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BLAINVILLE'S BEAKED WHALE (*Mesoplodon densirostris*): Hawaiian Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Blainville's beaked whale has a cosmopolitan distribution in tropical and temperate waters, apparently the most extensive known distribution of any *Mesoplodon* species (Mead 1989). Two strandings were reported in 1961 from Midway Island (Galbreath 1963) and another in 1983 from Laysan Island (Nitta 1991). Sixteen sightings were reported from the main islands by Shallenberger (1981), who suggested that Blainville's beaked whales were present off the Waianae Coast of Oahu for prolonged periods annually. Resightings of individual Blainville's beaked whales during a 21-yr study suggests long-term site fidelity and year round occurrence off the island of Hawaii (McSweeney et al. 2007). Three sightings were made during a 2002 shipboard survey of waters within the U.S. Exclusive Economic Zone (EEZ) of the Hawaiian Islands (Figure 1; Barlow 2006). Recent analysis of Blainville's beaked whale movements off the Island of Hawaii suggest the existence of insular and offshore populations of this species in Hawaiian waters; however, further movement and genetic studies are needed to better understand individual movements and stock structure of Blainville's beaked whales in Hawaii (McSweeney et al. 2007, Baird et al. 2009, Schorr et al., 2009).. Some genetic samples have been collected recently from around the main Hawaiian islands, (R.W. Baird, pers. comm.). For the Marine Mammal Protection Act (MMPA) stock assessment reports, three *Mesoplodon* stocks are defined within the Pacific U.S. EEZ: 1) *M. densirostris* in Hawaiian waters (this report), 2) *M. stejnegeri* in Alaskan waters, and 3) all *Mesoplodon* species off California, Oregon and Washington. The Hawaiian stock of Blainville's beaked whales includes animals found both within the Hawaiian Islands EEZ and in adjacent international waters; however, because data on abundance, distribution, and human-caused impacts are largely lacking for international waters, the status of this stock is evaluated based on data from U.S. EEZ waters of the Hawaiian Islands (NMFS 2005).

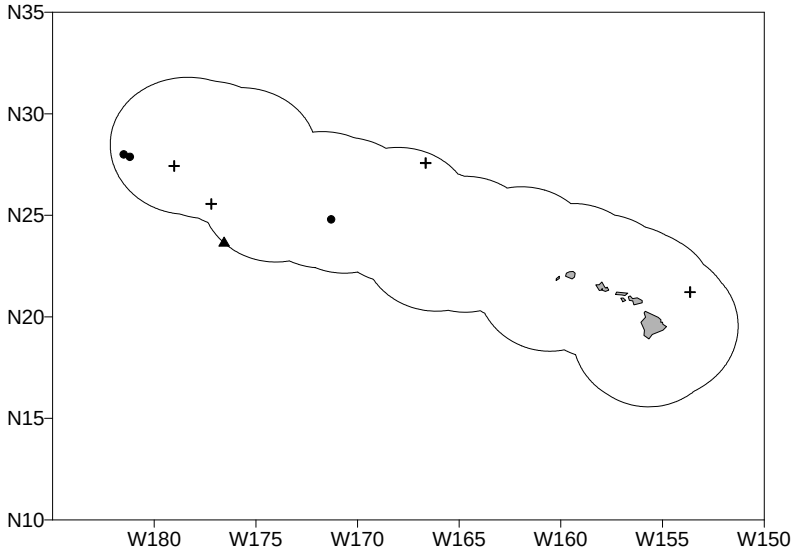

Figure 1. Sighting locations of *Mesoplodon densirostris* (filled circles), *Indopacetus pacificus* (triangle), and unidentified *Mesoplodon* beaked whales (cross) during the 2002 shipboard cetacean survey of U.S. EEZ waters surrounding the Hawaiian Islands (Barlow 2006; see Appendix 2 for details on timing and location of survey effort). Outer line indicates approximate boundary of survey area and U.S. EEZ.

POPULATION SIZE

Based on the photo-identification catalog for the island of Hawaii, a minimum of 55 individuals are known to occur there (McSweeney *et al.* 2007). A 2002 shipboard line-transect survey of the entire Hawaiian Islands EEZ resulted in an abundance estimate of 2,872 (CV=1.17) Blainville's beaked whales (Barlow 2006), including a correction factor for missed diving animals. This is currently the best available abundance estimate for this stock.

Minimum Population Estimate

The log-normal 20th percentile of the 2002 abundance estimate (Barlow 2006) is 1,314 Blainville's beaked whales within the Hawaiian Islands EEZ.

Current Population Trend

No data are available on current population trend.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No data are available on current or maximum net productivity rate.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size within the U.S. EEZ of the Hawaiian Islands (1,314) 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 recent fishery mortality or serious injury within the Hawaiian Islands EEZ; Wade and Angliss 1997), resulting in a PBR of 13 Blainville's beaked whales per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

Information on fishery-related mortality of cetaceans in Hawaiian waters is limited, but the gear types used in Hawaiian fisheries are responsible for marine mammal mortality and serious injury in other fisheries throughout U.S. waters. Gillnets appear to capture marine mammals wherever they are used, and float lines from lobster traps and longlines can be expected to occasionally entangle cetaceans (Perrin et al. 1994).

Interactions with cetaceans are reported for all pelagic fisheries (Nitta and Henderson 1993). There are currently two distinct longline fisheries based in Hawaii: a deep-set longline (DSLL) fishery that targets primarily tunas, and a shallow-set longline fishery (SSLL) that targets swordfish. Both fisheries operate within U.S. waters and on the high seas. Between 2004 and 2008, no Blainville's beaked whale was observed killed or seriously injured in the SSLL fishery (100% observer coverage) or the DSLL fishery (20-28% observer coverage) (Forney 2009, McCracken 2009) and one Blainville's beaked whale was observed taken, but not seriously injured, in international waters in the DSLL fishery (20-28% observer coverage) (McCracken & Forney 2010). Average 5-yr estimates of annual mortality and serious injury for 2004-2008 are 0.7 (CV=0.9) Blainville's beaked whales outside of the U.S. EEZs, and zero within the Hawaiian Islands EEZ (Table 1).

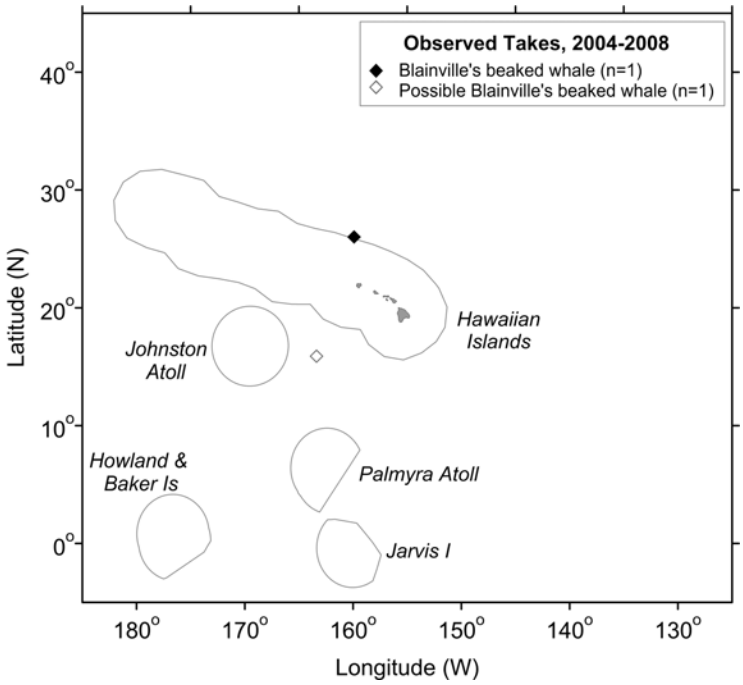

Figure 2. Location of the Blainville's beaked whale take (filled diamond) and the possible take of this species (open diamonds) in Hawaii-based longline fisheries, 2004-2008. Solid lines represent the U.S. EEZ. Fishery descriptions are provided in Appendix 1.

Other Mortality

In recent years, there has been increasing concern that loud underwater sounds, such as active sonar and seismic operations, may be harmful to beaked whales (Malakoff 2002). The use of active sonar from military vessels has been implicated in mass strandings of beaked whales in the Mediterranean Sea during 1996 (Frantzis 1998), the Bahamas during 2000 (U.S. Dept. of Commerce and Secretary of the Navy 2001), and the Canary Islands 2002 (Martel 2002). Similar military active sonar operations occur around the Hawaiian islands. It has been suggested that quick ascent from deep dives in response to acoustic exposure could lead to death in beaked whales (Cox *et al.* 2006). A modeling exercise based on dive data from Blainville's, Cuvier's and northern bottlenose whales suggest that the dive habits of all three species produce tissue nitrogen saturation levels that would normally cause

decompression sickness in terrestrial mammals (Hooker *et al.* 2009). The impact of sonar exercises on resident versus offshore beaked whales may be significantly different with offshore animals less frequently exposed, possibly subject to more extreme reactions (Baird *et al.* 2009). No estimates of potential mortality or serious injury are available for U.S. waters.

Table 1. Summary of available information on incidental mortality and serious injury of Blainville's beaked whales (Hawaiian stock) in commercial fisheries, within and outside of the Hawaiian Islands EEZ (McCracken & Forney 2010). Mean annual takes are based on 2004-2008 data unless otherwise indicated.

Fishery Name	Year	Data Type	Percent Observer Coverage	Mortality and Serious Injury outside of U.S. EEZ			Mortality and Serious Injury within Hawaiian Islands EEZ		
				Observed	Estimated (CV)	Mean Annual Takes (CV)	Observed	Estimated (CV)	Mean Annual Takes (CV)
Hawaii-based deep-set longline fishery	2004	Observer data	25%	0	0 (-)	0.7 (0.9)	0	0 (-)	0 (-)
	2005		28%	0	3 (0.3)		0	0 (-)	
	2006		22%	0	0 (-)		0	0 (-)	
	2007		20%	0	0 (-)		0	0 (-)	
	2008		22%	0	0 (-)		0	0 (-)	
Hawaii-based shallow-set longline fishery	2004	Observer data	100%	0	Same as observed	0	0	Same as observed	0
	2005		100%	0			0		
	2006		100%	0			0		
	2007		100%	0			0		
	2008		100%	0			0		
Minimum total annual takes within U.S. EEZ waters									0 (-)

STATUS OF STOCK

The status of Blainville's beaked whales in Hawaiian waters relative to OSP is unknown, and there are insufficient data to evaluate trends in abundance. It is not listed as "threatened" or "endangered" under the Endangered Species Act (1973), nor as "depleted" under the MMPA. . Given the absence of recent fishery-related mortality or serious injuries within U.S. EEZs, the Hawaiian stock of Blainville's beaked whales is not considered strategic under the 1994 amendments to the MMPA, and the total fishery mortality and serious injury can be considered to be insignificant and approaching zero. However, the effect of potential interactions of Blainville's beaked whales and unidentified beaked whales (some of which may have been Blainville's beaked whales) with the Hawaii-based longline fishery in international waters is not known. The increasing level of anthropogenic noise in the world's oceans has been suggested to be a habitat concern for whales (Richardson et al. 1995), particularly for deep-diving whales like Blainville's beaked whales that feed in the oceans' "sound channel".

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