MESOPLODONT BEAKED WHALES (*Mesoplodon* spp.): California/Oregon/Washington Stocks
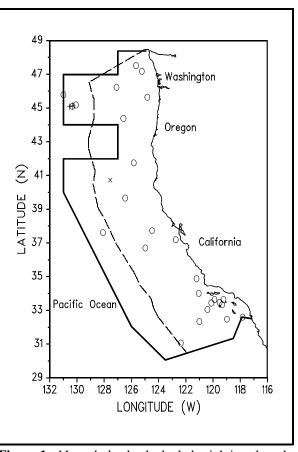
STOCK DEFINITION AND GEOGRAPHIC RANGE

Mesoplodont beaked whales are distributed throughout deep waters and along the continental slopes of the North Pacific Ocean. At least 5 species in this genus have been recorded off the U.S. west coast, but due to the rarity of records and the difficulty in identifying these animals in the field, virtually no species-specific information is available (Mead 1989). The five species known to occur in this region are: Blainville's beaked whale (*M. densirostris*), Hector's beaked whale, (*M. hectori*), Stejneger's beaked whale (*M. stejnegeri*), Gingko-toothed beaked whale (*M. gingkodens*), and Hubbs' beaked whale (*M. carlhubbsi*). Insufficient sighting records exist off the U.S. west coast (Figure 1) to determine any possible spatial or seasonal patterns in the distribution of mesoplodont beaked whales.

Until methods of distinguishing these five species are developed, the management unit must be defined to include all *Mesoplodon* stocks in this region. However, in the future, species-level management is desirable, and a high priority should be placed on finding means to obtain species-specific abundance information. For the Marine Mammal Protection Act (MMPA) stock assessment reports, three *Mesoplodon* stocks are defined: 1) all *Mesoplodon* species off California, Oregon and Washington (this report), 2) *M. stejnegeri* in Alaskan waters, and 3) *M. densirostris* in Hawaiian waters.

POPULATION SIZE

Although mesoplodont beaked whales have been sighted along the U.S. west coast on several line transect surveys utilizing both aerial and shipboard platforms, sightings have generally been too rare to produce reliable population estimates, and species identification has been problematic. Previous abundance estimates have been imprecise and biased downward by an unknown amount because of the large proportion of time mesoplodont beaked whales spend submerged, and because the surveys on which they were based covered only California waters, and thus could not include animals off Oregon/Washington.

Figure 1. *Mesoplodon* beaked whale sightings based on aerial and shipboard surveys off California, Oregon and Washington, 1975-1994. Key: **F** = *Mesoplodon* sp.; + = *Mesoplodon carlhubbsi*; × = *Mesoplodon densirostris* (see Appendix 2 in Barlow et al. 1997 Appendix 2 for data sources and information on timing and location of survey effort). Dashed line represents the U.S. EEZ, thick line indicates the outer boundary of all surveys combined.

Furthermore, there were a large number of unidentified beaked whale sightings, which were either *Mesoplodon* sp. or Cuvier's beaked whales (*Ziphius cavirostris*). Recent analyses (Barlow and Gerrodette 1996, Barlow and Sexton 1996, Barlow 1997) have resulted in improved estimates of abundance by 1) combining data from three surveys conducted in 1991, 1993, and 1996 within 300 nmi of the California coast, 2) whenever possible, assigning unidentified beaked whale sightings to *Mesoplodon* spp. or *Ziphius cavirostris* based on written descriptions, size estimates, and 'most probable identifications' made by the observers at the time of the sightings, 3) estimating a correction factor for animals missed because they are submerged, based on dive-interval data collected for mesoplodont whales in 1993-95 (about 26% of all trackline groups are estimated to be seen) and 4) conducting surveys off Oregon and Washington in summer/fall 1996. Furthermore, the first species-specific abundance estimate is now available for Blainville's beaked whale, which was identified once during the 1993 cruise. Combining the average 1991-96 abundance estimates in Barlow (1997) with the correction factor estimated by Barlow and Sexton (1996), the new

estimates of abundance are 3,738 (CV = 0.46) mesoplodont beaked whales of unknown species plus 360 (CV = 2.0) Blainville's beaked whales.

Minimum Population Estimate

Based on the combined abundance estimate of 4,098 (CV = 0.46) , the minimum population estimate (defined as the log-normal 20th percentile of the abundance estimate) for mesoplodont beaked whales in California, Oregon, and Washington is 2,840 animals. This includes a species-specific minimum abundance estimate of 123 Blainville's beaked whales.

Current Population Trend

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

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No information on current or maximum net productivity rates is available for mesoplodont beaked whales.

POTENTIAL BIOLOGICAL REMOVAL

Based on the unknown status and growth rate of mesoplodont beaked whales, and given the precision of the estimate of annual fishery mortality (CV≈0.65), the recovery factor (F_r) is 0.45. $\frac{1}{2}R_{max}$ is the default value of 0.02. Multiplying these two values times the minimum population estimate of 2,840 yields a potential biological removal (PBR) of 26 mesoplodont beaked whales per year, including at least 1.1 Blainville's beaked whales per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

A summary of recent fishery mortality and injury for mesoplodont beaked whales in this region is shown in Table 1. More detailed information on these fisheries is provided in Appendix 1 of Barlow et al. (1997). A recently completed genetic analysis of tissue samples has allowed the reliable identification of the majority of these animals (Henshaw et al. 1997). Based on past patterns of identification (NMFS, unpublished data), the remaining unidentified beaked whales are likely to have been *Mesoplodon* spp.   The average estimated annual mortality for all mesoplodont beaked whales in this fishery for the five most recent years of monitoring, 1992-96 , is 9.2 (CV=0.65) if only animals identified to the genus *Mesoplodon* are included, or 13 (CV=0.66) if the "unidentified beaked whales" are considered to have been mesoplodont beaked whales (Table 1).

Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may take animals from the same population. Quantitative data are available only for the Mexican swordfish drift gillnet fishery, which has increased from two vessels in 1986 to 29 vessels in 1992 (Sosa-Nishizaki et al. 1993). The total number of sets in this fishery in 1992 can be estimated from data provided by these authors to be approximately 2700, with an observed rate of marine mammal bycatch of 0.13 animals per set (10 marine mammals in 77 observed sets; Sosa-Nishizaki et al. 1993). This overall mortality rate is similar to that observed in California driftnet fisheries during 1990-95 (0.14 marine mammals per set; Julian and Beeson, in press), but species-specific information is not available for the Mexican fisheries.

STATUS OF STOCKS

The status of mesoplodont beaked whales in California, Oregon and Washington waters relative to OSP is not known, and there are insufficient data to evaluate trends in abundance. No habitat issues are known to be of concern for this species, but in recent years questions have been raised regarding potential effects of human-made sounds on deep-diving cetacean species, such as mesoplodont beaked whales (Richardson et al. 1995). None of the five species is listed as "threatened" or "endangered" under the Endangered Species Act nor considered "depleted" under the MMPA. The estimated annual human-caused mortality in 1992-96 for all mesoplodont beaked whales combined (9.2) plus all unidentified beaked whales (4.2) is less than the PBR (26); therefore, this group of species is not classified as a "strategic" stock as defined by the MMPA. The total fishery mortality and serious injury for all mesoplodont beaked whales exceeds 10% of the PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate.   It is likely that the difficulty in identifying these animals in the field will remain a critical obstacle to obtaining species-specific abundance estimates and stock assessments in the future.

Table 1. Summary of available information on the incidental mortality and injury of *Mesoplodon* beaked whales (California/Oregon/Washington Stocks) in commercial fisheries that might take these species (Julian 1997; Julian and Beeson, in press). All observed entanglements of *Mesoplodon* beaked whales resulted in the death of the animal. Coefficients of variation for mortality estimates are provided in parentheses.

Fishery Name	Data Type	Year(s)	Percent Observer Coverage	Observed Mortality	Estimated Annual Mortality	Mean Annual Takes 1992-96
CA/OR thresher shark/swordfish drift gillnet fishery	Hubbs' beaked whale, *Mesoplodon carlhubbsi*					
	observer data	1992	13.6%	3	22 (0.53)	
		1993	13.4%	0	0	
		1994	17.9%	2	11 (0.64)	
		1995	15.6%	0	0	
		1996	12.4%	0	0	6.6 (0.67)
	Stejneger's beaked whale, *Mesoplodon stejnegeri*					
	observer data	1992	13.6%	0	0	
		1993	13.4%	0	0	
		1994	17.9%	1	6 (0.91)	
		1995	15.6%	0	0	
		1996	12.4%	0	0	1.2 (1.00)
	Unidentified *Mesoplodon* beaked whale					
	observer data	1992	13.6%	1	7 (0.93)	
		1993	13.4%	0	0	
		1994	17.9%	0	0	
		1995	15.6%	0	0	
		1996	12.4%	0	0	1.4 (1.00)
	Unidentified beaked whale (probably *Mesoplodon*)					
	observer data	1992	13.6%	2	15 (0.65)	
		1993	13.4%	0	0	
		1994	17.9%	1	6 (0.90)	
		1995	15.6%	0	0	
		1996	12.4%	0	0	4.2 (0.70)
Minimum total annual takes of *Mesoplodon* beaked whales 1992-96						9.2 (0.65) to 13 (0.66)

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