

PACIFIC WHITE-SIDED DOLPHIN (*Lagenorhynchus obliquidens*): California/Oregon/Washington, Northern and Southern Stocks

STOCK DEFINITION AND GEOGRAPHIC RANGE

Pacific white-sided dolphins are endemic to temperate waters of the North Pacific Ocean, and common both on the high seas and along the continental margins. Off the U.S. west coast, Pacific white-sided dolphins occur primarily in shelf and slope waters (Figure 1). Sighting patterns from aerial and shipboard surveys conducted in California, Oregon and Washington (Green et al. 1992; 1993; Barlow 1995; Forney et al. 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).

Stock structure throughout the North Pacific is poorly understood, but based on morphological evidence, two forms are known off the California coast (Walker et al. 1986; Chivers et al. 1993). Specimens belonging to the northern form were collected from north of about 33°N, (Southern California to Alaska), and southern specimens were obtained from about 36°N southward along the coasts of California and Baja California. Samples of both forms have been collected in the Southern California Bight, but it is unclear whether this indicates sympatry in this region or whether they may occur there at different times (seasonally or interannually). Genetic analyses have confirmed the distinctness of animals found off Baja California from animals occurring in U.S. waters north of Point Conception, California and in the high seas of the North Pacific (Lux et al. 1997). Based on these genetic data, an area of mixing between the two forms appears to be located off Southern California (Lux et al. 1997).

Although there is clear evidence that two forms of Pacific white-sided dolphins occur along the U.S. west coast, there are no known differences in color pattern, and it is not currently possible to distinguish animals without genetic or morphometric analyses. Geographic stock boundaries appear dynamic and are poorly understood, and therefore cannot be used to differentiate the two forms. Until means of differentiating the two forms for abundance and mortality estimation are developed, these two stocks must be managed as a single unit; however, this is an undesirable management situation. Furthermore, Pacific white-sided dolphins are not restricted to U.S. territorial waters, but cooperative

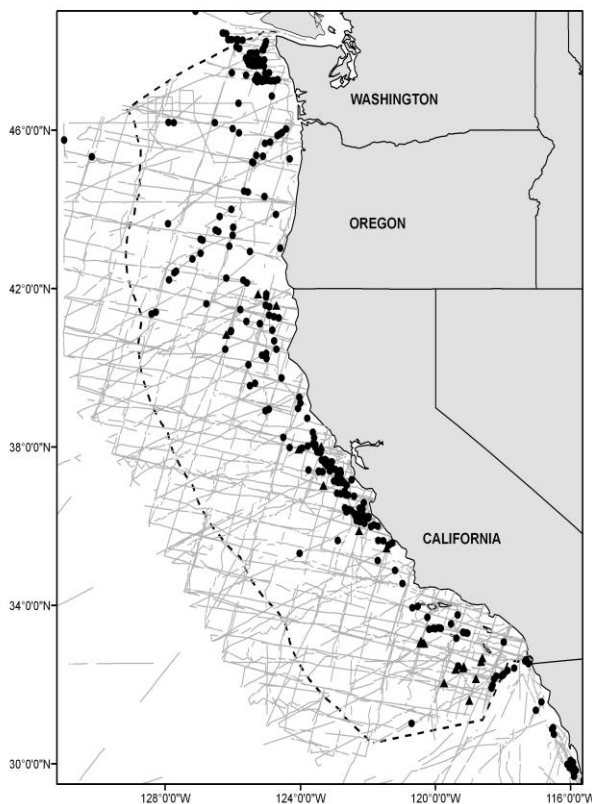


Figure 1. Pacific white-sided dolphin sightings based on aerial and shipboard surveys off California, Oregon, and Washington, 1991-2008 (see Appendix 2 for data sources and information on timing and location of survey effort). Dashed line represents the U.S. EEZ, thin lines indicate completed transect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

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). Until these goals are accomplished, the management stock includes animals of both forms. For the Marine Mammal Protection Act (MMPA) stock assessment reports, Pacific white-sided 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) Alaskan waters.

POPULATION SIZE

The most recent estimates of abundance for Pacific white-sided dolphins are based on two summer/autumn shipboard surveys conducted within 300 nmi of the coasts of California, Oregon, and Washington in 2005 (Forney 2007) and 2008 (Barlow 2010). The distribution of Pacific white-sided 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, Pacific white-sided dolphins may spend time outside the U.S. Exclusive Economic Zone, and therefore a multi-year average abundance estimate including California, Oregon and Washington 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 26,930 (CV=0.28) Pacific white-sided dolphins (Forney 2007, Barlow, 2010).

Minimum Population Estimate

The log-normal 20th percentile of the 2005-2008 average abundance estimate is 21,406 Pacific white-sided dolphins.

Current Population Trend

No long-term trends in the abundance of Pacific white-sided dolphins in California, Oregon and Washington are suggested based on historical and recent surveys (Dohl et al. 1980; 1983; Green et al. 1992; 1993; Barlow 1995; Forney et al. 1995, Barlow and Forney 2007, Forney 2007, Barlow 2010).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No information on current or maximum net productivity rates is available for Pacific white-sided 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 (21,406) 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 171 Pacific white-sided dolphins per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

New Serious Injury Guidelines

NMFS updated its serious injury designation and reporting process, which uses guidance from previous serious injury workshops, expert opinion, and analysis of historic injury cases to develop new criteria for distinguishing serious from non-serious injury (Angliss and DeMaster 1998, Andersen *et al.* 2008, NOAA 2012). NMFS defines serious injury as an “*injury that is more likely than not to result in mortality*”. Injury determinations for stock assessments revised in 2013 or later incorporate the new serious injury guidelines, based on the most recent 5-year period for which data are available.

Fishery Information

A summary of recent fishery mortality and injury for this stock of Pacific white-sided dolphin is shown in Table 1. More detailed information on these fisheries is provided in Appendix 1. Including mortality from drift gillnet, groundfish trawl, and unknown fisheries, the average annual fishery-related mortality of Pacific white-sided dolphins is 11.8 (CV=0.88) animals. Mortality estimates for the California swordfish drift gillnet fishery are included for the five most recent years of monitoring, 2007-2011 (2009a, 2009b, 2010, 2012a, 2012b). Acoustic pinger use in the swordfish drift gillnet fishery

appears to reduce bycatch rates of Pacific white-sided dolphins, but the reduction is not statistically significant, given the rarity of bycatch of this species (Carretta and Barlow 2011). Bycatch estimates for the U.S. west coast groundfish fleet are summarized by Jannot et al. (2011). 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.

Table 1. Summary of available information on the incidental mortality and injury of Pacific white-sided dolphins (California/ Oregon/Washington Stock) in commercial fisheries that might take this species. All observed entanglements of Pacific white-sided 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 2007-2011 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	2007	16.4%	1	6 (1.00)	11.6 (0.88)
		2008	13.5%	5	37 (0.70)	
		2009	13.0%	2	15 (1.02)	
		2010	11.9%	0	0	
		2011	19.5%	0	0	
WA/OR/CA domestic groundfish trawl (At-sea processing Pacific hake fishery).	observer	2005	100%	0	0	0
		2006	100%	0	0	
		2007	99%	0	0	
		2008	99%	0	0	
		2009	100%	0	0	
West Coast limited entry bottom trawl fishery	observer	2005	18 – 23%	0	0	0
		2006				
		2007				
		2008				
		2009				
Unknown fishery	stranding	2007		1	n/a	≥0.2 (n/a)
		2008		0		
		2009		0		
		2010		0		
		2011		0		
Minimum total annual takes						11.8 (0.88)

Other removals

Pacific white-sided dolphins have been seriously injured and killed in scientific research trawls for sardines and rockfish. From 2007 through 2011, there were 26 deaths and 4 serious injuries of Pacific white-sided dolphins in scientific research trawls (Carretta et al. 2013). The average annual research-related mortality of Pacific white-sided dolphin from 2007-2011 is 6.0 animals.

STATUS OF STOCK

The status of Pacific white-sided dolphins in California, Oregon and Washington relative to OSP is not known, and there is no indication of a trend in abundance for this stock. 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. Including commercial fishery (11.8/yr) and research-related mortality (6.0/yr), the average annual mortality for the 5-year period 2007-2011 is 17.8 animals. The average annual human-caused mortality in 2007-2011 (17.8 animals) is estimated to be less than the PBR (171), and therefore they are not classified as a "strategic" stock under the MMPA. The total commercial fishery mortality and serious injury for this stock (11.8/yr) is less than 10% of the calculated PBR and, therefore, is considered to be insignificant and approaching zero mortality and serious injury rate. Including research-related takes, annual mortality of this stock (17.8/yr) exceeds 10% of the calculated PBR, but under Section 118 of the MMPA, only commercial takes are evaluated against the zero mortality rate goal (ZMRG).

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