Humpback whale bycatch in the 2010 - 2013 U.S. West Coast Groundfish Fisheries

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April 2015

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Executive Summary

In accordance with the National Marine Fisheries Service (NMFS) Biological Opinion (BiOp) on Continuing Operation of the Pacific Coast Groundfish Fishery, this document provides a summary of observed bycatch of U.S. Endangered Species Act (ESA)-listed humpback whales (*Megaptera novaeangliae*) in all sectors of the west coast groundfish fishery from 2010–2013.

There were no documented takes of humpback whale from 2010-2013 in the Pacific Coast groundfish fisheries. There was an observed entanglement of a humpback whale in October 2014, which will be included in the next biennial report. Although there were no observed interactions between humpbacks and Pacific coast groundfish fisheries during 2010-2013, pot and trap fisheries generally represent the majority of documented fishery interactions with humpbacks along the U.S. west coast (Carretta et al. 2014b).

Acknowledgments

The authors gratefully acknowledge the hard work and dedication of observers from the West Coast Groundfish Observer Program and the At-Sea Hake Observer Program, as well as contributions from observer program staff. This document was a joint effort of the Marine Mammal Bycatch Reporting Team, which included at various times and in various roles, Jason Jannot (NWFSC, WCGOP), Vanessa Tuttle (NWFSC, ASHOP), Brad Hanson (NWFSC, CBD), Eric Ward (NWFSC, CBD), Jim Caretta (SWFSC,), Karin Forney (SWFSC,), Robyn Angliss (NMML), Teresa Mongillo (WCRO, PRD), and Strandings Network Coordinators: Kristin Wilkinson, Brent Norberg, Justin Viezbicke, and Justin Greenman).

Introduction and Background

In accordance with the National Marine Fisheries Service (NMFS) Biological Opinion (BiOp) Regarding the Effects of the Continued Operation of the Pacific Coast Groundfish Fishery (NMFS 2012a) as governed by Pacific Coast Groundfish Fishery Management Plan, this document provides a reporting of observed takes of U.S. Endangered Species Act-listed humpback whales (*Megaptera novaeangliae*) in U.S. west coast groundfish fishery sectors.

Humpback Whale Life History[1]

Humpback whales are a long-lived species, with late onset of sexual maturity (NMFS 1991). In the Pacific Ocean, females bear their first calves between 8 to 16 years of age, and the maximum life span is at least 50 years, with an average generation time of 21.5 years. Calving intervals are from 2 to 3 years following an 11-month gestation period. Humpback whales feed on krill and small schooling fish using solitary and group foraging strategies.

Humpback whales are found in all oceans of the world with a broad geographical range from tropical to temperate waters in the northern hemisphere and tropical to arctic waters in the southern hemisphere. All populations migrate seasonally between their winter calving and breeding grounds and summer feeding grounds. Humpback whales typically occur in the feeding grounds during the summer and fall months. For management under the MMPA, stocks of humpback whales are defined based on feeding areas, with the whales feeding off California, Oregon, and Washington currently considered one stock.

In the North Pacific, the primary breeding grounds are located in coastal areas of Central America, Mexico, Hawaii, the Philippines, the islands of Ogasaware and Okinawa, and an unidentified additional Western Pacific breeding ground (Calambokidis et al. 2008; Fleming and Jackson 2011). The breeding populations are genetically different (Baker et al. 1998; Baker and Steel 2010), and photo identification-based mark/recapture studies indicate a high, but not complete, degree of individual fidelity to one of the four general breeding areas (Mexico, Central America, Hawaii, Asia) (Calambokidis et al. 2008).

Feeding areas include coastal waters across the Pacific Rim from California to Japan. Humpback whales are commonly observed off the California, Oregon, and Washington coasts during the spring, summer, and fall months, and they have also been detected off California (Forney and Barlow 1998) and Washington (Olsen et al. 2009; NWFSC unpublished data) during the winter. The whales feeding off of California and Oregon are primarily from the Mexican breeding area, with smaller contributions from Central America. The whales feeding off of Washington and Southern British Columbia are also from the Mexican and Central American breeding areas, but also include a significant number of individuals from the Hawaiian breeding area (Calambokidis et al. 2008).

[1] Adapted from NMFS 2012a

There is relatively high site fidelity of individuals to broad feeding grounds (Calambokidis et al. 2008), but movements likely occur between feeding areas. The migratory routes used by humpbacks from their West Coast feeding areas to breeding areas are not well known. Based on photo-identification data, their movements in Oregon and California are probably primarily coastal as they move to Mexico and Central America. Limited information is available on the routes of whales tagged on their Mexican breeding ground, one whale's movements to the British Columbia feeding ground was near or westward of the continental slope (Lagerquist et al. 2008). This coastal migration pattern may be similar for the portion of the northern Washington animals that also breed in these areas, but a substantial proportion of the animals observed in this area winter in Hawaii, and these animals have a less coastal migration pattern.

West Coast humpback whales migrate from breeding grounds in Mexico and Hawaii to the West Coast of the U.S. and British Columbia to feed in the summer. Thus, while whales do occur throughout the shelf waters of the U.S. West Coast, they aggregate off central California, Oregon, and the northwest coast of Washington State. In California, the whales use the Monterey Bay and Gulf of the Farallons (Barlow et al. 2009; Benson 2002; Benson et al. 2002; Forney 2007; Kieckhefer 1992). Off the northwest coast of Washington, whales are primarily observed east of the Barkley Canyon, between the La Perouse Bank and Nitnat Canyon, and on the shelf edge near the Juan de Fuca Canyon (Calambokidis et al. 2004; Dalla Rosa 2010). In particular, the whales occur primarily on the periphery of the Juan de Fuca Eddy (Dalla Rosa 2010). In northern California and southern Oregon, humpback whale occurrence may be associated with the inside edge of the coastal upwelling front (Tynan et al. 2005).

Humpback Whale Status

Humpback whales were listed as endangered under the ESA in 1970, and a Recovery Plan was finalized for this species in 1991 (NMFS 1991). Under the MMPA, humpback whales are classified as a strategic stock and considered depleted. On August 12, 2009, NMFS initiated an ESA status review of humpback whales (74 Fed. Reg. 40568). The status review (Bettridge et al. 2015) is currently undergoing a public comment period; following the status review, NMFS has proposed reclassifying the humpback whale into 14 distinct population segments under the Endangered Species Act as well as proposing that 10 of the 14 populations do not warrant listing (80 FR 22302, April, 2015). This following information is adapted from NMFS (2012) and summarizes information taken from a draft NWFSC risk assessment of Pacific Coast Groundfish Fisheries (PCGF) to threatened and endangered marine species (Ford et al. 2012), which includes review of the recovery plan (NMFS 1991), stock assessment reports (reports for each stock are available online at http://www.nmfs.noaa.gov/pr/sars/species.htm#largewhales), the draft status review (Fleming and Jackson 2011), as well as data that became available more recently.

The most recent population estimate of humpback whales in the North Pacific Ocean is 21,808 (CV=0.04) (2004-2006 estimate) (Barlow et al. 2011). This is higher than the estimated pre-exploitation abundance of ~15,000, but uncertainty about the latter estimate (Rice 1978) exists. Estimates of the breeding population are approximately 10,000 whales (Hawaii), 6,000 to 7,000 whales (Mexico, including Baja and the Revillagigedos Islands), 500 whales (Central America), and 1,000 whales (Western Pacific) (Calambokidis et al. 2008). For management under the

MMPA, the whales feeding off of California, Oregon, and Washington are currently considered one stock, which includes a California and Oregon feeding group and a Washington and southern British Columbia feeding group (Carretta et al. 2014a). The combined abundance estimate of these two feeding groups was 1,981 whales (CV≈0.03) (Carretta et al. 2014a), with a minimum population estimate of 1,876 whales (lower 20th percentile of the combined mark-recapture estimate for both feeding groups) (Calambokidis et al. 2014). The potential biological removal (PBR) for this stock is 11 whales per year in U.S. waters (Caretta et al. 2014a).

The maximum expected rate of annual increase for the species as a whole ranges from an estimated 7.3 to 8.6 percent (Zerbini et al. 2010), with a maximum plausible rate (upper 99 percent confidence interval of the expected maximum) of 11.8 percent annually. North Pacific populations as a whole grew by an estimated 6.8 percent annually over the period from 1966 to 2006 (based on an estimated post-exploitation abundance of 1,400 in 1966) (Calambokidis et al. 2008). The Hawaiian breeding population grew by an estimated 5.5 to 6.0 percent annually over the period from 1991–1993 to 2006. The annual growth rate for the California-Oregon-Washington stock is estimated at 7.5 percent (Carretta et al. 2012). Most Southern Hemisphere populations have been increasing at 7 to 9 percent/year since the early- to mid-1990s (Fleming and Jackson 2011). The Gulf of Maine feeding population has been estimated to be increasing at a lower rate of ~3 percent annually from 1979 to 1993 (Stevick et al. 2003).

Humpback whales face a variety of threats, depending on the region in which they occur. Threats listed in the Recovery Plan include entrapment and entanglement in fishing gear, collisions with ships, acoustic disturbance, habitat degradation, and competition for resources with humans (NMFS 1991). Climate change and ocean acidification are also global threats to marine ecosystems that could indirectly affect humpback whales via trophic dynamics and available prey. Globally, entrapment and entanglement in fishing gear and collisions with ships represent most of the reported and observed serious injuries and mortalities for the species (review in Carretta et al. 2014b). Entanglement data are available for most stocks of humpback whales worldwide. These entanglements result from humpback whale interactions with a variety of fisheries and gear types and generally result in some level of serious injury and mortality. The absolute number of humpback whale entanglements is likely under-represented by these data, in part because observer programs and stranding networks do not exist in many parts of the world. For the CA/OR/WA stock, there may be unreported entanglements in fishing gear off Mexico, which could occur while these humpback whales are in their breeding grounds.

West Coast Groundfish Fishery

The west coast groundfish fishery (WCGF) is a multi-species fishery that utilizes a variety of gear types. The fishery harvests species designated in the Pacific Coast Groundfish Fishery Management Plan (PFMC 2011) and is managed by the Pacific Fishery Management Council (PFMC). Over 90 species are listed in the groundfish FMP, including a variety of rockfish, flatfish, roundfish, skates, and sharks. These species are found in both federal (> 5.6 km off-shore) and state waters (0-5.6 km). Groundfish are both targeted and caught incidentally by trawl nets, hook-&-line gear, and fish pots.

Under the FMP, the groundfish fishery consists of four management components:

The Limited Entry (LE) component encompasses all commercial fishers who hold a federal limited entry permit. The total number of limited entry permits available is restricted. Vessels with an LE permit are allocated a larger portion of the total allowable catch for commercially desirable species than vessels without an LE permit.

The Open Access (OA) component encompasses commercial fishers who do not hold a federal LE permit. Some states require fishers to carry a state-issued OA permit for certain OA sectors.

The Recreational component includes recreational anglers who target or incidentally catch groundfish species. Recreational fisheries are not covered by this report.

The Tribal component includes native tribal commercial fishers in Washington State that have treaty rights to fish groundfish. Tribal fisheries are not included in this report, with the exception of the observed tribal at-sea Pacific hake (*Merluccius productus*) (also known as whiting) sector.

These four components are further subdivided into sectors based on gear type, target species, permits and other regulatory factors. This report includes data from the following sectors:

Limited Entry (LE) sectors
Beginning in 2011, an Individual Fishing Quota (IFQ) program for the LE bottom trawl fleet and the at-sea Pacific hake fleet was implemented, under the West Coast Groundfish Trawl Catch Share Program.

- IFQ fishery (formerly LE bottom trawl and at-sea Pacific hake, 2002-2010): This sector is subdivided into the following components due to differences in gear type and target strategy:
  - Bottom trawl: Bottom trawl nets are used to catch a variety of non-hake groundfish species. Catch is delivered to shore-based processors.
  - Midwater non-hake trawl: Midwater trawl nets are used to target midwater non-hake species. Catch is delivered to shore-based processors.
  - Pot: Pot gear is used to target groundfish species, primarily sablefish (*Anoplopoma fimbria*). Catch is delivered to shore-based processors.
  - Hook-and-line: Longlines are primarily used to target groundfish species, mainly sablefish. Catch is delivered to shore-based processors.
  - LE California halibut (*Paralichthys californicus*) trawl: Bottom trawl nets are used to target California halibut by fishers holding both a state California halibut permit and an LE federal trawl groundfish permit. Catch is delivered to shore-based processors.
  - Shoreside Pacific hake trawl: Midwater trawl nets are used to catch Pacific hake. Catch is delivered to shore-based processors.
  - At-sea motherships and catcher-processors: Midwater trawl nets are used to catch Pacific hake. Catcher vessels deliver unsorted catch to a mothership. The catch is sorted and processed aboard the mothership. Catcher-processors catch and process at-sea. This component also includes the at-sea processing component of the tribal sector. The tribal sector must operate within defined boundaries in waters off northwest Washington.

Tribal catch can be delivered to a contracted mothership by catcher vessels for processing or be caught and processed by a contracted catcher-processor.

- LE fixed gear (non-nearshore): This sector is subdivided into two components due to differences in permitting and management:
  - LE sablefish endorsed season: Longlines and pots are used to target sablefish. Catch is generally delivered to shore-based processors.
  - LE sablefish non-endorsed: Longlines and pots are used to target groundfish, primarily sablefish and thornyheads. Catch is delivered to shore-based processors or sold live at the dock.

Open Access (OA) Federal sectors

- OA fixed gear (non-nearshore): Fixed gear, including longlines, pots, fishing poles, stick gear, etc. is used to target non-nearshore groundfish. Catch is delivered to shore-based processors.

Open Access (OA) state sectors

- OA ocean shrimp (*Pandalus jordani*) trawl: Trawl nets are used to target ocean shrimp. Catch is delivered to shore-based processors.
- OA California halibut trawl: Trawl nets are used to target California halibut by fishers holding a state California halibut permit. Catch is delivered to shore-based processors.
- Nearshore fixed gear: A variety of gear, including longlines, pots, fishing poles, stick gear, etc. are used to target nearshore rockfish and other nearshore species managed by state permits in Oregon and California. Catch is delivered to shore-based processors or sold live.

Northwest Fisheries Science Center Groundfish Observer Programs

The NWFSC Groundfish Observer Program observes commercial sectors that target or take groundfish as bycatch. The observer program has two units: the West Coast Groundfish Observer Program (WCGOP) and the At-Sea Hake Observer Program (A-SHOP). The WCGOP Program was established in May 2001 by NOAA Fisheries (a.k.a., National Marine Fishery Service, NMFS) in accordance with the Pacific Coast Groundfish Fishery Management Plan (50 CFR Part 660) (50 FR 20609). This regulation requires all vessels that catch groundfish in the US EEZ from 3-200 miles offshore carry an observer when notified to do so by NMFS or its designated agent. Subsequent state rule-making has extended NMFS's ability to require vessels fishing in the 0-3 mile state territorial zone to carry observers.

The NWFSC Groundfish Observer Program's goal is to improve estimates of total catch and discard by observing commercial sectors of groundfish fisheries along the U.S. west coast that target or take groundfish as bycatch. The observer program has two units: the West Coast Groundfish Observer Program (WCGOP) and the At-Sea Hake Observer Program (A-SHOP). The WCGOP Program was established in May 2001 by NMFS in accordance with the Pacific Coast Groundfish Fishery Management Plan (50 CFR Part 660) (50 FR 20609). This regulation requires all vessels that catch groundfish in the U.S. Exclusive Economic Zone (EEZ) from 3-200 miles offshore to carry an observer when notified to do so by NMFS or its designated agent. Subsequent state rule-making has extended NMFS's ability to require vessels fishing in the 0-3

mile state territorial zone to carry observers.

The WCGOP and A-SHOP observe distinct sectors of the groundfish fishery. The WCGOP observes the following sectors: IFQ shore-based delivery of groundfish and Pacific hake, LE and OA fixed gear, and state-permitted nearshore fixed gear sectors. The WCGOP also observes several state-managed fisheries that incidentally catch groundfish, including the California halibut trawl and ocean shrimp trawl fisheries. The A-SHOP observes the IFQ fishery that delivers Pacific hake at-sea including: catcher-processor, mothership, and tribal vessels. Details on how fisheries observers operate in both the IFQ (Catch Share) and Non-IFQ (Non-Catch Share) sectors can be found at: http://www.nwfsc.noaa.gov/research/divisions/fram/observation/index.cfm.

Humpback whale bycatch in West coast Groundfish fisheries

The primary objective of this report is to provide estimates of bycatch of the ESA-listed humpback whale in observed U.S. West Coast federally permitted groundfish fisheries from 2010–2013. Previous reports on marine mammal bycatch in West Coast groundfish fisheries (Jannot et al. 2011) as well as reports on the NWFSC Protected Species Reports webpage http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_products/protected_species.cfm) have provided data on estimated bycatch of marine mammals in U.S. west coast commercial fisheries, which were derived from the Observer Program data.

Amount and Extent of Humpback Whale Take

The Biological Opinion (BiOp) Regarding the Effects of the Continued Operation of the Pacific Coast Groundfish Fishery (PCGF) (NMFS 2012a) stated that:

> We anticipate that take of humpback whales will occur as a result of the proposed continued operation of the PCGF. Incidental take of humpback whales occurs as a result of entanglement with fishing gear, as a consequence of fishing activity. This take is expected to occur in the sablefish pot/trap fishery. In the effects section, we estimated an average of 1 humpback whale per year entangled by proposed fishing, with a maximum of 3 humpback whales entangled in a single year. Therefore, the incidental take limit for humpback whales is a 5-year average of 1 humpback whale injury or mortality per year, and up to 3 humpback whale injuries or mortalities in any single year. Available data on takes will be reviewed periodically by a Pacific Coast Groundfish and Endangered Species Workgroup as described under Reasonable and Prudent Measures and Terms and Conditions below. In addition to these take limits, we will evaluate total human-caused serious injury and mortality of humpback whales annually, and if PBR is exceeded, we will determine whether the MMPA 101(a)(5)(E) permit and humpback whale ITS are still valid. Consistent with the analysis in this biological opinion, a portion of unidentified whale and gear entanglements would be counted against these take limits and for this PBR evaluation in addition to known humpback whale entanglements in gear of the proposed fishery (pro-rating criteria and methods described in Section 2.3.3 or as adjusted by the Workgroup). Data

used to pro-rate unidentified whale and gear entanglements will be updated each year. These criteria and methods are conservative in light of uncertainty about proposed fishery impacts on humpback whales, because of the opportunistic nature of entanglement observation and reporting, potential for unobserved injury or mortality because of entanglements, and difficulty identifying entangled whales to species and entangling gear to specific fisheries.

This first biennial report represents the fulfillment of the take estimate requirement and associated reporting requirements.

Methods

Data Sources

Data sources for this analysis include onboard observer data from the WCGOP and A-SHOP and landing receipt data, referred to as fish tickets, and obtained from the Pacific Fisheries Information Network (PacFIN). In the event of observed takes, the following procedures and analyses would occur.

Observer Data

A list of fisheries, coverage priorities and data collection methods employed by WCGOP in each observed fishery can be found in the Catch Shares (IFQ) and Non-Catch Shares (Non-IFQ) WCGOP manuals (NWFSC 2015a, b). A-SHOP information and documentation on data collection methods can be found in the A-SHOP observer manual (NWFSC 2014).

The sampling protocol employed by the WCGOP is primarily focused on the discarded portion of catch. To ensure that the recorded weights for the retained portion of the observed catch are accurate, haul-level retained catch weights recorded by observers are adjusted based on trip-level fish ticket records. This process is described in detail on the WCGOP Data Processing webpage (http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_processing.cfm). Data processing was applied prior to the analyses presented in this report. For a complete list of groundfish species defined in the Pacific Coast Groundfish Fishery Management Plan see PFMC (2011).

Fish Ticket Data

For bycatch estimation, the landed amount of a particular fish species or species group is used as the effort metric. Thus, the retained landing information from sales receipts (known as fish tickets) is crucial for fleet-wide total bycatch estimation for all sectors of the commercial groundfish fishery on the U.S. west coast. Fish ticket landing receipts are completed by fish-buyers in each port for each delivery of fish by a vessel. Fish tickets are trip-aggregated sales receipts for market categories that may represent single or multiple species. Fish tickets are issued to fish-buyers by a state agency and must be returned to the issuing agency for processing.

Fish tickets are designed by the individual states (Washington, Oregon, and California) with slightly different formats by state. In addition, each state conducts species-composition sampling at the ports for numerous market categories that are reported on fish tickets. Fish ticket and species-composition data are submitted by state agencies to the PacFIN regional database. Annual fish ticket landings data for 2010-2013, with state species composition sampling applied, were retrieved from the PacFIN database in 2014 and subsequently divided into various sectors of the groundfish fishery. Observer and fish ticket data processing steps are described in detail on the WCGOP website under Data Processing Appendix (http://www.nwfsc.noaa.gov/research/divisions/fram/observer/data_processing.cfm/). All data processing steps specific to this report are described in the bycatch estimation methods section below.

Designation of 'take' and 'serious injury' interactions

NMFS has established guidelines for distinguishing serious from non-serious injury of marine mammals pursuant to the Marine Mammal Protection Act through a policy directive (NMFS 2012b).

Results

Documented Humpback Whale Bycatch

There were no documented takes of humpback whale from 2010-2013 in the Pacific Coast groundfish fisheries. Despite no observed interactions between humpbacks and Pacific coast groundfish fisheries during this time, pot and trap fisheries generally represent the majority of documented fishery interactions with humpbacks along the U.S. west coast (Carretta et al. 2014b).

Discussion

Although there were no takes of humpback whales from 2010-2013, there was an observed entanglement of a humpback whale in October 2014:

> On Oct. 11, 2014 while working aboard a Limited Entry Sablefish Pot vessel fishing off the WA/OR border an observer witnessed a deceased adult Humpback whale brought up with the gear. During this set the vessel was fishing a string of approximately 35 sablefish pots using weighted line between the traps. The vessel had recovered 27 traps when the line became taught, and the Captain was the first to see the whale as it was brought up next to the vessel. Observer notes describe seeing the top of the head of an adult Humpback whale next to the boat ~6ft below the surface of the water (it was night and raining), and it appeared to

have become entangled in a portion of the ground line between pots. There was no movement and no sign of life, "definitely drowned". This was the best sighting the observer was able to get as the vessel let the whale back down into the water so it wouldn't collide with the vessel and cause damage. No photos were able to be taken of the encounter and the Captain supports the observer's id as an adult Humpback whale. The ground line was cut to free the vessel from the entanglement and fishing resumed over the next 2 days on the 13 other sets before returning to the other end of the set that had the entangled whale to retrieve the remaining pots in the string. Three more pots were retrieved ending with the cut end of the string, the whale had fallen loose over the past couple days. The ground line was wrapped and knotted upon itself and 5 pots in the set were lost.

A side note: The interaction prompted one of the deckhands on this vessel to recount a similar encounter to the observer that occurred while he was working on another Limited Entry Sablefish vessel two month prior to this incident. The vessel was also fishing long strings of Sablefish pots, but they were near the OR/CA border, when a Humpback whale had become entangled in the buoy line. The line had wrapped around the whale's tail and aft caudal peduncle in a "figure eight". The vessel pulled the whale close to the rail and attempted to cut the line with a knife fixed to a flag pole. This didn't work and they pulled it closer so that the tail was "at rail height or above". The whale appeared to be too tired to fight or thrash so the crew was able to cut the line with knives in hand, setting it free. It followed them for 2-3 miles after being freed from the entanglement.

Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). The following conservation recommendations for humpback whales described in the BiOp provide general guidance for unique, visual marking of sablefish pot/trap gear as identifiable to a specific fishery, as well as guidance to report, track, and retrieve pot/trap gear that becomes lost, and guidance to minimize the loss of pot/trap gear. Implementing these recommendations would improve our knowledge of incidental take of humpback whales in the PCGF and minimize that take. Washington and Oregon commercial Dungeness crab fisheries are example models where regulations for unique, visual marking of gear and programs to report, track, and retrieve lost gear are established. Citations regarding these regulations and programs are provided below. These measures shall be further discussed and developed by the PCGW, who may recommend adoption as conservation measures.

1) NMFS and the PCGW should work with the PFMC to require or recommend visual marking that can be used to uniquely identify sablefish pot/trap gear (e.g., OAR 635-005-0480 and WAC 220-52-040 for Dungeness Crab Buoy Tag and Gear Marking

Requirements). Visual marking can help identify gear entangled on a whale to a specific fishery, while absence of visual markings can also help rule out a fishery that uses unique, visual markers.

2) NMFS and the PCGW should work with the PFMC to create electronic monitoring and logbook reporting requirements for the sablefish pot/trap fishery that require or recommend fishers to document effort and lost gear (see Appendix C for example logbook regulations, instructions, and entry forms that include lost gear reporting).
3) NMFS and the PCGW should work with the PFMC to develop a database to track sablefish pot/trap fishing effort, locations, and lost fixed-gear (see Appendix D for an example database).
4) NMFS and the PCGW should work with the PFMC to summarize data on lost gear from the sablefish pot/trap fishery to evaluate the magnitude of gear loss and factors that may influence loss (specific areas, times of year, etc.). Also, summarize fixed-gear fishing effort and locations to support overlap analysis with humpback whale (or other large whale) migrations or aggregation. Data summary should follow the reporting cycle developed for the PCGW above.
5) NMFS and the PCGW should work with the PFMC to promote retrieval of lost gear (see Appendix E and Appendix F for information about example programs for gear recovery).
6) NMFS and the PCGW should work with the PFMC to assess available technology to minimize loss of sablefish pot/trap gear (i.e., Gearfinder technology) and promote use of appropriate technology.
7) NMFS and the PCGW should work with the PFMC to investigate the practice of storing sablefish pot/trap gear in the ocean to evaluate the potential for conservation issues and any need for additional regulation.

Additional information relevant to the BiOp/RPMs and Conservation Measures

In the incidental take statement in the BiOp, we included reasonable and prudent measures for management planning and take reporting that is applicable to all species considered in the BiOp. "Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). "Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14). These must be carried out for the exemption in section 7(o)(2) to apply. Here we provide the reasonable and prudent measures, including species specific measures described in the BiOp, followed by additional information on the status of each measure. Included were measures to minimize the amount or extent of incidental take associated with NMFS observer program sampling and handling of protected species where these effects are not otherwise authorized or exempted.

(1) NMFS shall develop a Pacific Coast Groundfish and Endangered Species Workgroup

NMFS has identified membership for a Pacific Coast Groundfish and Endangered Species Workgroup (PCGW), invited PFMC and other entities to provide points of contact, and helped develop terms of reference for the workgroup. The Pacific Coast

Groundfish and Endangered Species Workgroup will convene in May 2015 to consider new information.

(2) NMFS shall characterize changes in fishing effort.

A report has been compiled summarizing fishing effort in the U. S. Pacific Coast Groundfish Fisheries (2002-2013) by NOAA Fisheries' West Coast Groundfish Observer Program (Somers et al. 2015).

(3) NMFS shall update reporting of take considered in this opinion.

(4) NMFS shall update the NWFSC risk assessment, as needed.

If necessary, NMFS will update the BA's risk assessment for humpback whale.

Species-Specific Measures

NMFS included the following reasonable and prudent measure to improve our knowledge of incidental take of humpback whales in the PCGF.

(1) NMFS shall provide all west coast observers with the Fixed Gear Guide (http://swr.nmfs.noaa.gov/psd/Fixed%20Gear%20Guide-FINAL_12.14.11.pdf) and the entangled whale hotline (877-SOS-WHALe) during observer training. The guide will help observers that may opportunistically sight an entangled whale identify the entangling gear to a specific fishery. The hotline provides a resource for reporting and response.

All observers are trained to identify Humpback Whales and are deployed with a marine mammal identification guide. Observers are also provided with the Fixed Gear Guide and the Whale Hotline number and trained to contact the hotline if they observe a whale entanglement. Furthermore, observers are provided with the Marine Mammal Reporting Form, which is given to and submitted by the fisher, when an incidental mortality or injury occurs during commercial fishing activity.

Species-specific Terms and Conditions

The terms and conditions described in the BiOp are non-discretionary, and NMFS must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). NMFS has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in the incidental take statement (50 CFR 402.14). If the terms and conditions in the BiOp are not complied with, the protective coverage of section 7(o)(2) will likely lapse. Terms and conditions specific to humpback whales are provided below.

1.a. Reporting shall be directed from observers through the observer program.

1.b. Reporting shall be similar to or modeled after the attached form (Appendix B of the BiOp).

The observer program has a data collection form for interactions of marine mammals and other protected species with fishing vessels. This form can be found at: http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_collection/manuals/cs_manual_2015/CS%202015%20Chapter%208.pdf.

Conservation Recommendations

The following conservation recommendations for humpback whales described in the BiOp provide general guidance for unique, visual marking of sablefish pot/trap gear as identifiable to a specific fishery, as well as guidance to report, track, and retrieve pot/trap gear that becomes lost, and guidance to minimize the loss of pot/trap gear. Implementing these recommendations would improve our knowledge of incidental take of humpback whales in the PCGF and minimize that take. Washington and Oregon commercial Dungeness crab fisheries are example models where regulations for unique, visual marking of gear and programs to report, track, and retrieve lost gear are established. Citations regarding these regulations and programs are provided below. These measures shall be further discussed and developed by the PCGW, who may recommend adoption as conservation measures.

(1) NMFS and the PCGW should work with the PFMC to require or recommend visual marking that can be used to uniquely identify sablefish pot/trap gear (e.g., OAR 635-005-0480 and WAC 220-52-040 for Dungeness Crab Buoy Tag and Gear Marking Requirements). Visual marking can help identify gear entangled on a whale to a specific fishery, while absence of visual markings can also help rule out a fishery that uses unique, visual markers.

(2) NMFS and the PCGW should work with the PFMC to create electronic monitoring and logbook reporting requirements for the sablefish pot/trap fishery that require or recommend fishers to document effort and lost gear (see Appendix C for example logbook regulations, instructions, and entry forms that include lost gear reporting).

(3) NMFS and the PCGW should work with the PFMC to develop a database to track sablefish pot/trap fishing effort, locations, and lost fixed-gear (see Appendix D for an example database).

(4) NMFS and the PCGW should work with the PFMC to summarize data on lost gear from the sablefish pot/trap fishery to evaluate the magnitude of gear loss and factors that may influence loss (specific areas, times of year, etc.). Also, summarize fixed-gear fishing effort and locations to support overlap analysis with humpback whale (or other large whale) migrations or aggregation. Data summary should follow the reporting cycle developed for the PCGW above.

(5) NMFS and the PCGW should work with the PFMC to promote retrieval of lost gear (see Appendix E and Appendix F for information about example programs for gear recovery).

(6) NMFS and the PCGW should work with the PFMC to assess available technology to minimize loss of sablefish pot/trap gear (i.e., Gearfinder technology) and promote use of appropriate technology.

(7) NMFS and the PCGW should work with the PFMC to investigate the practice of storing sablefish pot/trap gear in the ocean to evaluate the potential for conservation issues and any need for additional regulation.

The NWFSC Observer Program presently collects information on sablefish pot/trap fishing effort, locations, and lost fixed gear on observed vessels, and this information is in the program database. The Fishing Effort Report, submitted as part of the Biological Opinion process, summarizes the Sablefish fishing effort by gear, area, and depth. In addition, that report also summarizes information regarding lost gear. As the Sablefish fleet is currently observed at less than 100% coverage and there is no logbook associated with the fishery, the data available represent the observed portion of the fleet.

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