

RISSO'S DOLPHIN (*Grampus griseus*): California/Oregon/Washington Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Risso's dolphins are distributed world-wide in tropical and warm-temperate waters. Off the U.S. West coast, Risso's dolphins are commonly seen on the shelf in the Southern California Bight and in slope and offshore waters of California, Oregon and Washington. Based on sighting patterns from recent aerial and shipboard surveys conducted in these three states during different seasons (Figure 1), animals found off California during the colder water months are thought to shift northward into Oregon and Washington as water temperatures increase in late spring and summer (Green et al. 1992). The southern end of this population's range is not well-documented, but previous surveys have shown a conspicuous 500 nmi distributional gap between these animals and Risso's dolphins sighted south of Baja California and in the Gulf of California (Mangels and Gerrodette 1994). Thus this population appears distinct from animals found in the eastern tropical Pacific and the Gulf of California. Although Risso's dolphins are not restricted to U.S. waters, cooperative management agreements with Mexico exist only for the tuna purse seine fishery and not for other fisheries which may take this species (e.g. gillnet fisheries). For the Marine Mammal Protection Act (MMPA) stock assessment reports, Risso's dolphins 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.

POPULATION SIZE

Current estimates of population size are derived from two shipboard surveys within 300 nmi of the coasts of California, Oregon, and Washington in summer/autumn of 2005 (Forney 2007) and 2008 (Barlow 2010). The distribution of Risso's dolphins throughout this region is highly variable, apparently in response to oceanographic changes on both seasonal and interannual time scales (Forney and Barlow 1998). As oceanographic conditions vary, Risso's 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 most recent ship surveys is 6,272 (CV=0.30) Risso's dolphins (Forney, 2007, Barlow 2010).

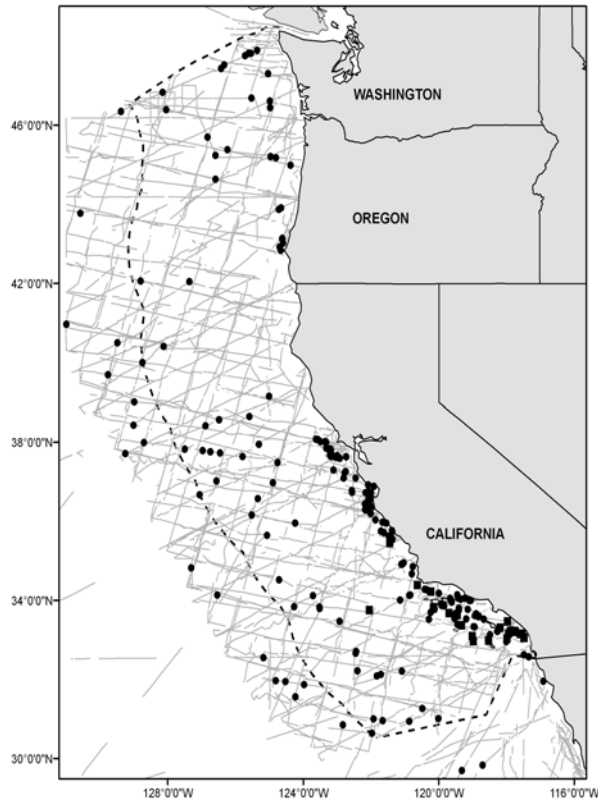


Figure 1. Risso's dolphin sightings based on aerial and shipboard surveys off California, Oregon, and Washington, 1991-2008 (see Appendix 2 for data sources and information on timing and location of survey effort). Dashed line represents the U.S. EEZ, thin lines indicate completed transect effort of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

Minimum Population Estimate

The log-normal 20th percentile of the 2005-2008 geometric mean abundance estimate is 4,913 Risso's dolphins.

Current Population Trend

Barlow and Forney (2007) and Barlow (2010) report abundance estimates ranging from approximately 4,000 to 11,000 animals in California waters for five separate surveys conducted between 1991 and 2008, with no apparent trend in abundance. Inter-annual variability in the distribution of Risso's dolphin within the ship survey study area is likely responsible for the differences in estimated abundance between surveys.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

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

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size (4,913) 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 39 Risso's dolphins per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

A summary of recent fishery mortality and injury for this stock of Risso's 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 Risso's dolphin entanglements, additional years of data will be required to fully evaluate the effectiveness of pingers for reducing mortality of this particular species. Mean annual takes in Table 1 are based on 2004-2008 data. This results in an average estimate 1.6 ($CV = 0.99$) Risso's 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).

Historically, Risso's dolphin mortality has been documented in the squid purse seine fishery off Southern California (Heyning et al. 1994). This mortality probably represented animals killed intentionally to protect catch or gear, rather than incidental mortality, and such intentional takes are now illegal under the 1994 Amendment to the MMPA. This fishery has expanded markedly since 1992 (California Department of Fish and Game, unpubl. data). An observer program in the squid purse seine fishery was initiated in 2004 and a total of 377 sets have been observed through 2008 without a Risso's dolphin interaction. Observer coverage in this fishery has been less than 10% of all fishing effort.

Table 1. Summary of available information on the incidental mortality and injury of Risso's dolphin (California/ Oregon/Washington Stock) in commercial fisheries that might take this species. All observed entanglements of Risso's dolphins resulted in the death of the animal. Coefficients of variation for mortality estimates are provided in parentheses; n/a = not available. 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 (CV)	Mean Annual Takes (CV)
CA/OR thresher shark/swordfish drift gillnet fishery	observer	2004	20.6%	0	0	1.4 (0.99)
		2005	20.9%	0	0	
		2006	18.5%	0	0	
		2007	16.4%	0	0	
		2008	13.5%	1	7 (0.99)	
CA shallow set longline fishery	observer	2004 No fishery in 2005	< 10%		0	0
CA deep set longline fishery	observer	2005-2008	100%	0	0	0
Market squid purse seine	observer	2004-2008	<10%	0	0	0
Unknown fishery	Stranding	2004-2008		1	≥1	≥0.2
Minimum total annual takes						1.6 (0.99)

STATUS OF STOCK

The status of Risso's dolphins off California, Oregon and Washington relative to OSP is not known, and there are insufficient data to evaluate potential 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. Over the last 5-year period (2004-2008), the average annual human-caused mortality (1.6 animals) is estimated to be less than the PBR (39), and therefore they are not classified as a "strategic" stock under the MMPA. The total fishery mortality and serious injury for this stock is less than 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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