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

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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.

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

| Code | Common Name | Scientific name |
|-------------|---|-----------------------------------|
| 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 | | | | | | | | | | | | |
| | 2005 | | | | | | | | 1 | | | | |
| | 2006 | | | | | | | | 2 | | | | |
| | 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 | | |

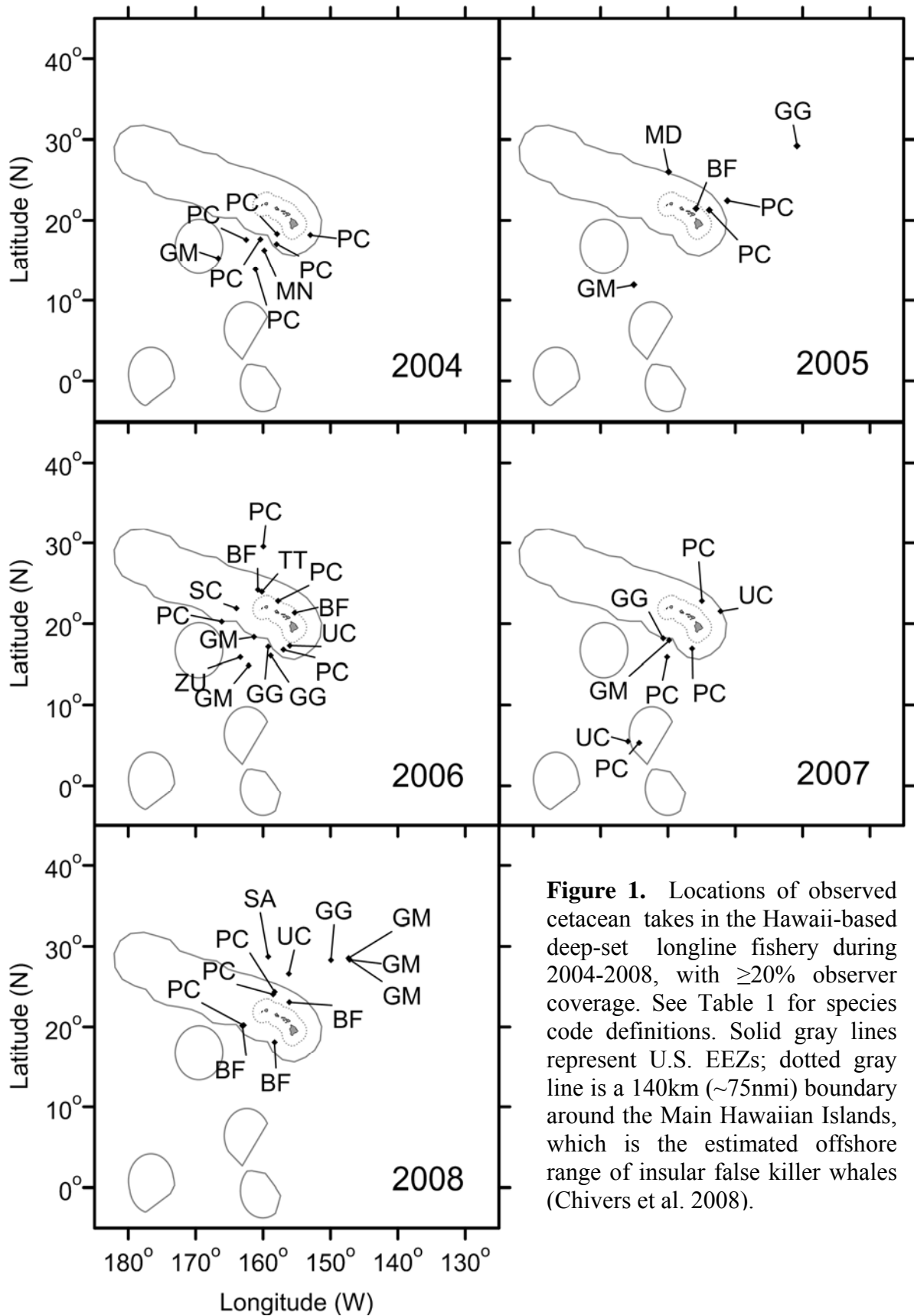


Figure 1. Locations of observed cetacean takes in the Hawaii-based deep-set longline fishery during 2004-2008, with $\geq 20\%$ observer coverage. See Table 1 for species code definitions. Solid gray lines represent U.S. EEZs; dotted gray line is a 140km (~75nmi) boundary around the Main Hawaiian Islands,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

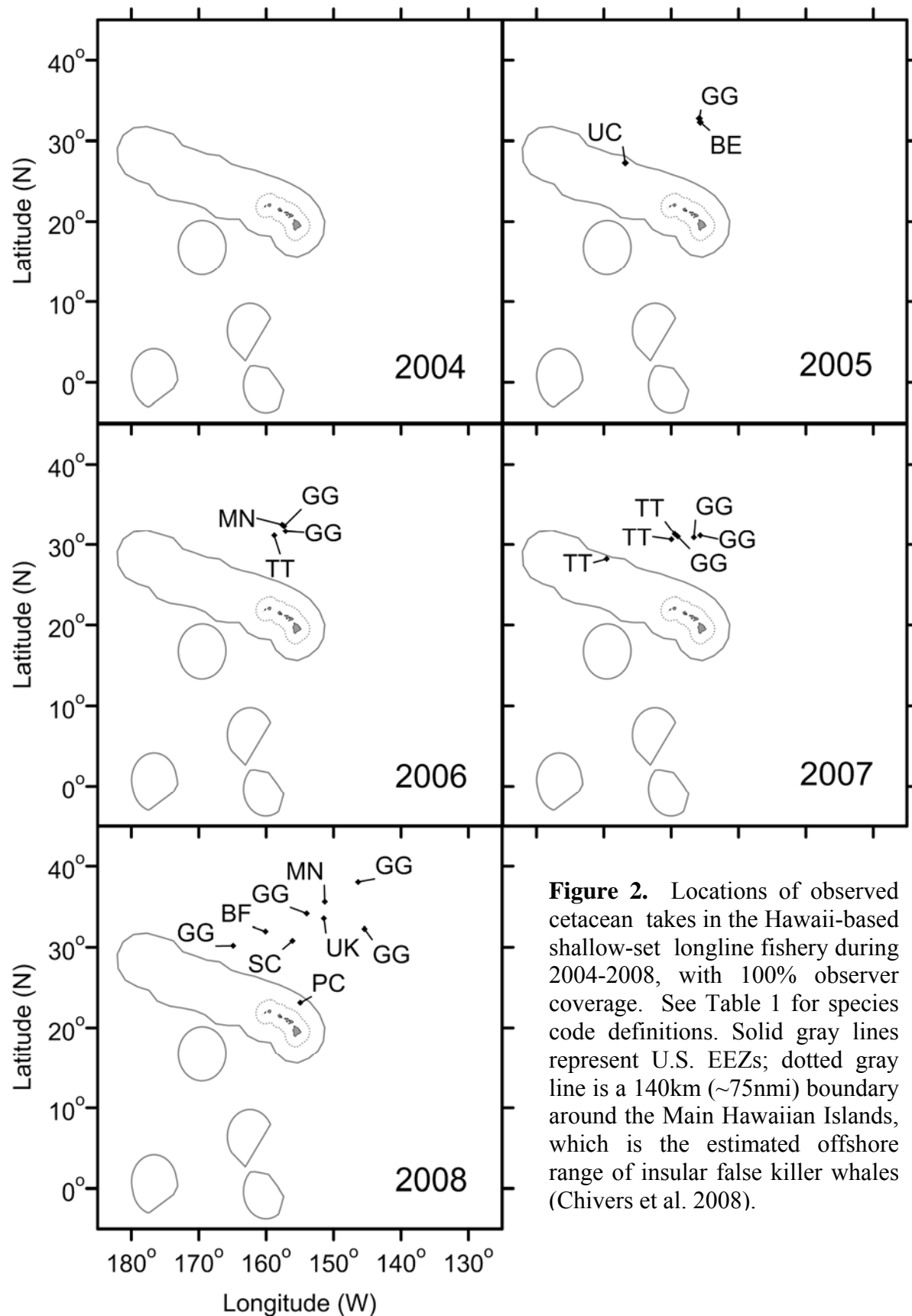


Figure 2. Locations of observed cetacean takes in the Hawaii-based shallow-set longline fishery during 2004-2008, with 100% observer coverage. See Table 1 for species code definitions. Solid gray lines represent U.S. EEZs; dotted gray line is a 140km (~75nmi) boundary around the Main Hawaiian Islands,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

| 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 | | | | |
|--|--|------------------------|------------------------|-------------------|
| Criterion | Injury/Information Categories | Large Cetaceans | Small Cetaceans | Pinnipeds |
| Pre-Existing Guidance (included in Angliss and DeMaster (1998) and/or NEFSC publications, retained with no changes) | | | | |
| 1 | Ingestion of gear or hook | SI | SI | SI |
| Modified Criteria (some aspects retained from guidance provided in Angliss and DeMaster (1998) and/or NEFSC publications, with some changes or additions) | | | | |
| 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 |
| New Criteria | | | | |
| 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 ^o | n/a | n/a | CBD/case specific |

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

^o 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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A.M. GORGONE, B.L. HANCOCK, N.M. HEDRICK, D. MATILLA,
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