

NORTHERN RIGHT-WHALE DOLPHIN (*Lissodelphis borealis*): California/Oregon/Washington Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Northern right-whale dolphins are endemic to temperate waters of the North Pacific Ocean. Off the U.S. west coast, they have been seen primarily in shelf and slope waters (Figure 1), with seasonal movements into the Southern California Bight (Leatherwood and Walker 1979; Dohl et al. 1980; 1983; NMFS, unpublished data). Sighting patterns from recent aerial and shipboard surveys conducted in California, Oregon and Washington during different seasons (Green et al. 1992; 1993; Forney et al. 1995; Barlow 1995) suggest seasonal north-south movements, with animals found primarily off California during the colder water months and shifting northward into Oregon and Washington as water temperatures increase in late spring and summer (Green et al. 1992; Forney 1994; Forney and Barlow 1998). The southern end of this population's range is not well-documented, but during cold-water periods, they probably range into Mexican waters off northern Baja California. Genetic analyses have not found statistically significant differences between northern right-whale dolphins from the U.S. West coast and other areas of the North Pacific (Dizon et al. 1994); however, power analyses indicate that the ability to detect stock differences for this species is poor, given traditional statistical error levels (Dizon et al. 1995). Although northern right-whale dolphins are not restricted to U.S. territorial waters, there are currently no international agreements for cooperative management. For the Marine Mammal Protection Act (MMPA) stock assessment reports, there is a single management stock including only animals found within the U.S. Exclusive Economic Zone of California, Oregon and Washington.

POPULATION SIZE

The previous best estimates of abundance for northern right-whale dolphins (Barlow et al. 1997) were based on winter/spring 1991-92 aerial surveys (Forney et al. 1995) off California, which were presumed to include northern right-whale dolphins that are found off Oregon and Washington during summer and fall. Two summer/fall shipboard surveys were conducted within 300 nmi of the coasts of California, Oregon and Washington in 2005 (Forney 2007) and 2008 (Barlow 2010). The distribution of northern right-whale dolphins throughout this region is highly variable, apparently in response to

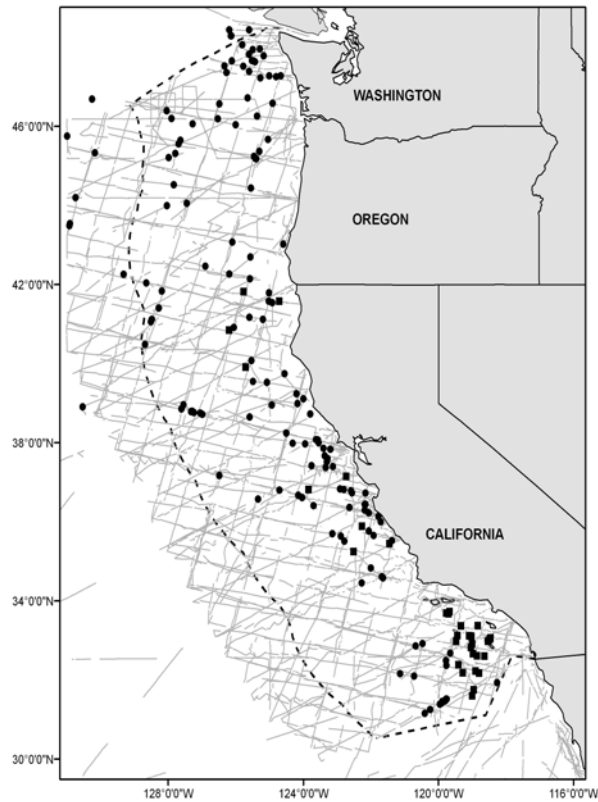


Figure 1. Northern right whale dolphin sightings based on aerial and shipboard surveys off California, Oregon, and Washington, 1991-2008 (see Appendix 2 for data sources and information on timing and location of survey effort). Dashed line represents the U.S. EEZ, thin lines indicates completed transect effort of all surveys combined. Key: ● = summer/autumn ship-based sightings; ■ = winter/spring aerial-based sightings.

oceanographic changes on both seasonal and interannual time scales (Forney and Barlow 1998). As oceanographic conditions vary, northern right-whale dolphins may spend time outside the U.S. Exclusive Economic Zone, and therefore a multi-year average abundance estimate is the most appropriate for management within U.S. waters. The 2005-2008 geometric mean abundance estimate for California, Oregon and Washington waters based on the two ship surveys is 8,334 (CV=0.40) northern right-whale dolphins (Forney 2007, Barlow 2010).

Minimum Population Estimate

The log-normal 20th percentile of the 2005-2008 average abundance estimate is 6,019 northern right-whale dolphins.

Current Population Trend

Abundance estimates for all California, Oregon, and Washington waters from 1996, 2001, 2005, and 2008 surveys were 11,347 (CV = 0.27), 14,937 (0.21), 11,100 (0.60), and 6,258 (CV=0.58), respectively (Barlow and Forney 2007, Forney 2007, Barlow 2010). Currently, there is no evidence of a trend in abundance for this stock.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No information on current or maximum net productivity rates is available for northern right-whale dolphins off the U.S. west coast.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size (6,019) times one half the default maximum net growth rate for cetaceans ($\frac{1}{2}$ of 4%) times a recovery factor of 0.40 (for a species of unknown status with a mortality rate CV >0.80; Wade and Angliss 1997), resulting in a PBR of 48 northern right-whale dolphins per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

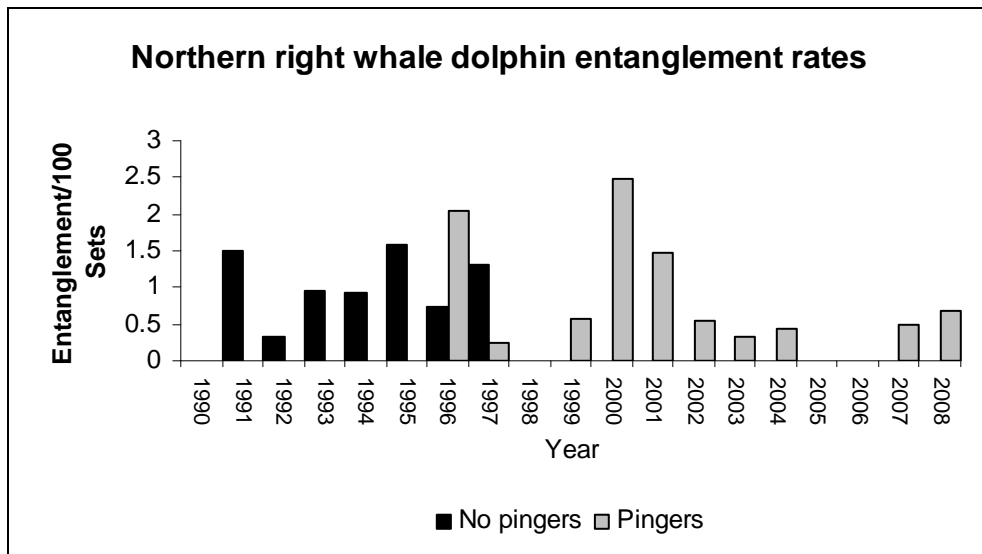
A summary of recent fishery mortality and injury for this stock of northern right-whale dolphin is shown in Table 1. More detailed information on these fisheries is provided in Appendix 1. Mortality estimates for the California drift gillnet fishery are included for the five most recent years of monitoring, 2004-2008 (Carretta et al. 2005 Carretta and Enriquez 2006, 2007, 2009a, 2009b). 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 2003). However, because of interannual variability in entanglement rates and the relative rarity of northern right-whale dolphin entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this particular species. Entanglement rates for this species may be related to oceanographic conditions, as lower entanglement rates have been observed during warm-water periods, such as El Niño (Figure 2). Mean annual takes in Table 1 are based on 2004-2008 data. This results in an average estimate of 3.6 (CV= 0.96) northern right-whale dolphins taken annually.

Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may take animals from this 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 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, 1998), but species-specific information is not available for the Mexican fisheries. Previous efforts to convert the Mexican swordfish driftnet fishery to a longline fishery have resulted in a mixed-fishery, with 20 vessels alternately using longlines or driftnets, 23 using driftnets only, 22 using longlines only, and seven with unknown gear type (Berdegué 2002).

Table 1. Summary of available information on the incidental mortality and injury of northern right-whale dolphins (California/Oregon/Washington Stock) in commercial fisheries that might take this species. All observed entanglements of northern right-whale dolphins resulted in the death of the animal. Coefficients of variation for mortality estimates are provided in parentheses. Mean annual takes are based on 2004-2008 data unless noted otherwise.

| Fishery Name | Data Type | Year(s) | Percent Observer Coverage | Observed Mortality | Estimated Annual Mortality | Mean Annual Takes (CV in parentheses) |
|--|---------------|---------|---------------------------|--------------------|----------------------------|---------------------------------------|
| CA/OR thresher shark/swordfish drift gillnet fishery | observer data | 2004 | 20.6% | 1 | 5 (0.99) | 3.6 (0.96) |
| | | 2005 | 20.9% | 0 | 0 | |
| | | 2006 | 18.5% | 0 | 0 | |
| | | 2007 | 16.4% | 1 | 6 (1.00) | |
| | | 2008 | 13.5% | 1 | 7 (0.99) | |
| Minimum total annual takes | | | | | | 3.6 (0.96) |

Figure 2. Entanglement rates of northern right whale dolphin per set fished in the California drift gillnet fishery for swordfish and thresher shark, 1990-2008. Kill rates include observations from pingered and unpingered sets. Pingers were not used from 1990-95 and were used experimentally in 1996 and 1997. For the period 1998-2008, over 99% of all observed sets utilized pingers.



Other removals

In 2008, six northern right whale dolphins were incidentally killed in California waters during scientific sardine trawling operations conducted by NMFS (Southwest Regional Office Stranding Program, unpublished data). All six animals were killed in a single trawl where 11 Pacific white-sided dolphin were also killed (see Pacific white-sided dolphin stock assessment). The average annual research-related mortality of northern right whale dolphin from 2004 to 2008 is 1.2 animals.

STATUS OF STOCK

The status of northern right-whale dolphins in California, Oregon and Washington 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. They are not listed as "threatened" or "endangered" under the Endangered Species Act nor as "depleted" under the MMPA. The average annual human-caused mortality in 2004-

2008 (4.8 animals) is estimated to be less than the PBR (48), and therefore they are not classified as a "strategic" stock under the MMPA. The total fishery mortality and serious injury for northern right-whale dolphins does not exceed 10% of the calculated PBR and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate.

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