Revised 3/15/2022

LONG-BEAKED COMMON DOLPHIN (*Delphinus delphis bairdii*): California Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Long-beaked common dolphins were recognized as a distinct species in the 1990s (Heyning and Perrin 1994; Rosel *et al*. 1994), but Cunha *et al.* (2015) suggests that *Delphinus capensis* is an invalid species and the Society of Marine Mammalogy now provisionally recognizes animals from this stock as the subspecies *Delphinus delphis bairdii*. In the future, it is possible that this stock will be recognized as a separate species (perhaps *D. bairdii*), as discussed by Dall (1873) and advocated by Banks and Brownell (1969), but further taxonomic analyses are required. Along the U.S. west coast, their distribution overlaps with that of the short-beaked common dolphin. Long-beaked common dolphins are commonly found within about 50 nmi of the coast, from Baja California (including the Gulf of California) northward to about central California (Figure 1). Along the west coast of Baja California, long-beaked common dolphins primarily occur inshore of the 250 m isobath, with very few sightings (<15%) in waters deeper than 500 meters (Gerrodette and Eguchi 2011). Stranding and sighting records indicate that the abundance of this species off California changes both seasonally and inter-annually (Heyning and Perrin 1994, Forney and Barlow 1998, Barlow 2016). Although long-beaked common 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 MMPA stock assessment reports, there is a single Pacific management stock including only animals found within the U.S. Exclusive Economic Zone off California.

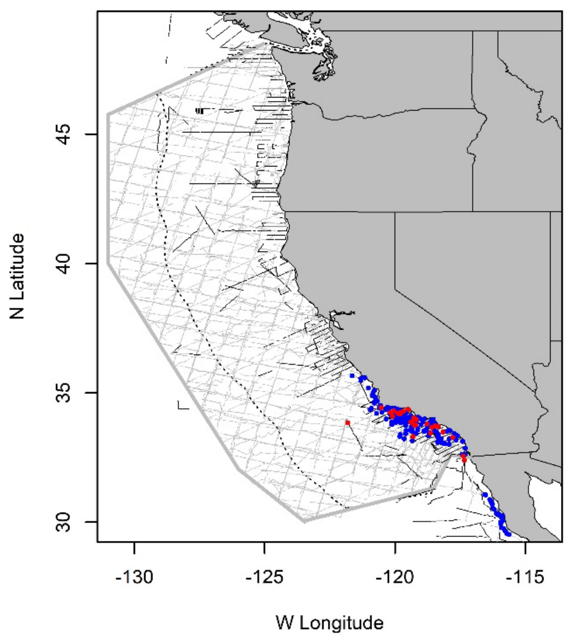

Figure 1. Long-beaked common dolphin sightings based on shipboard surveys off California, Oregon, and Washington, 1991-2018 (Barlow 2016, Henry *et al*. 2020). Dashed line represents U.S. EEZ, thin lines indicate completed transect effort (gray = 1991-2014, black = 2018). Sightings from the 2018 survey are shown in red.

POPULATION SIZE

Becker *et al*. (2020) generated species distribution models (SDMs) from fixed and dynamic ocean variables using 1991-2018 line-transect survey data to estimate density and abundance of cetaceans in the California Current Ecosystem (CCE). The use of SDMs for density estimation is well-established for this region and models incorporate changes in species abundance and habitat shifts over time (Becker *et al*. 2016, 2017, Redfern *et al*. 2017). Additionally, use of SDMs facilitates abundance estimation when survey coverage is limited, as was the case in 2018 when line-transect effort was largely limited to continental shelf waters (Henry *et al*. 2020). The best-estimate of abundance is taken as the estimate from 2018, or 83,379 (CV=0.216) animals (Becker *et al.* 2020).

Minimum Population Estimate

The log-normal 20th percentile of the 2018 abundance estimate is 69,636 long-beaked common dolphins.

Current Population Trend

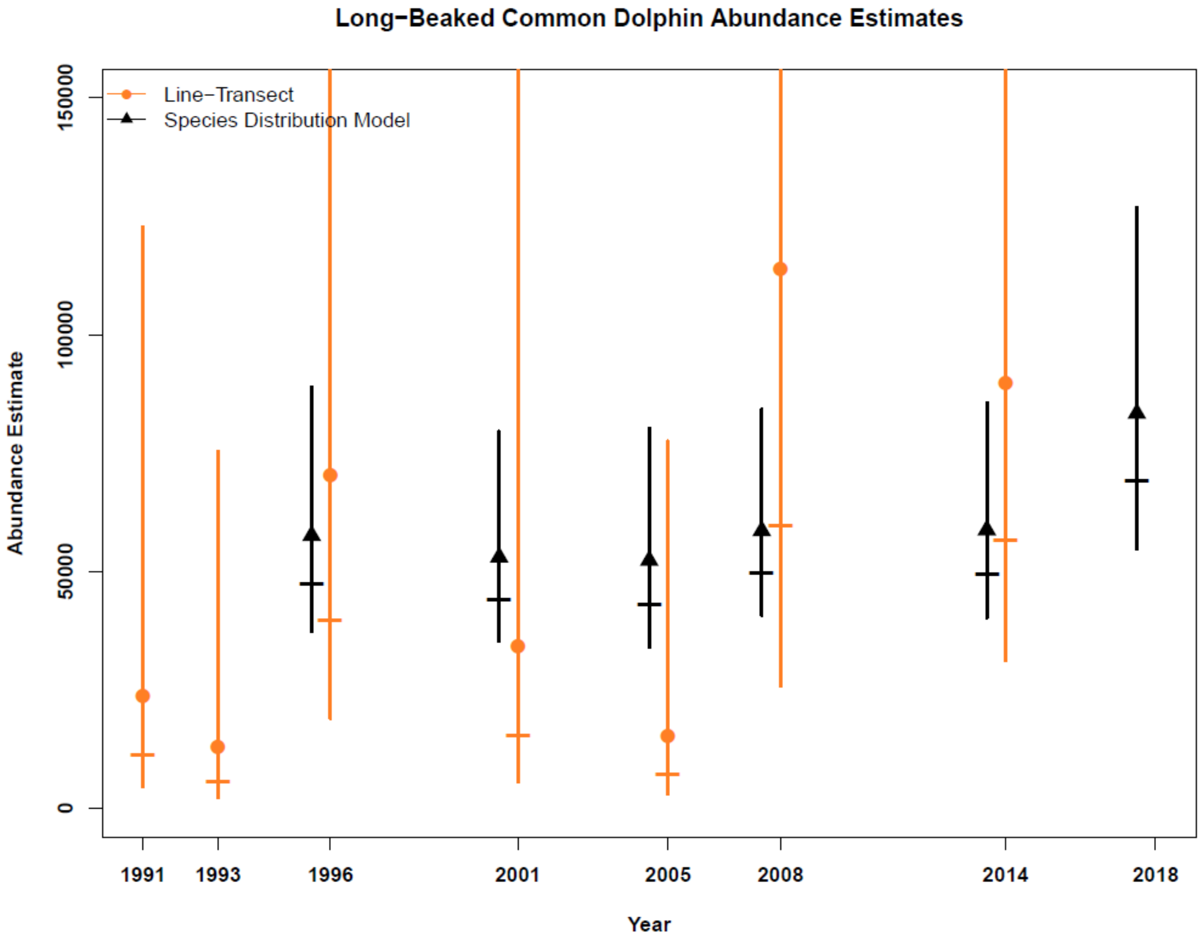

Figure 2. Abundance estimates and 95% confidence intervals from vessel-based line transect surveys (Barlow 2016) and species distribution models (Becker *et al.* 2020) within the California Current. Line-transect surveys in 1991 and 1993 did not include the waters of Oregon and Washington, but all research vessel sightings of this stock have occurred in California waters. Vertical bars indicate approximate 95% confidence limits for line-transect and species distribution model estimates. Horizontal hatch marks represent minimum population size estimates based on 20th percentiles of mean estimates. The y-axis has been truncated to provide the best display in variability in mean estimates between line-transect and species distribution models, due to relatively poor precision in the line-transect estimates. Upper 95% confidence limits for line-transect surveys in 1996, 2001, 2008, and 2014 not visible in the plot ranged between 205,000 and 503,000 animals.

California waters represent the northern limit for this stock and animals likely move between U.S. and Mexican waters. . The ratio of strandings of long-beaked to short-beaked common dolphin in southern California has varied, suggesting that the proportions of each species varies with ocean conditions (Heyning and Perrin 1994, Danil *et al*. 2010). There appears to be an increasing trend of long-beaked common dolphins in California waters over the last 30 years coincident with warming ocean conditions (Fig. 2), but a trend analysis for this stock has not been performed to date, while other stocks with more urgent conservation concerns are analyzed (e.g., Moore and Barlow 2011, 2013).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

There are no estimates of current or maximum net productivity rates for long-beaked common dolphins.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size (69,636) 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 of 0.3 to 0.6; Wade and Angliss 1997), resulting in a PBR of 668 long-beaked common dolphins per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

A summary of recent fishery mortality and injury for long-beaked common dolphins is shown in Table 1. More detailed information on these fisheries is provided in Appendix 1. The estimate of mortality and serious injury for long-beaked common dolphin in the California drift gillnet fishery for the five most recent years of monitoring, 2015-2019, averages 1.7 (CV= 0.60) per year (Carretta 2020). Stranding data are the primary source of documenting human-caused mortality for this stock during the most-recent 5-year period of 2015-2019 (Table 1). Human-caused mortality totals based on observed counts from strandings are negatively-biased because only a fraction of carcasses are detected (Carretta *et al*. 2016). 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 (including a coefficient of variation = 0.46 derived from the results of Carretta *et al*. 2016) to account for the non-detection of most carcasses (Carretta *et al*. 2016a). Applying this correction factor to the 21 stranded long-beaked common dolphins yields a minimum estimate of 84 fishery-related dolphin deaths, or an average of 16.8 annually (Table 1).

Table 1. Summary of available information on the incidental mortality and serious injury of long-beaked common dolphins (California Stock) in commercial fisheries that might take this species (Carretta 2021, Carretta *et al*. 2021). All observed entanglements resulted in the death of the animal. Coefficients of variation for mortality estimates are provided in parentheses, when available. n/a = information not available. 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).

Fishery Name	Data Type	Year(s)	Percent Observer Coverage	Observed Mortality (and Serious Injury)	Estimated Annual Mortality (CV)	Mean Annual Takes (CV
CA thresher shark/swordfish drift gillnet fishery	observer	2015-2019	21%	2	8.7 (0.60)	1.7 (0.60)
CA Spot Prawn Trap Fishery	Strandings	2015-2019	n/a	1	≥ 4	≥ 0.8 (0.46)
CA halibut/white seabass and other species set gillnet fishery	Strandings	2015-2019	n/a	2	≥ 8 (n/a)	≥ 1.6 (0.46)
Unidentified gillnet fishery interaction	Strandings	2015-2019	n/a	21	≥ 84	≥ 16.8 (0.46)
Unidentified fishery interaction	Strandings	2015-2019	n/a	7	≥ 28	≥ 5.6 (0.46)
Minimum total annual takes (includes correction for unobserved beach strandings)						≥ 26.5 (0.39)

Other Mortality

Stranding records from 2015-2019 include two deaths resulting from hook and line fishery entanglements (Carretta *et al*. 2021). Applying the minimum correction factor of 4 to account for undetected mortality (Carretta *et al*. 2016a), yields an estimated 16 human-caused long-beaked common dolphin deaths from hook and line fisheries or 3.2 annually for 2015-2019.

‘Unusual mortality events’ of long-beaked common dolphins off California due to domoic acid toxicity have been documented by NMFS as recently as 2007. One study suggests that increasing anthropogenic CO_2 levels and ocean acidification may increase the toxicity of the diatom responsible for these mortality events (Tatters *et al*. 2012).

STATUS OF STOCK

The status of long-beaked common dolphins in California waters relative to OSP is not known, and there are insufficient data to evaluate potential trends in abundance. Exposure to blast trauma resulting from underwater detonations is a local concern for this stock (Danil and St. Leger 2011), but population level impacts from such activities are unclear. In response to the 2011 event, the U.S. Navy has implemented training protocols to reduce the probability of blast trauma events occurring (Danil and St. Leger 2011). Long-beaked common dolphins are not listed as "threatened" or "endangered" under the Endangered Species Act nor as "depleted" under the MMPA. The average annual human-caused mortality from commercial fisheries (≥ 26.5/yr) and other sources (3.2 /yr) is 29.7 long-beaked common dolphins. This does not exceed the PBR (668), and therefore they are not classified as a "strategic" stock under the MMPA. The average total fishery mortality and injury for long-beaked common dolphins (29.7/yr) is less than 10% of the PBR and therefore, is considered to be insignificant and approaching zero mortality and serious injury rate.

REFERENCES

Banks, R. C. and R. L. Brownell. 1969. Taxonomy of the common dolphins of the eastern Pacific Ocean. Journal of Mammalogy 50:262-271.

Barlow, J. 2016. Cetacean abundance in the California current estimated from ship-based line-transect surveys in 1991-2014. Southwest Fisheries Science Center, Administrative Report, LJ-2016-01. 63 p.

Becker, E.A., Karin A. Forney, David L. Miller, Paul C. Fiedler, Jay Barlow, and Jeff E. Moore. 2020. Habitat-based density estimates for cetaceans in the California Current Ecosystem based on 1991-2018 survey data, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-638.

Becker E.A., Forney K.A., Thayre B.J., Debich A.J., Campbell G.S., Whitaker K., Douglas A.B., Gilles A, Hoopes R., Hildebrand J.A. 2017. Habitat-based density models for three cetacean species off southern California illustrate pronounced seasonal differences. Frontiers in Marine Science. 4(121):1–14.

Carretta, J.V., Danil, K., Chivers, S.J., Weller, D.W., Janiger, D.S., Berman-Kowalewski, M., Hernandez, K.M., Harvey, J.T., Dunkin, R.C., Casper, D.R., Stoudt, S., Flannery, M., Wilkinson, K., Huggins, J., and Lambourn, D.M. 2016a. Recovery rates of bottlenose dolphin (*Tursiops truncatus*) carcasses estimated from stranding and survival rate data. Marine Mammal Science, 32(1), pp.349-362Carretta, J.V., J. Greenman, K. Wilkinson, J. Freed, L. Saez, D. Lawson, J. Viezbicke, and J. Jannot. 2021. Sources of human-related injury and mortality for U.S. Pacific West Coast Marine Mammal Stock Assessments, 2015-2019. NOAA Technical Memorandum NMFS-SWFSC-643. 157 pp.

Carretta, J.V. 2021. Estimates of marine mammal, sea turtle, and seabird bycatch in the California large-mesh drift gillnet fishery: 1990-2019. NOAA Technical Memorandum NMFS-SWFSC-654.

Cunha, H.A., R.L. de Castro, E.R. Secchi, E.A. Crespo, J. Lailson-Brito, A.F. Azevedo, C. Lazoski, and A.M. Solé-Cava. 2015. Molecular and morphological differentiation of common dolphins (*Delphinus* sp.) in the Southwestern Atlantic: testing the two species hypothesis in sympatry." *PloS one* 10, no. 11: e0140251.

Dall, W.H. Preliminary descriptions of three new species of Cetacea from the coast of California. Ann. Mag. Nat. Hist. [Internet]. 1873; 11:316–7. Available from: http://biostor.org/reference/92189

Danil, K., S.J. Chivers, M.D. Henshaw, J.L. Thieleking, R. Daniels, J.A. St. Leger. 2010. Cetacean strandings in San Diego County, California, USA: 1851-2008. Journal of Cetacean Research and Management 11:163-184.

Danil, K. and J.A. St. Leger. 2011. Seabird and dolphin mortality associated with underwater detonation exercises. Marine Technology Society Journal 45:89-95.

Forney, K. A. and J. Barlow. 1998. Seasonal patterns in the abundance and distribution of California cetaceans, 1991-92. Mar. Mamm. Sci. 14:460-489.

Gerrodette, T. and T. Eguchi. 2011. Precautionary design of a marine protected area based on a habitat model. Endangered Species Research 15:159-166.

Henry A.E., Moore J.E., Barlow J., Calambokidis J., Ballance L.T., Rojas-Bracho, L., Urbán Ramírez, J. 2020. Report on the California Current Ecosystem Survey (CCES): Cetacean and Seabird Data Collection Efforts, June 26 – December 4, 2018, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-636.

Heyning, J. E. and W. F. Perrin. 1994. Evidence for two species of common dolphins (Genus *Delphinus*) from the eastern North Pacific. Contributions In Science, Natural History Musuem, Los Angeles County, No. 442.

Joseph, J. 1994. The tuna-dolphin controversy in the eastern Pacific Ocean: biological, economic and political impacts. Ocean Development and International Law 25:1-30.

Moore, J.E. and J. Barlow. 2011. Bayesian state-space model of fin whale abundance trends from a 1991-2008 time series of line-transect surveys in the California Current. Journal of Applied Ecology 48:1195-1205.

Moore, J.E., Barlow J.P. 2013. Declining abundance of beaked whales (family Ziphiidae) in the California Current large marine ecosystem. PLoS ONE 8(1):e52770. doi:10.1371/journal.pone.0052770.

NMFS, Southwest Region, 501 West Ocean Blvd, Long Beach, CA 90802-4213.

Redfern J.V., Moore T.J., Fiedler P.C., de Vos A., Brownell R.L., Jr., Forney K.A., Becker E.A., Ballance L.T. 2017. Predicting cetacean distributions in data-poor marine ecosystems. Diversity and Distributions.1–15.

Rosel, P. E., A. E. Dizon and J. E. Heyning. 1994. Population genetic analysis of two forms of the common dolphin (genus *Delphinus*) utilizing mitochondrial DNA control region sequences. Marine Biology 119:159-167.

Sosa-Nishizaki, O., R. De la Rosa-Pacheco, R. Castro-Longoria, M. Grijalva Chon, and J. De la Rosa Velez. 1993. Estudio biologico pesquero del pez (*Xiphias gladius*) y otras especies de picudos (marlins y pez vela). Rep. Int. CICESE, CTECT9306.

Tatters A.O., Fu F-X, Hutchins, D.A. (2012). High CO_2 and silicate limitation synergistically increase the toxicity of *Pseudo-nitzshchia fraudulenta*. Plos ONE 7 e32116.

Wade, P. R. and R. P. Angliss. 1997. Guidelines for Assessing Marine Mammal Stocks: Report of the GAMMS Workshop April 3-5, 1996, Seattle, Washington. U. S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-12. 93 pp.