Revised 6/4/2014

# RISSO'S DOLPHIN (*Grampus griseus*): Hawaii Stock

## STOCK DEFINITION AND GEOGRAPHIC RANGE

Risso's dolphins are found in tropical to warm-temperate waters worldwide (Perrin et al. 2009). Risso's dolphins represent less than 1% of all odontocete sightings in leeward surveys of the main Hawaii Islands from 2000 to 2012 (Baird et al. 2013); however, six sightings were made during a 2002 survey and 12 during a 2010 survey of the U.S. Exclusive Economic Zone (EEZ) of the Hawaiian Islands (Barlow 2006, Bradford et al. 2013; Figure 1).

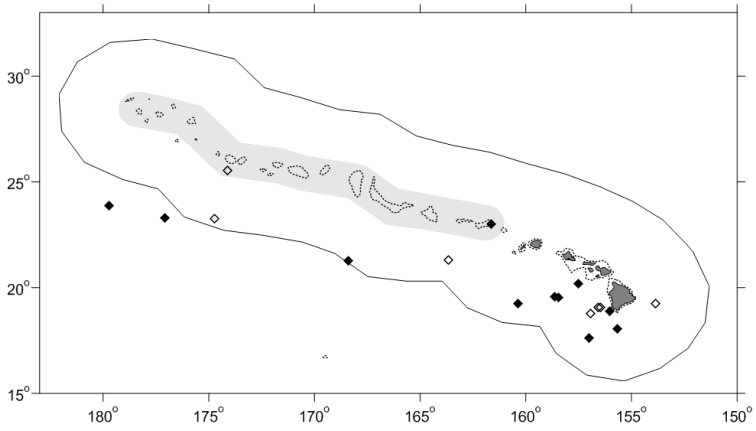


**Figure 1**. Risso's dolphin sighting locations during the 2002 (open diamonds) and 2010 (black diamonds) shipboard cetacean surveys of U.S. EEZ waters surrounding the Hawaiian Islands (Barlow 2006, Bradford et al. 2013; see Appendix 2 for details on timing and location of survey effort). Outer line represents approximate boundary of survey area and U.S. EEZ. Gray shading indicates area of Papahanaumokuakea Marine National Monument. Dotted line is the 1000m isobath.

For the Marine Mammal Protection Act (MMPA) stock assessment reports, Risso's dolphins within the Pacific U.S. EEZ are divided into two discrete areas: 1) Hawaiian waters (this report), and 2) waters off California, Oregon and Washington. The Hawaiian stock includes animals found both within the Hawaiian Islands EEZ and in adjacent high seas waters; however, because data on abundance, distribution, and human-caused impacts are largely lacking for high seas waters, the status of this stock is evaluated based on data from U.S. EEZ waters of the Hawaiian Islands (NMFS 2005).

## POPULATION SIZE

Population estimates are available from Japan (Miyashita 1993), the eastern tropical Pacific (Wade and Gerrodette 1993), and the U.S. West Coast (Barlow and Forney 2007), but it is not known whether these animals are part of the same population that occurs around the Hawaiian Islands and in the central North Pacific. A 2002 shipboard line-transect survey of the entire Hawaiian Islands EEZ resulted in an abundance estimate of 2,372 (CV=0.97) Risso's dolphins (Barlow 2006). The recent 2010 shipboard line-transect survey of the Hawaiian Islands EEZ resulted in an abundance estimate of 7,256 (CV=0.41) Risso's dolphins (Bradford et al. 2013). This is currently the best available abundance estimate for this stock.

### Minimum Population Estimate

The minimum population size is calculated as the lower 20th percentile of the log-normal distribution (Barlow et al. 1995) of the 2010 abundance estimate, or 5,207 Risso's dolphins within the Hawaiian Islands EEZ.

### Current Population Trend

The broad and overlapping confidence intervals around the 2002 and 2010 estimates preclude assessment of trends with the available data.

## CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No data are available on current or maximum net productivity rate for Hawaiian animals.

## POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for the Hawaii stock of Risso's dolphins is calculated as the minimum population size within the U.S. EEZ of the Hawaiian Islands (5,207) times one half the default maximum net growth rate for cetaceans (½ of 4%) times a recovery factor of 0.40 (for a stock of unknown status with a

Hawaiian Islands EEZ fishery mortality and serious injury rate CV greater than 0.80 ; Wade and Angliss 1997), resulting in a PBR of 42 Risso's 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.

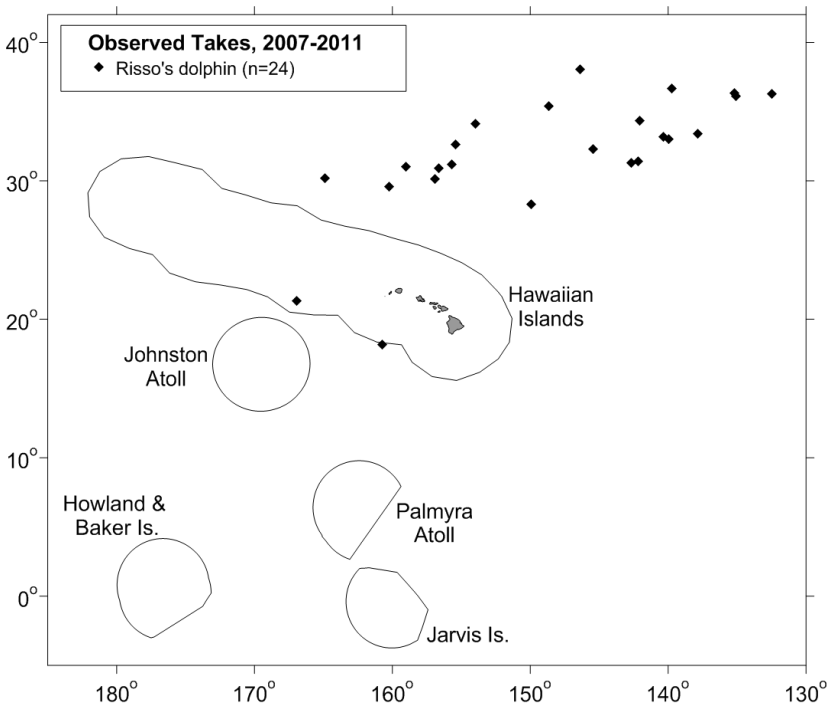


**Figure 2.** Locations of Risso's dolphin takes (filled diamonds) in Hawaii-based longline fisheries, 2007-2011. Solid lines represent the U.S. EEZs. Fishery descriptions are provided in Appendix 1.

### Fishery Information

**Table 1.** Summary of available information on incidental mortality and serious injury of Risso's dolphin (Hawaii stock) in commercial longline fisheries, within and outside of U.S. EEZs (McCracken 2013). Mean annual takes are based on 2007-2011 data unless indicated otherwise. Information on all observed takes (T) and combined mortality events & serious injuries (MSI) is included. Total takes were prorated to deaths, serious injuries, and non-serious injuries based on the observed proportions of each outcome.

| Fishery Name | Year | Data Type | Percent Observer Coverage | Observed total interactions (T) and mortality events, and serious injuries (MSI), and total estimated mortality and serious injury (M&SI) of Risso's dolphins | | | |
|---|---|---|---|---|---|---|---|
| | | | | Outside U.S. EEZs | | Hawaiian EEZ | |
| | | | | Obs. T/MSI | Estimated M&SI (CV) | Obs. T/MSI | Estimated M&SI (CV) |
| **Hawaii-based deep-set longline fishery** | 2007 | Observer data | 20% | 1/1 | 3 (1.4) | 0 | 0 (-) |
| | 2008 | | 22% | 1/1 | 2 (1.5) | 0 | 0 (-) |
| | 2009 | | 21% | 0 | 0 (-) | 0 | 0 (-) |
| | 2010 | | 21% | 0 | 0 (-) | 1/1 | 3 (0.7) |
| | 2011 | | 20% | 0 | 0 (-) | 0 | 0 (-) |
| **Mean Estimated Annual Take (CV)** | | | | | **0.9 (1.5)** | | **0.6 (2.0)** |
| **Hawaii-based shallow-set longline fishery** | 2007 | Observer data | 100% | 3/3 | 3 | 0 | 0 |
| | 2008 | | 100% | 4/4 | 4 | 0 | 0 |
| | 2009 | | 100% | 3/2 | 2 | 0 | 0 |
| | 2010 | | 100% | 7/6 | 6 | 0 | 0 |
| | 2011 | | 100% | 4/3 | 3 | 0 | 0 |
| **Mean Annual Takes (100% coverage)** | | | | | **3.6** | | **0** |
| **Minimum total annual takes within U.S. EEZ** | | | | | | | **0.6 (2.0)** |

Information on fishery-related mortality and serious injury of cetaceans in Hawaiian waters is limited, but

the gear types used in Hawaiian fisheries are responsible for marine mammal mortality and serious injury in other fisheries throughout U.S. waters. No interactions between nearshore fisheries and Risso's dolphins have been reported in Hawaiian waters. No estimates of human-caused mortality or serious injury are currently available for nearshore hook and line fisheries because these fisheries are not observed or monitored for protected species bycatch.

There are currently two distinct longline fisheries based in Hawaii: a deep-set longline (DSLL) fishery that targets primarily tunas, and a shallow-set longline fishery (SSLL) that targets swordfish. Both fisheries operate within U.S. waters and on the high seas. Between 2007 and 2011, 21 Risso's dolphins were observed killed or seriously injured in the SSLL fishery (100% observer coverage), and 3 Risso's dolphins were observed killed or seriously injured in the DSLL fishery (20-22% observer coverage) (Bradford & Forney 2013, McCracken 2013). One Risso's dolphin in the DSLL fishery and two in the SSLL fishery were killed, 16 in the SSLL fishery and two in the DSLL fishery were considered to have been seriously injured, and the remaining three interactions in the SSLL fishery were determined to be not seriously injured (Bradford & Forney 2013) based on evaluation of the observer's description of the interaction and following the most recently developed criteria for assessing serious injury in marine mammals (NMFS 2012). Average 5-yr estimates of annual mortality and serious injury for 2007-2011are 4.5 (CV = 1.5) Risso's dolphins outside of U.S. EEZs, and 0.6 (CV = 2.0) within the Hawaiian Islands EEZ (Table 1, McCracken 2013). Eight additional unidentified cetaceans were taken in the DSLL fishery, and two unidentified cetaceans were taken in the SSLL fishery, some of which may have been Risso's dolphins.

**STATUS OF STOCK**

The Hawaii stock of Risso's dolphins is not considered strategic under the 1994 amendments to the MMPA. The status of Risso's dolphins in Hawaiian waters relative to OSP is unknown, and there are insufficient data to evaluate trends in abundance. No habitat issues are known to be of concern for this stock. Risso's dolphins are not listed as "threatened" or "endangered" under the Endangered Species Act (1973), nor designated as "depleted" under the MMPA. The estimated rate of fisheries related mortality or serious injury within the Hawaiian Islands EEZ (0.6 animals per year) is less than the PBR (42).The total fishery mortality and serious injury can be considered to be insignificant and approaching zero because mortality and serious injury is less than 10% of PBR.

**REFERENCES**


Andersen, M. S., K. A. Forney, T. V. N. Cole, T. Eagle, R. Angliss, K. Long, L. Barre, L. Van Atta, D. Borggaard, T. Rowles, B. Norberg, J. Whaley, and L. Engleby. 2008. Differentiating Serious and Non-Serious Injury of Marine Mammals: Report of the Serious Injury Technical Workshop, 10-13 September 2007, Seattle, Washington. NOAA Technical Memorandum NMFS-OPR-39. 94p.

Angliss, R.P. and D.P. DeMaster. 1998. Differentiating Serious and Non-Serious Injury of Marine Mammals Taken Incidental to Commercial Fishing Operations. NOAA Tech Memo. NMFS-OPR-13, 48 p.

Baird, R.W., D.L. Webster, J.M. Aschettino, G.S. Schorr, D.J. McSweeney. 2013. Odontocete cetaceans around the main Hawaiian Islands: Habitat use and relative abundance from small-boat sighting surveys. Aquatic Mammals 39:253-269.

Barlow, J. 2006. Cetacean abundance in Hawaiian waters estimated from a summer/fall survey in 2002. Marine Mammal Science 22(2): 446-464.Barlow, J., and Forney, K.A. 2007. Abundance and density of cetaceans in the California Current ecosystem. Fishery Bulletin 105(4): 509-526.

Barlow, J., S.L. Swartz, T.C. Eagle, and P.R. Wade. 1995. U.S. Marine Mammal Stock Assessments: Guidelines for Preparation, Background, and a Summary of the 1995 Assessments. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-6, 73 p.

Bradford, A.L. and K.A. Forney. 2013. Injury determinations for cetaceans observed interacting with Hawaii and American Samoa longline fisheries during 2007-2011. PIFSC Working Paper WP-13-002.

Bradford. A.L., K.A. Forney, E.M. Oleson, and J. Barlow. 2013. Line-transect abundance estimates of cetaceans in the Hawaiian EEZ. PIFSC Working Paper WP-13-004

Maldini, D., L. Mazzuca, and S. Atkinson. 2005. Odontocete stranding patterns in the Main Hawaiian Islands (1937-2002): How do they compare with live animal surveys? Pacific Science 59(1):55-67.

McCracken, M. 2013. Preliminary assessment of incidental interactions with marine mammals in the Hawaii longline deep and shallow set fisheries from 2007 to 2011. PIFSC Working Paper WP-13.

Miyashita, T. 1993. Abundance of dolphin stocks in the western North Pacific taken by the Japanese drive fishery. Rep. Int. Whal. Commn. 43:417-437.

Nitta, E. 1991. The marine mammal stranding network for Hawaii: an overview. *In*: J.E. Reynolds III, D.K. Odell (eds.), Marine Mammal Strandings in the United States, pp.56-62. NOAA Tech. Rep. NMFS 98, 157 pp.

Nitta, E. and J. R. Henderson. 1993. A review of interactions between Hawaii's fisheries and protected species. Mar. Fish. Rev. 55(2):83-92.
NMFS. 2005. Revisions to Guidelines for Assessing Marine Mammal Stocks. 24 pp. Available at: http://www.nmfs.noaa.gov/pr/pdfs/sars/gamms2005.pdf
NMFS. 2012. NOAA Fisheries Policy Directive 02-038-01 Process for Injury Determinations (01/27/12). Available at: http://www.nmfs.noaa.gov/pr/pdfs/serious_injury_policy.pdf
Perrin, W.F., B. Würsig and J.G.M. Thewissen. 2009. Encyclopedia of Marine Mammals. Second Edition. Academic Press, Amsterdam.
Shallenberger, E.W. 1981. The status of Hawaiian cetaceans. Final report to U.S. Marine Mammal Commission. MMC-77/23, 79pp.
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.
Wade, P. R. and T. Gerrodette. 1993. Estimates of cetacean abundance and distribution in the eastern tropical Pacific. Rep. Int. Whal. Commn. 43:477-493.