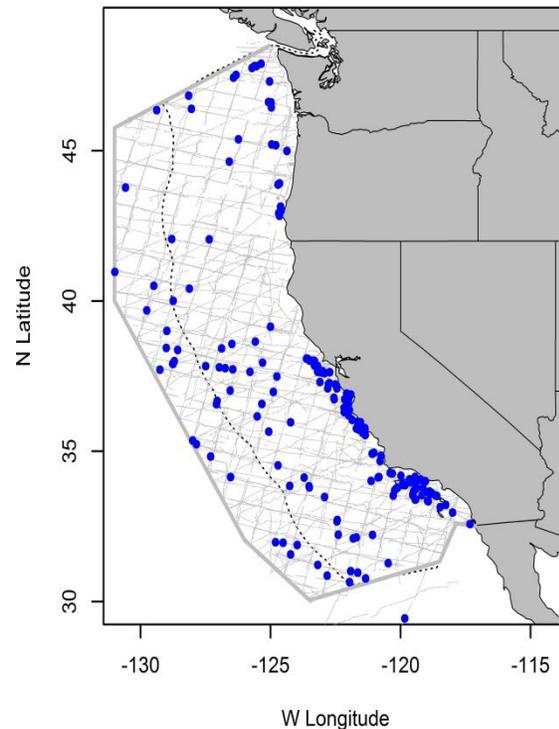


## RISSO'S DOLPHIN (*Grampus griseus*): California/Oregon/Washington Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

Risso's dolphins are distributed worldwide 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, 1993). 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.



**Figure 1.** Risso's dolphin sightings based on shipboard surveys off California, Oregon, and Washington, 1991-2014 (Barlow 2016). Dashed line represents the U.S. EEZ, thin gray lines indicate completed transect effort of all surveys combined.

### POPULATION SIZE

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 most recent estimate of Risso's dolphin abundance is the geometric mean of estimates from 2008 and 2014 summer/autumn vessel-based line-transect surveys of California, Oregon, and Washington waters, 6,336 (CV=0.32) animals (Barlow 2016). This estimate includes new correction factors for animals missed during the surveys.

#### Minimum Population Estimate

The log-normal 20th percentile of the 2008-2014 geometric mean abundance estimate is 4,817 Risso's dolphins.

#### Current Population Trend

The distribution and abundance of Risso’s dolphins off California, Oregon and Washington varies considerably at both seasonal and interannual time scales (Forney and Barlow 1998, Becker *et al.* 2012, Barlow 2016), but no long-term trends have been identified.

**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 (4,817) times one half the default maximum net growth rate for cetaceans (½ of 4%) times a recovery factor of 0.48 (for a species of unknown status with a mortality rate CV between 0.3 and 0.6; Wade and Angliss 1997), resulting in a PBR of 46 Risso’s dolphins per year.

**HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

**Fishery Information**

A summary of recent fishery mortality and injury information for this stock of Risso’s dolphin is shown in Table 1. More detailed information on these fisheries is provided in Appendix 1. The estimate of mortality and serious injury for Risso’s dolphin in the California drift gillnet fishery for the five most recent years of monitoring, 2010-2014, is an average of 1.3 per year (Carretta *et al.* 2017, Table 1). Although some Risso’s dolphins have been incidentally killed in West Coast groundfish fisheries in the past, no takes of this species were observed during 2009-2013 (Jannot *et al.* 2011, NWFSC unpublished data). Gillnets have been documented to entangle marine mammals off Baja California (Sosa-Nishizaki *et al.* 1993), but no recent bycatch data from Mexico are available.

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 from 2004-2008 observed 377 sets (<10%) without an observed Risso’s dolphin interaction.

Human-caused mortality and injury documentation is often based on stranding data, where raw counts are negatively-biased because only a fraction of carcasses are detected (Carretta *et al.* 2016a). Carretta *et al.* (2016b) estimated the mean recovery rate of California coastal bottlenose dolphin carcasses to be 25% (95% CI 20% - 33%) and stated that given the extremely coastal habits of coastal bottlenose dolphins, carcass recovery rates for this stock represented a maximum, compared with more pelagic dolphin species in the region. Therefore, in this stock assessment report and others involving dolphins along the U.S. West Coast, human-related deaths and injuries counted from beach strandings along the outer U.S. West Coast are multiplied by a factor of 4 to account for the non-detection of most carcasses (Carretta *et al.* 2016b). Three Risso’s dolphins stranded during 2010-2014 with evidence of fishery interaction (Carretta *et al.* 2016a), yielding a minimum estimate of 12 fishery-related dolphin deaths.

**Table 1.** Summary of available information on the incidental mortality and serious injury of Risso's dolphin (California/ Oregon/Washington Stock) in commercial fisheries that might take this species (Carretta *et al.* 2016b, 2017; Jannot *et al.* 2011; NWFSC, unpublished data). All observed entanglements of Risso's dolphins resulted in the death of the animal. Human-caused mortality values based on strandings recovered along the outer U.S. West Coast are multiplied by a correction factor of 4 to account for undetected mortality (Carretta *et al.* 2016a). Coefficients of variation for mortality estimates are provided in parentheses; n/a = not available.

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	2010	12%	0	1.5 (2.5)	1.3 (0.93)
		2011	20%	1	2.8 (1.3)	
		2012	19%	0	0.8 (2.8)	
		2013	37%	0	0.9 (1.9)	
		2014	24%	0	0.7 (2.8)	

Fishery Name	Data Type	Year(s)	Percent Observer Coverage	Observed Mortality	Estimated Annual Mortality (CV)	Mean Annual Takes (CV)
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	2007-2013	n/a	3	≥ 12	≥2.4 (0.46) <sup>1</sup>
WA/OR/CA groundfish (bottom trawl) <sup>a</sup>	observer	2009-2013	23% (2009) 18% (2010) 100% (2011-2013)	0	0	0
<b>Minimum total annual takes</b> (includes correction for unobserved beach strandings)						≥ 3.7 (0.44)

### 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 (2010-2014), the average annual human-caused mortality (3.7 animals) is estimated to be less than the PBR (46), and therefore they are not classified as a "strategic" stock under the MMPA. The total fishery mortality and serious injury for this stock (3.7) 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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<sup>1</sup> The coefficient of variation (CV) for corrected carcass counts was derived from the results of Carretta *et al.* (2016b), who estimated that 25% (95% CI = 20% - 33%) of all available carcasses were recovered / documented.

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