was prorated.
DS	Outside	2004	11-Mar-2004	PC	PC	Injured	Serious	Serious	7 or 8, 10?	Hooked in head/beak/mouth; released trailing unknown amount of line
DS	Outside	2004	29-Mar-2004	PC	PC	Injured	Serious	Serious	1,10	Hook ingested; released with 2 ft of trailing line
DS	Johnston	2004	27-Apr-2004	GM	GM	Injured	Serious	Serious	14	Entangled around body, released entangled and with ~4 m of trailing line
DS	Hawaii (P)	2004	31-Aug-2004	PC	PC	Dead	Dead	Dead	n/a	Hooked in jaw
DS	Hawaii (P)	2004	12-Sep-2004	PC	PC	Injured	Not Serious	Not Serious	7	Hooked in mouth, hook pulled out
SS	Outside	2005	30-Jan-2005	GG	GG	Injured	Serious	Serious	1	Hook ingested
SS	Outside	2005	23-Feb-2005	BE	BE	Injured	Not Serious	Not Serious	11	Line came off whale after mainline cut

**Table 2.** (Continued)

Fishery Type	EEZ Area	Trip Arrival Year	Take Date	Species Code	Possible Species Codes	Recorded Animal condition	(A) Previous Determination	(B) Revised Determination	Andersen et al. 2008 Table 1 Criteria	Injury determination criteria / Comments
DS	Outside	2005	7-Mar-2005	GM	GM	Injured	Serious	Serious	14	Released with two wraps of mono around head
SS	Hawaii	2005	18-Apr-2005	UC	UC	Injured	Not Serious	Not Serious	11	Freed itself from gear after line cut
DS	Outside	2005	18-Aug-2005	GG	GG	Injured	Serious	Serious	7,10	Hooked in mouth, gear from snap to hook remained
DS	Hawaii (P)	2005	24-Sep-2005	PC	PC	Dead	Dead	Dead	n/a	Dead
DS	Outside	2005	17-Sep-2005	PC	PC	Injured	Serious	Serious	14,10	Released with 10-15m of mainline and branchlines wrapped around flukes and trailing behind animal
DS	Hawaii (I)	2005	21-Oct-2005	UC	BF	Injured	CBD (prorated serious)	CBD (prorated serious)	-	Entangled in unknown manner; released with unknown gear attached
DS	Outside	2005	3-Nov-2005	MD	MD	Injured	Not Serious	Not Serious	26	Hooked in fluke, hook ripped out leaving 3-4" fluke injury, whale swam away slowly
DS	Hawaii	2006	27-Dec-2005	TT	TT	Injured	Serious	Serious	10	Released with >5m branchline hooked into body in front of pec fin
SS	Outside	2006	25-Jan-2006	GG	GG	Injured	CBD (prorated serious)	CBD (prorated serious)	-	Hooked in unknown location; released with hook and ~1/2ft mono branchline
DS	Hawaii (P)	2006	14-Jan-2006	UC	BF	Injured	Serious	Serious	8,10	Hooked in head above eye; released with 4ft line and hook
SS	Outside	2006	17-Jan-2006	GG	GG	Dead	Dead	Dead	n/a	
DS	Outside	2006	28-Jan-2006	GM	GM	Injured	CBD (prorated serious)	Serious	10	Hooked in unknown location; unknown if entangled; released with hook and 2-3m clear mono line
DS	Outside	2006	19-Feb-2006	PC	PC	Injured	Not serious	Serious	10	Hooked in fluke; not entangled; released with hook and 25ft branchline; active animal
SS	Outside	2006	19-Feb-2006	MN	MN	Injured	Serious	Serious	3,10,14,23?	Whale wrapped several times in mainline and branchline, around body and flukes; unknown if light sticks still on branchlines; mainline cut on either side of whale to release animal. Swam slowly at surface and never dove, heard moaning and breathing.
DS	Outside	2006	12-Mar-2006	UC	ZU	Injured	Serious	Serious	7,10	Hooked in mouth/head, unknown if entangled, released with hook and 7m branchline
SS	Outside	2006	7-Mar-2006	TT	TT	Injured	Serious	Serious	7,10	Hooked in mouth; hook and 1/2 ft line left on hook
DS	Hawaii	2006	3-Apr-2006	GM	GM	Injured	Serious	Serious	7,10	Hooked in mouth; released with hook and 3-4m of line

**Table 2.** (Continued)

Fishery Type	EEZ Area	Trip Arrival Year	Take Date	Species Code	Possible Species Codes	Recorded Animal condition	(A) Previous Determination	(B) Revised Determination	Andersen et al. 2008 Table 1 Criteria	Injury determination criteria / Comments
DS	Hawaii (P)	2006	26-Apr-2006	UC	GG, BF	Injured	CBD (prorated serious)	Serious	10	Probably tail hooked/entangled; released with hook and ~1/2 branchline (=5m based on gear data); animal ~12ft long
DS	Outside	2006	6-Apr-2006	GG	GG	Injured	Not serious	Serious	10	Hooked in anterior part of dorsal fin; released with hook and 18ft mono line; 80g lead swivel, wire leader 0.6m
DS	Hawaii (P)	2006	21-Apr-2006	PC	PC	Injured	Serious	Serious	(7?),10	Hooked in head or front body/flipper; released with hook and 15m of branchline attached
DS	Outside	2006	9-May-2006	GG	GG	Injured	Serious	Serious	7,10	Hooked in mouth; released with hook and 1m of line attached
DS	Outside	2006	26-Jun-2006	PC	PC	Injured	Serious	Serious	7,10	Hooked in mouth; released with hook, 0.5m wire leader, 45g lead weight and 20ft monofilament branchline; 2-5 high-pitched 'barks' heard
DS	Hawaii (P)	2006	24-Oct-2006	UC	BF	Injured	Serious	Serious	7	Hooked in jaw; released with hook, but no line still attached.
DS	Hawaii (I)	2006	11-Nov-2006	PC	PC	Injured	Not Serious	Not Serious	11	Entangled around flukes; all line cut free; no gear remained on animal and it swam away vigorously
DS	Hawaii	2006	25-Nov-2006	SC	SC	Dead	Dead	Dead	n/a	
SS	Outside	2007	22-Feb-2007	TT	TT	Injured	Serious	Serious	7	Hooked in mouth
SS	Outside	2007	21-Feb-2007	GG	GG	Injured	Serious	Serious	7	Hooked in mouth
SS	Outside	2007	24-Mar-2007	GG	GG	Injured	Serious	Serious	7,10	Hooked in mouth, 3 ft line remained
SS	Outside	2007	26-Mar-2007	TT	TT	Injured	Serious	Serious	7,10	Hooked in mouth, 3 ft line remained; adult hooked, 4-ft calf nearby
SS	Outside	2007	22-Mar-2007	GG	GG	Injured	Serious	Serious	7	Hooked in mouth
SS	Hawaii	2007	29-Mar-2007	TT	TT	Injured	Serious	Serious	1 or 7,10	Hook ingested/in mouth, 6ft branchline remained
DS	Outside	2007	6-May-2007	UC	UC	Injured	Not Serious	Not Serious	11	Entangled near float, dove and caused line to get caught on props. Dolphin not resighted, but float came to surface with all gear accounted for. Presumably animal freed itself?
DS	Palmyra	2007	19-Apr-2007	PC	PC	Injured	Serious	Serious	1 or 7,10	Hook ingested/in mouth, 3ft branchline remained
DS	Hawaii (P)	2007	23-May-2007	PC	PC	Injured	Not Serious	Not Serious	11	Hooked unknown location, straightened hook and was freed; observer retrieved hook
DS	Outside	2007	16-Sep-2007	PC	PC	Injured	Not Serious	Not Serious	11	Hooked in mouth, pulled free, hook and line retrieved.
DS	Outside	2007	15-Nov-2007	GM	GM	Injured	Serious	Serious	10	Hooked in mouth, hook, leader and 7m line remained

**Table 2.** (Continued)

Fishery Type	EEZ Area	Trip Arrival Year	Take Date	Species Code	Possible Species Codes	Recorded Animal condition	(A) Previous Determination	(B) Revised Determination	Andersen et al. 2008 Table 1 Criteria	Injury determination criteria / Comments
DS	Hawaii	2007	31-Oct-2007	UC	UC	Injured	Serious	Serious	10	Hook, weight, leader and ~5m branch line attached (somehow) when released.
DS	Hawaii (P)	2007	7-Dec-2007	PC	PC	Injured	Serious	Serious	7,10	Hooked in mouth; released with hook, leader and 15ft line
DS	Outside	2007	24-Dec-2007	GG	GG	Dead	Dead	Dead	n/a	
SS	Outside	2008	29-Dec-2007	MN	MN	Injured	Not Serious	Not Serious	11	Entangled, mainline cut; all hooks, floats, branchlines retrieved; unknown if all mainline was recovered; some animals seen surfacing after interaction, but unknown if animal entangled was among them
SS	Outside	2008	22-Jan-2008	UK	UK	Injured	Not Serious	Not Serious	9,11	Hooked pierced through lip or skin part of outer part of mouth; pulled out before release
SS	Outside	2008	14-Feb-2008	GG	GG	Injured	Serious	Serious	7,10	Hooked in mouth and approximately 7m of leader line was still attached
SS	Outside	2008	2-Mar-2008	GG	GG	Injured	Serious	Serious	7,10	Hooked inside mouth; 18/0 offset circle hook and approx. 14.5 m of clear monofilament line with 80g wt left attached
SS	Outside	2008	15-Mar-2008	SC	SC	Injured	Serious	Serious	7,10	18/0 Offset circle hook and ~2ft line wrapped tightly around beak, preventing beak from opening; Hook presumed inside mouth/swallowed. Dolphin struggled during attempt to cut line; came loose and slowly swam down/away. Not seen again
SS	Outside	2008	28-Mar-2008	GG	GG	Injured	Serious	Serious	7,10	Hooked in mouth/jaw; released with about 10ft of mono leader
DS	Hawaii (P)	2008	13-Apr-2008	UC	BF	Injured	Serious	Serious	10	Hooked in unknown location; 0.6m wire leader, 45g weight and 7m branchline left attached
DS	Hawaii (P)	2008	23-Apr-2008	PC	PC	Injured	Serious	Serious	7,10	Hooked in right side of mouth, 3m branchline, offset 36mm tuna hook and 45g weight left
DS	Outside	2008	5-May-2008	SA	SA	Dead	Dead	Dead	n/a	Entangled, dead
DS	Hawaii (P)	2008	3-May-2008	UC	BF	Injured	Serious	Serious	10	Hooked and entangled; released with 10m of branch & leader line, weight
DS	Outside	2008	14-May-2008	UC	UC	Injured	Serious	Serious	10	Hooked and entangled in unknown location; broke free; hook, leader and branchline (10.5m) not recovered
DS	Outside	2008	19-Jun-2008	GG	GG	Injured	Serious	Serious	7,10	Hooked in mouth; released with 15/0 offset circle hook, 0.5m leader, 45g weight and ~2.5m branchline

**Table 2.** (Continued)

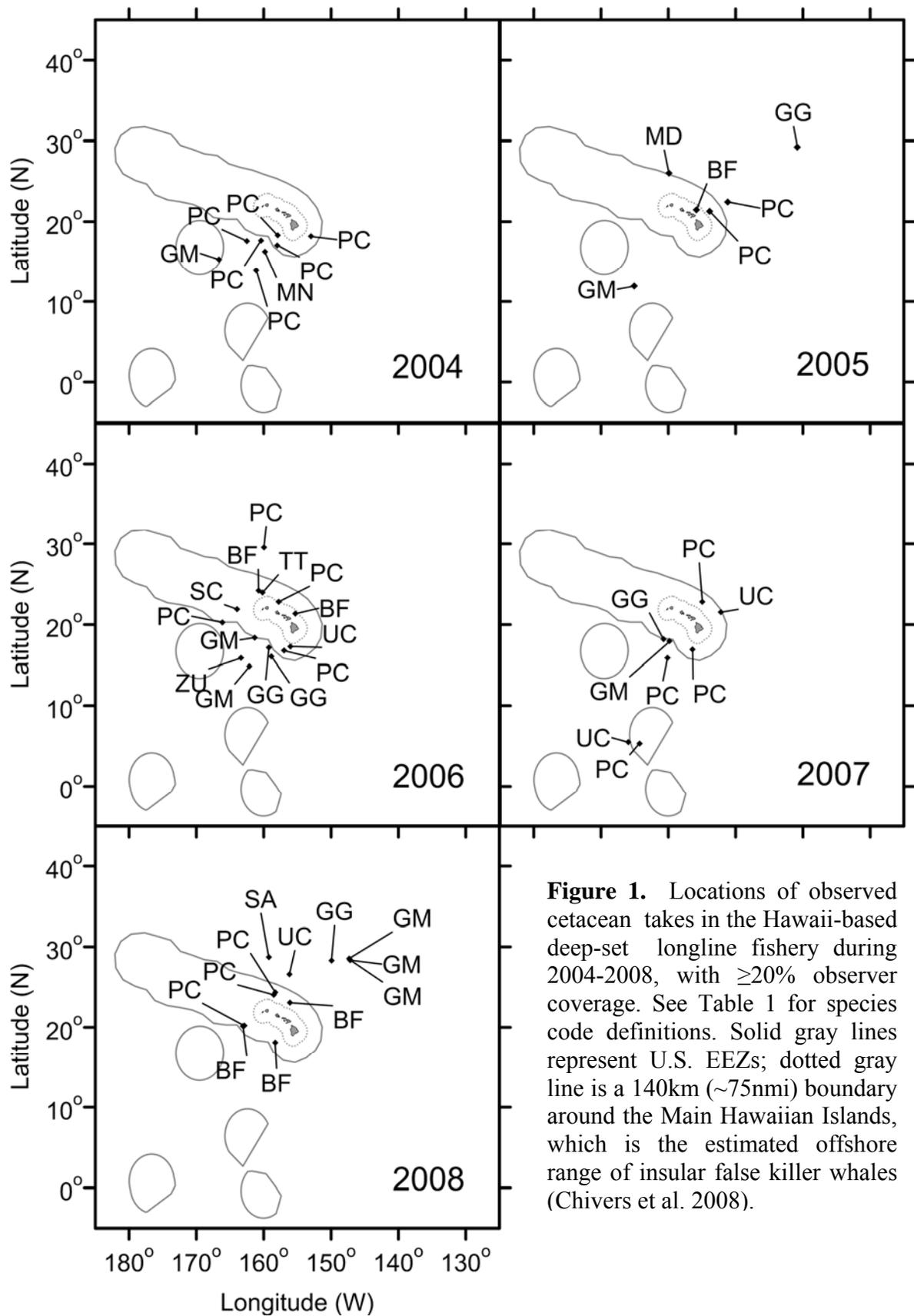
Fishery Type	EEZ Area	Trip Arrival Year	Take Date	Species Code	Possible Species Codes	Recorded Animal condition	(A) Previous Determination	(B) Revised Determination	Andersen et al. 2008 Table 1 Criteria	Injury determination criteria / Comments
DS	Outside	2008	20-Jun-2008	GM	GM	Injured	Serious	Serious	11,12,13	Entangled in mainline @mouth/head; freed itself while struggling alongside vessel; swam away slowly. Based on size (~7ft), this was a dependent calf, therefore this is considered a serious injury
DS	Hawaii (P)	2008	5-Jul-2008	UC	BF	Injured	Serious	Serious	7,10	Hooked/entangled @ head area; 15 or 18 offset circle hook, 0.5m leader, 45g weight and 7m branchline attached when line cut
DS	Hawaii (P)	2008	5-Jul-2008	PC	PC	Injured	Serious	Serious	7,10	Hooked/entangled @ head area; 15 or 18 offset circle hook, 0.5m leader, 45g weight and 5m branchline attached when animal broke free
DS	Outside	2008	25-Jun-2008	GM	GM	Injured	Not Serious	Not Serious	11	Hooked in pectoral fin or mouth/head; all gear pulled free with straightened hook. No gear remained on this larger (15 ft) animal, which swam away strongly.
DS	Outside	2008	25-Jun-2008	GM	GM	Injured	Not serious	Not Serious	11	Hooked in pectoral fin or mouth/head; hook pulled free and no gear remained on this 7-8 ft animal, which swam away with larger animal (previous record)
SS	Hawaii (P)	2008	12-Jun-2008	PC	PC	Injured	Not Serious	Not Serious	26	Hooked and entangled @ fluke; <1ft line left attached to hook after line cut
SS	Outside	2008	20-Aug-2008	UC	BF	Injured	Serious	Serious	10	Apparent depredation event, whale struggling and lots of tuna or whale blood in water. 18 offset circle hook and 9m branchline, 80g weight not recovered. Unknown how whale hooked/entangled.
DS	Hawaii (P)	2008	24-Oct-2008	PC	PC	Injured	Serious	Serious	7	Hooked in mouth (right side), hook not visible. Either 15 offset circle hook or 36mm offset tuna hook; 0.5 wire leader, 45g weight, 6-8m branchline remained attached.
SS	Outside	2008	10-Nov-2008	GG	GG	Dead	Dead	Dead	n/a	Hooked in fluke, dead

Table 3. Summary of deaths (D), serious injuries (SI), and non-serious injuries (NSI) in the Hawaii-based deep-set longline fishery during 2004-2008.

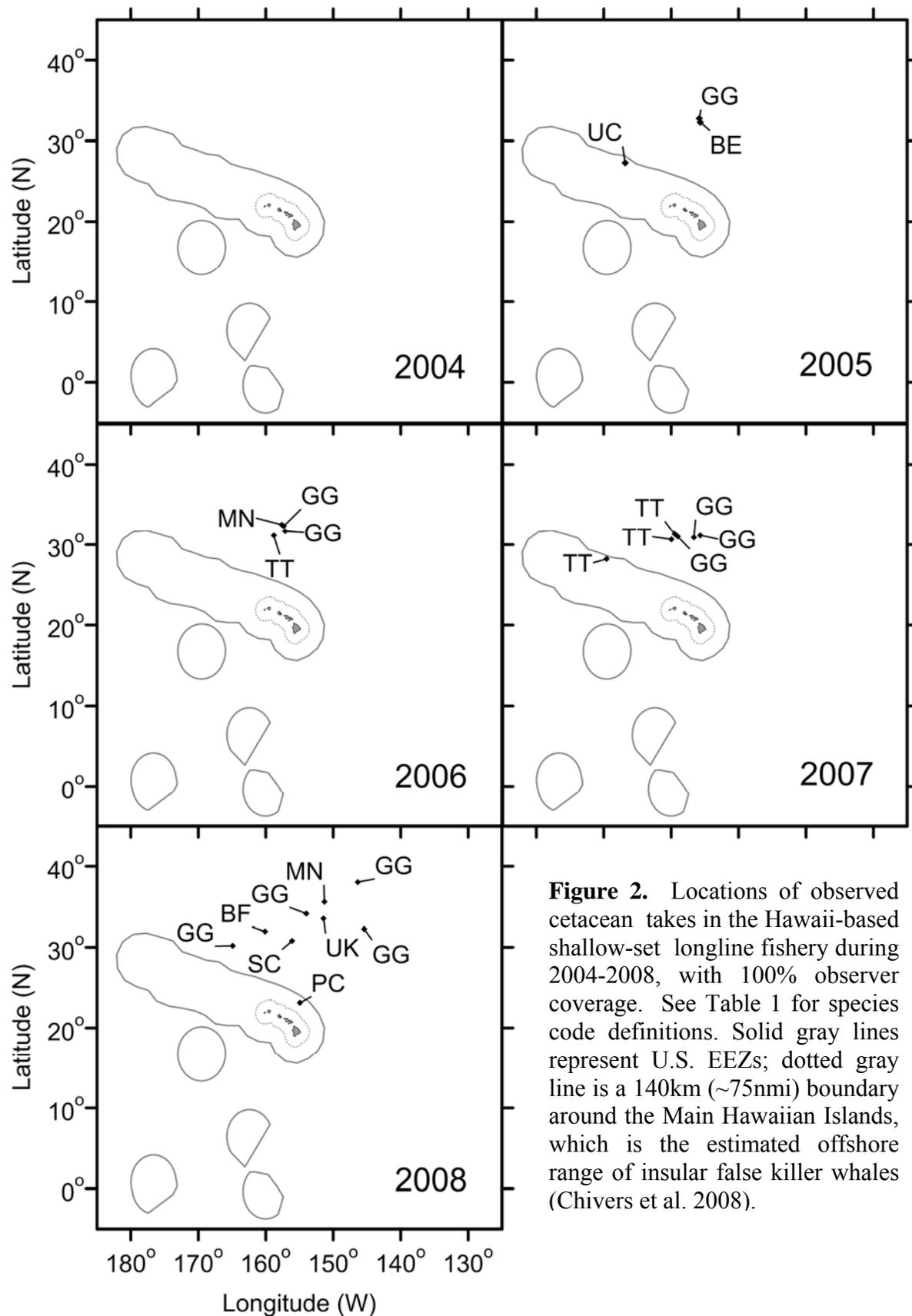
Species	Year	Hawaii EEZ			Johnston EEZ			Outside U.S. EEZs			Palmyra EEZ		
		D	SI	NSI	D	SI	NSI	D	SI	NSI	D	SI	NSI
'Blackfish' (BF)	2004												
	2005		1										
	2006		2										
	2007												
	2008		3										
Risso's dolphin (GG)	2004								1				
	2005								2				
	2006												
	2007							1					
	2008								1				
Short-finned pilot whale (GM)	2004				1								
	2005								1				
	2006		1						1				
	2007								1				
	2008								1	2			
Blainville's beaked whale (MD)	2004												
	2005										1		
	2006												
	2007												
	2008												
Humpback whale (MN)	2004									1			
	2005												
	2006												
	2007												
	2008												
False killer whale (PC)	2004	1	2						3				
	2005	1							1				
	2006		1	1					2				
	2007		1	1						1		1	
	2008		3										
Pantropical spotted dolphin (SA)	2004												
	2005												
	2006												
	2007												
	2008								1				
Striped dolphin (SC)	2004												
	2005												
	2006	1											
	2007												
	2008												
Common bottlenose dolphin (TT)	2004												
	2005												
	2006		1										
	2007												
	2008												
Unidentified cetacean (UC)	2004												
	2005												
	2006		1										
	2007		1							1			
	2008								1				
Unidentified beaked whale (ZU)	2004												
	2005												
	2006								1				
	2007												
	2008												

Table 4. Summary of deaths (D), serious injuries (SI), and non-serious injuries (NSI) in the Hawaii-based shallow-set longline fishery during 2004-2008.

Species	Year	Hawaii EEZ			Johnston EEZ			Outside U.S. EEZs			Palmyra EEZ		
		D	SI	NSI	D	SI	NSI	D	SI	NSI	D	SI	NSI
Bryde's whale (BE)	2004												
	2005												
	2006									1			
	2007												
	2008												
'Blackfish' (BF)	2004												
	2005												
	2006												
	2007												
	2008									1			
Risso's dolphin (GG)	2004												
	2005									1			
	2006								1	1			
	2007								1	3			
	2008								1	3			
Humpback whale (MN)	2004												
	2005												
	2006									1			
	2007												
	2008										1		
False killer whale (PC)	2004												
	2005												
	2006												
	2007												
	2008			1									
Striped dolphin (SC)	2004												
	2005												
	2006												
	2007												
	2008									1			
Common bottlenose dolphin (TT)	2004												
	2005												
	2006									1			
	2007			1						2			
	2008												
Pygmy or dwarf sperm whale (UK)	2004												
	2005												
	2006												
	2007												
	2008										1		



**Figure 1.** Locations of observed cetacean takes in the Hawaii-based deep-set longline fishery during 2004-2008, with  $\geq 20\%$  observer coverage. See Table 1 for species code definitions. Solid gray lines represent U.S. EEZs; dotted gray line is a 140km (~75nmi) boundary around the Main Hawaiian Islands, which is the estimated offshore range of insular false killer whales (Chivers et al. 2008).



**Figure 2.** Locations of observed cetacean takes in the Hawaii-based shallow-set longline fishery during 2004-2008, with 100% observer coverage. See Table 1 for species code definitions. Solid gray lines represent U.S. EEZs; dotted gray line is a 140km (~75nmi) boundary around the Main Hawaiian Islands, which is the estimated offshore range of insular false killer whales (Chivers et al. 2008).

**APPENDIX A – Anderson et al (2008), Table 1.  
Recommended Serious-Injury Criteria for Different Taxonomic Groups \***

<b>SI = Serious Injury; NSI = Not Serious Injury; CBD/case specific = Potential SI, but either 1) insufficient information about the impact of a particular injury, or 2) additional factors must be considered on a case-by-case basis to determine the severity; n/a = not applicable; TBD= To Be Determined; ■ = areas lacking near-complete agreement among Day 4 participants</b>				
<b>Criterion</b>	<b>Injury/Information Categories</b>	<b>Large Cetaceans</b>	<b>Small Cetaceans</b>	<b>Pinnipeds</b>
<b>Pre-Existing Guidance (included in Angliss and DeMaster (1998) and/or NEFSC publications, retained with no changes)</b>				
1	Ingestion of gear or hook	SI	SI	SI
<b>Modified Criteria (some aspects retained from guidance provided in Angliss and DeMaster (1998) and/or NEFSC publications, with some changes or additions)</b>				
2	A free-swimming animal observed at a date later than its human interaction, exhibited a marked change in skin discoloration, lesions near the nares, fat loss, or increased cyamid loads, etc.	SI	SI	SI
3	Gear constricted on any body part, or likely to become constricting as the animal grows	SI	SI	SI
4	Uncertain whether gear is constricting, but appendages near the entanglement's point of attachment are discolored	SI	SI	SI
5	Anchored/immobilized (not freed)	SI	SI	SI
6	Head trauma (including eye injuries)	SI	SI	SI
7	Hook in mouth (excluding case 9 below), no trailing gear	CBD/case specific	SI	SI
8	Hook confirmed in head (excluding mouth), no trailing gear	NSI	SI	CBD/case specific
9	Hook confirmed in lip only, no trailing gear	n/a	CBD/case specific	CBD/case specific
10	Gear attached to free-swimming animal with potential to 1) wrap around pectoral fins/flippers, peduncle, or head; 2) be ingested; or 3) accumulate drag	■ CBD/case specific	SI	SI
11	Animal freed from gear and released without gear	CBD/case specific	CBD/case specific	CBD/case specific
12	Social animal separated from group or released alone	CBD/case specific	CBD/case specific	CBD/case specific
13	Dependent animal (e.g., calf, pup) alone post-interaction	SI	SI	SI
14	Wrap(s) of gear around pectoral fin/flippers, peduncle, head, abdomen, or chest	CBD/case specific	SI	SI
<b>New Criteria</b>				
15	Deep, external cut or laceration to body	CBD/case specific	CBD/case specific	CBD/case specific
16	Body cavity penetration by foreign object or body cavity exposure	SI	SI	SI
17	Visible blood loss	CBD/case	CBD/case	CBD/case

		specific	specific	specific
18	Loss or disfigurement of dorsal fin	CBD/case specific	CBD/case specific	n/a
19	Partially severed flukes (transecting midline)	SI	SI	n/a
20	Partially severed flukes (not transecting midline)	CBD/case specific	CBD/case specific	n/a
21	Partially severed pectoral fins or flippers	CBD/case specific	CBD/case specific	CBD/case specific
22	Severed pectoral fins or flippers	CBD/case specific	CBD/case specific	SI
23	Entanglement, immobilization or entrapment of a certain duration before being freed (TBD, species-dependent)	SI	SI	SI
24	Body trauma not covered by cases 6, 15, and 16 above (e.g., broken appendages, hemorrhaging)	CBD/case specific	CBD/case specific	CBD/case specific
25	Detectable fractures	SI	SI	SI
26	Hook in appendage, without trailing gear or with trailing gear that does not have the potential to wrap, be ingested, or accumulate drag	NSI	NSI	NSI
27	Animal brought on vessel deck following entanglement/entrapment	n/a	SI	CBD/case specific
28	Vertebral transection	SI	SI	SI
29	Collision with vessel of certain minimum size (TBD, species-specific)	SI	SI	CBD/case specific
30	Collision with vessel traveling at a certain minimum speed (TBD, species-specific)	SI	SI	CBD/case specific
31	Collision with vessel below a certain size threshold (TBD, species-specific)	CBD/case specific	CBD/case specific	CBD/case specific
32	Collision with vessel traveling below a certain speed threshold (TBD, species-specific)	CBD/case specific	CBD/case specific	CBD/case specific
33	Dog Bites <sup>o</sup>	n/a	n/a	CBD/case specific

\* See section 8.0 for additional details on the intent and purpose of Table 1.

<sup>o</sup> This criterion was not included by the Day 4 Participants. The Workshop Steering Committee added this criterion for clarity. About  $\frac{3}{4}$  of the Day 4 participants preferred subsuming dog bites under criteria 6, 15, 16, or 24 (depending on the injury inflicted by the dog bite). The pinniped experts generally preferred to include dog bites in a separate category, because of the additional potential for inter-species disease transmission.

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