Revised 2/10/2017

PYGMY SPERM WHALE (*Kogia breviceps*): California/Oregon/Washington Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Pygmy sperm whales are distributed throughout deep waters and along the continental slopes of the North Pacific and other ocean basins (Ross 1984; Caldwell and Caldwell 1989). Along the U.S. west coast, sightings of this species and of animals identified only as *Kogia* sp. have been rare (Figure 1). However, this probably reflects their pelagic distribution, small body size and cryptic behavior, rather than a measure of rarity. Strandings of pygmy sperm whales in this region are known from California, Oregon and Washington (Roest 1970; Caldwell and Caldwell 1989; NMFS, Northwest Region, unpublished data; NMFS, Southwest Region, unpublished data), while strandings of dwarf sperm whales (*Kogia sima*) are rare in this region. At-sea sightings in this region have all been either of pygmy sperm whales or unidentified *Kogia* sp. Available data are insufficient to identify any seasonality in the distribution of pygmy sperm whales, or to delineate possible stock boundaries. For the Marine Mammal Protection Act (MMPA) stock assessment reports, pygmy sperm whales within the Pacific U.S. Exclusive Economic Zone are divided into two discrete, non-contiguous areas: 1) waters off California, Oregon and Washington (this report), and 2) Hawaiian waters.

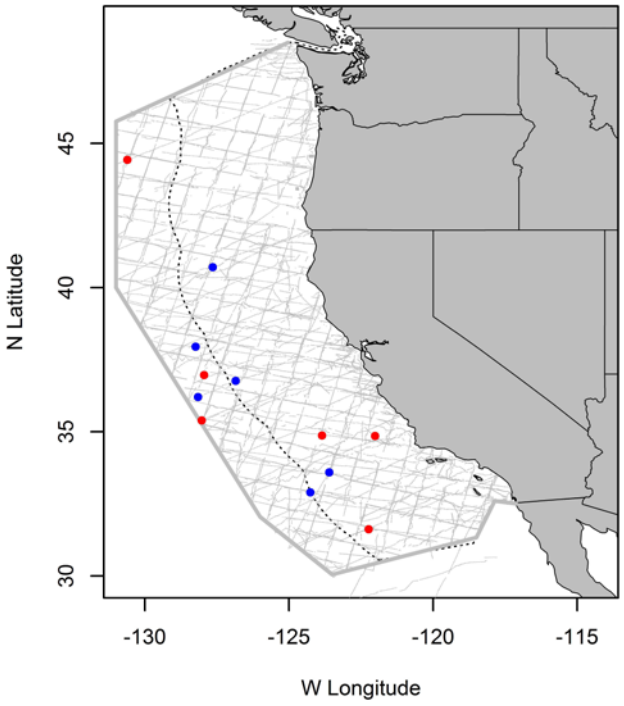

Figure 1. *Kogia* sightings based on shipboard surveys off California, Oregon and Washington, 1991-2014. Key: ● = *Kogia breviceps*, ● = *Kogia* spp. Dashed line represents the U.S. EEZ, thin lines indicate completed transect effort of all surveys combined.

POPULATION SIZE

Most sightings of *Kogia* in the California Current are only identified to genus due to their cryptic nature, but based on positively-identified sightings from previous surveys and historical stranding data, most of these sightings were probably pygmy sperm whales; *K. breviceps*. The rarity of sightings likely reflects the cryptic nature of this species (they are detected almost exclusively in extremely calm sea conditions), rather than an absence of animals in the region. The best estimate of abundance for this stock is the geometric mean of 2008 and 2014 shipboard line-transect surveys, or 4,111 (CV=1.12) animals. This estimate is considerably higher than previous abundance estimates for the genus *Kogia* and results from a new and lower estimate of *g(0)*, the trackline detection probability (Barlow 2015). Only 3% of *Kogia* groups were estimated to have been detected on the trackline during 1991-2014 surveys (Barlow 2016).

Minimum Population Estimate

The minimum population estimate is taken as the log-normal 20th percentile of the 2008 and 2014 average abundance estimate for California, Oregon, and Washington waters, or 1,924 animals.

Current Population Trend

Due to the rarity of sightings of this species on surveys along the U.S. West coast, no information exists regarding trends in abundance of this population.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No information on current or maximum net productivity rates is available for this species.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size (1,924) times one half the default maximum net growth rate for cetaceans (½ of 4%) times a recovery factor of 0.50 (for a species of unknown status with no known fishery mortality during the last five years; Wade and Angliss 1997), resulting in a PBR of 19 pygmy sperm whales per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

A summary of recent fishery mortality and injury for pygmy sperm whales and unidentified *Kogia*, which may have been pygmy sperm whales, is shown in Table 1. In the California swordfish drift gillnet fishery (the only U.S. west coast fishery likely to interact with *Kogia*), no mortality of pygmy sperm whales or unidentified *Kogia* was observed during the most recent five years of monitoring (Carretta *et al*. 2017). Over 8,600 fishing sets have been monitored in the California swordfish drift gillnet fishery between 1990 and 2014 and only 2 pygmy sperm whales were observed entangled (Carretta et al. 2017). Both animals were entangled in years that predated the use of acoustic pingers in the fishery to reduce bycatch (Barlow and Cameron 2003), but the small sample size of *Kogia breviceps* bycatch in the fishery precludes any conclusions regarding the effectiveness of acoustic pingers in reducing bycatch of this species (Carretta and Barlow 2011). Mean annual takes in Table 1 are based on 2010-2014 data. This results in an average estimated annual mortality of zero pygmy sperm whales.

One pygmy sperm whale stranded in California in 2002 with evidence that it died as a result of a shooting (positive metal detector scan). Due to the cryptic and pelagic nature of this species, it is likely that the shooting resulted from an interaction with an unknown entangling net fishery. Although there are no records of fishery-related strandings of pygmy sperm whales along the U.S. west coast in recent years (Carretta *et al*. 2013, 2014, 2015, 2016a), compared with other more coastal cetaceans, the probability of a pygmy sperm whale carcass coming ashore and being detected would be quite low (Carretta *et al*. 2016b).

Other mortality

Unknown levels of injuries and mortality of pygmy sperm whales may occur as a result of anthropogenic sound, such as military sonars. Atypical multispecies mass strandings, sometimes involving pygmy and/or dwarf sperm whales have been associated with military sonar use. One 1988 event from the Canary Islands included 2 pygmy sperm whales and the species *Ziphius cavirostris* and *Hyperoodon ampullatus* (reviewed in D'Amico *et al*. 2009). Another mass stranding and unusual mortality event (UME) in North Carolina, USA in 2005 included 2 dwarf sperm whales, in addition to 33 short-finned pilot whales and a minke whale (Hohn *et al*. 2006). This UME coincided in time and space with military activity using mid-frequency active sonar, although the authors note that a definitive association between the UME and sonar use is lacking (Hohn *et al*. 2006). Such injuries or mortality to pygmy sperm whales would rarely be documented, due to the remote nature of many of these activities and the low probability that an injured or dead pygmy sperm whale would strand.

STATUS OF STOCK

The status of pygmy sperm whales in California, Oregon and Washington waters relative to OSP is not known, and there are insufficient data to evaluate potential trends in abundance. Although the impacts of anthropogenic sounds such as sonar are often focused on beaked whales (Barlow and Gisiner 2006), the impacts of such sounds on deep-diving pygmy beaked whales also warrants concern. They are not listed as "threatened" or "endangered" under the Endangered Species Act nor as "depleted" under the MMPA. Given the rarity of sightings and lack of recent documented fishery interactions in U.S. west coast waters, pygmy sperm whales are not classified as a "strategic" stock under the MMPA.

Table 1. Summary of available information on the incidental mortality and injury of pygmy sperm whales and unidentified *Kogia* sp. (California/Oregon/Washington Stock) in commercial fisheries that might take this species. Coefficients of variation for mortality estimates are provided in parentheses. Mean annual takes are based on 2010-2014 data unless noted otherwise (Carretta *et al.* 2017).

Fishery Name	Data Type	Year(s)	Percent Observer Coverage	Observed Mortality *K. breviceps /Kogia* sp.	*Estimated Annual Mortality of K. breviceps/Kogia* sp.	*Mean Annual Takes (CV in parentheses)*

Fishery Name	Data Type	Year(s)	Percent Observer Coverage	Observed Mortality *K. breviceps /Kogia* sp.	*Estimated Annual Mortality of K. breviceps/Kogia* sp.	*Mean Annual Takes (CV in parentheses)*
CA/OR thresher shark/swordfish drift gillnet fishery	observer data	2010 2011 2012 2013 2014	12% 20% 19% 37% 24%	0 0 0 0 0	0	0
Minimum total annual takes						0

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