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BRYDE'S WHALE (*Balaenoptera edeni*): Eastern Tropical Pacific Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The International Whaling Commission (IWC) recognizes 3 stocks of Bryde's whales in the North Pacific (eastern, western, and East China Sea), 3 stocks in the South Pacific (eastern, western and Solomon Islands), and one cross-equatorial stock (Peruvian) (Donovan 1991). Bryde's whales are distributed widely across the tropical and warm-temperate Pacific (Leatherwood et al. 1982), and there is no real justification for splitting stocks between the northern and southern hemispheres (Donovan 1991). Recent surveys (Lee 1993; Wade and Gerrodette 1993) have shown them to be common and distributed throughout the eastern tropical Pacific with a concentration around the equator east of 110°W (corresponding approximately to the IWC's "Peruvian stock") and a reduction west of 140°W. They are also the most common baleen whale in the central Gulf of California (Tershy et al. 1990). Only one was positively identified in surveys of California coastal waters (Barlow 1997). Bryde's whales in California are likely to belong to a larger population inhabiting at least the eastern part of the tropical Pacific. For the Marine Mammal Protection Act (MMPA) stock assessment reports, Bryde's whales within the Pacific U.S. Exclusive Economic Zone are divided into two areas: 1) the eastern tropical Pacific (east of 150°W and including the Gulf of California and waters off California; this report), and 2) Hawaiian waters.

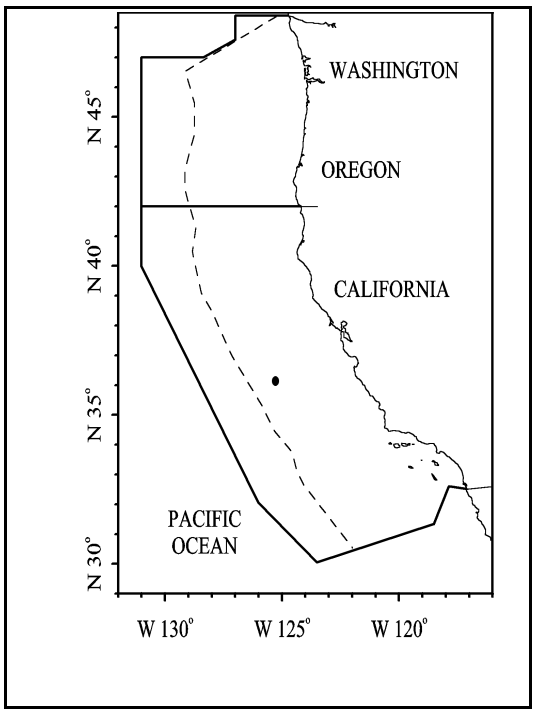

Figure 1. Sighting locations of Bryde's whales based on aerial and shipboard surveys off California, Oregon, and Washington, 1991-96 (see Appendix 2, Figures 1-5 for data sources and information on timing and location of surveys). Dashed line represents the U.S. EEZ; bold line indicates the outer boundary of all surveys combined.

POPULATION SIZE

In the western North Pacific, Bryde's whale abundance in the early 1980s was estimated independently by tag mark-recapture and ship survey methods to be 22,000 to 24,000 (Tillman and Mizroch 1982; Miyashita 1986). Bryde's whale abundance has never been estimated for the entire eastern Pacific; however, a portion of that stock in the eastern tropical Pacific was estimated recently as 13,000 (CV=0.20; 95% C.I.=8,900-19,900) (Wade and Gerrodette 1993), and the minimum number in the Gulf of California is 160 based on individually-identified whales (Tershy et al. 1990). Only one confirmed sighting of Bryde's whales and five possible sightings (identified as sei or Bryde's whales) were made in California waters during extensive ship and aerial surveys in 1991, 1992, 1993, and 1996 (Hill and Barlow 1992; Carretta and Forney 1993; Mangels and Gerrodette 1994; VonSaunder and Barlow 1999). Green et al. (1992) did not report any sightings of Bryde's whales in aerial surveys off Oregon and Washington. The estimated abundance of Bryde's whales in California, Oregon, and Washington coastal waters is 12 (CV=2.0) (Barlow 1997).

Minimum Population Estimate

The minimum population estimate for Bryde's whales is taken as the lower 20th percentile of the log-normal distribution of abundance estimated from the summer/fall ship surveys in 1986-90 (Wade and Gerrodette 1993) plus the minimum of 160 whales counted in the Gulf of California (Tershy et al. 1990), or 11,163.

Current Population Trend

There are no data on trends in Bryde's whale abundance in the eastern tropical Pacific.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

There are no estimates of the growth rate of Bryde's whale populations in the Pacific (Best 1993).

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock cannot be calculated because the only relevant abundance estimate (Wade and Gerrodette 1993) is more than 8 years old. Additional data on the abundance of Bryde's whales in the eastern Pacific was gathered in 1998-99, but their abundance has not yet been estimated from those data.

HUMAN CAUSED MORTALITY

Historic Whaling

The reported take of North Pacific Bryde's whales by commercial whalers totaled 15,076 in the western Pacific from 1946-1983 (Holt 1986) and 2,873 in the eastern Pacific from 1973-81 (Cooke 1983). In addition, 2,304 sei-or-Bryde's whales were taken in the eastern Pacific from 1968-72 (Cooke 1983) (based on subsequent catches, most of these were probably Bryde's whales). None were reported taken by shore-based whaling stations in central or northern California between 1919 and 1926 (Clapham et al. 1997) or 1958 and 1965 (Rice 1974). There has been a prohibition on taking Bryde's whales since 1988.

Table 1. Summary of available information on the incidental mortality and injury of Bryde's whales (eastern tropical Pacific stock) for commercial fisheries that might take this species (Julian 1997; Julian and Beeson 1998; Cameron and Forney 1999). n/a indicates that data are not available. Mean annual takes are based on 1994-98 data unless noted otherwise.

Fishery Name	Year(s)	Data Type	Percent Observer Coverage	Observed Mortality	Estimated Mortality (CV in parentheses)	Mean Annual Takes (CV in parentheses)
CA/OR thresher shark/swordfish drift gillnet fishery	1994-98	observer data	12-23%	0,0, 0,0, 0	0,0, 0,0, 0	0[1]
Mexico thresher shark/swordfish drift gillnet fishery	1991-95	observer data	n/a	n/a	n/a	n/a
					Total annual takes	0

[1] Only 1997-98 mortality estimates are included in the average because of gear modifications implemented within the fishery as part of a 1997 Take Reduction Plan. Gear modifications included the use of net extenders and acoustic warning devices (pingers).

Fishery Information

The offshore drift gillnet fishery is the only fishery that is likely to take Bryde's whales from this stock, but no fishery mortalities or serious injuries have been observed (Table 1). Detailed information on this fishery is provided in Appendix 1. After the 1997 implementation of a Take Reduction Plan, which included skipper education workshops and required the use of pingers and minimum 6-fathom extenders, overall cetacean entanglement rates in the drift gillnet fishery dropped considerably (Barlow and Cameron 1999). Because of the changes in this fishery after implementation of the Take Reduction Plan, mean annual takes for this fishery (Table 1) are based only on 1997-98 data. This results in an average estimate of zero Bryde's whales taken annually. However, some gillnet mortality of large whales may go unobserved because whales swim away with a portion of the net.

Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California and may take animals from the same population. Quantitative data are available only for the Mexican swordfish drift gillnet fishery, which uses vessels, gear, and operational procedures similar to those in the U.S. drift gillnet fishery, although nets may be up to 4.5 km long (Holts and Sosa-Nishizaki 1998). The fleet increased from two vessels in 1986 to 31 vessels in 1993 (Holts and Sosa-Nishizaki 1998). The total number of sets in this fishery in 1992 can be estimated from data provided by these authors to be approximately 2,700, 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 1998), but species-specific information is not available for the Mexican fisheries. There are currently efforts underway to convert the Mexican swordfish driftnet fishery to a longline fishery (D. Holts, pers. comm.).

Ship Strikes

Ship strikes may occasionally kill Bryde's whales as they are known to kill their larger relatives: blue and fin whales. No ship strikes have been reported for this species in this area.

STATUS OF STOCK

Commercial whaling of Bryde's whales was largely limited to the western Pacific. Bryde's whales are not listed as "threatened" or "endangered" under the Endangered Species Act (ESA). Bryde's whales in the eastern tropical Pacific would not be considered a strategic stock under the MMPA. The total human-caused mortality rate is estimated to be zero; therefore, under the MMPA, total fishery mortality is approaching zero mortality and serious injury rate. The increasing levels of anthropogenic noise in the world's oceans has been suggested to be a habitat concern for whales, particularly for baleen whales that may communicate using low-frequency sound.

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