

RISSO'S DOLPHIN (*Grampus griseus*): Northern Gulf of Mexico Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Risso's dolphins are distributed worldwide in tropical to warm temperate waters (Leatherwood and Reeves 1983). Risso's dolphins in the northern Gulf of Mexico (i.e., U.S. Gulf of Mexico) occur throughout oceanic waters but are concentrated in continental slope waters (Figure 1; Baumgartner 1997; Maze-Foley and Mullin 2006). Risso's dolphins were seen in all seasons during GulfCet aerial surveys of the northern Gulf of Mexico between 1992 and 1998 (Hansen *et al.* 1996; Mullin and Hoggard 2000).

Although there are only a few records from Gulf of Mexico waters beyond U.S. boundaries (e.g., Jefferson and Schiro 1997, Ortega Ortiz 2002), Risso's dolphins almost certainly occur throughout the oceanic Gulf of Mexico (Jefferson *et al.* 2008), including waters belonging to Mexico and Cuba where there is currently little information on cetacean species abundance and distribution. U.S. waters only comprise about 40% of the entire Gulf of Mexico and 35% of the oceanic (i.e., >200 m) Gulf of Mexico.

The Gulf of Mexico population is being considered a separate stock for management purposes, although there is currently little information to differentiate this stock from the Atlantic Ocean stock.

In 2006, a Risso's dolphin that stranded on the Florida Gulf Coast was rehabilitated, tagged with a satellite-linked transmitter and released into the Gulf southwest of Tampa Bay. Over a 23-day period the Risso's dolphin moved from the Gulf release site into the Atlantic Ocean and north to just off of Delaware (Wells *et al.* 2009). During September 2007 – January 2008, tracking of an adult female Risso's dolphin that had been

rehabilitated and released by Mote Marine Laboratory after stranding on the southwest coast of Florida documented movements throughout the northern Gulf of Mexico. The dolphin, released with its young calf, traveled as far as Bahia de Campeche, Mexico, and waters off Texas and Louisiana before returning to the shelf edge southwest of its stranding site off Florida (Wells *et al.* 2008a). As Wells *et al.* (2009) note, it is difficult to determine the effects of stranding and rehabilitation on post-release behavior, so it is unknown whether these movements were representative of Risso's dolphin ranging patterns in either the Gulf of Mexico or Atlantic Ocean. Additional morphological, genetic and/or behavioral data are needed to provide further information on stock delineation.

POPULATION SIZE

The best abundance estimate available for northern Gulf of Mexico Risso's dolphins is 2,442 (CV=0.57; Table 1). This estimate is from a summer 2009 oceanic survey covering waters from the 200-m isobath to the seaward

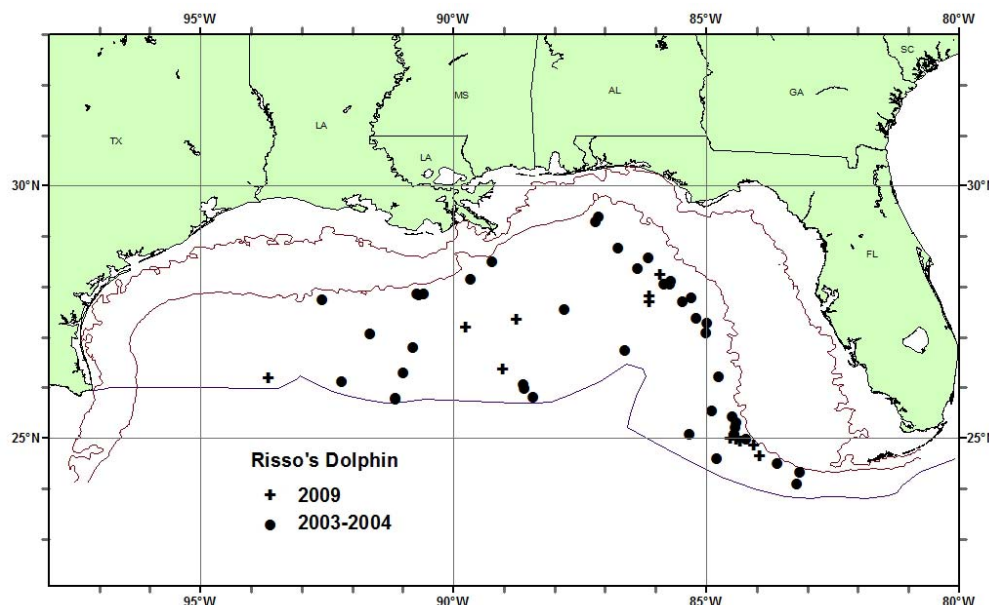


Figure 1. Distribution of Risso's dolphin sightings from SEFSC vessel surveys during summer 2003 and spring 2004, and during summer 2009. All the on-effort sightings are shown, though not all were used to estimate abundance. Solid lines indicate the 20-m and 200-m isobaths and the offshore extent of the U.S. EEZ.

extent of the U.S. EEZ.

Earlier abundance estimates

Please see Appendix IV for a summary of abundance estimates, including earlier estimates and survey descriptions.

Recent survey and abundance estimate

During summer 2009, a vessel-based line-transect survey dedicated to estimating the abundance of oceanic cetaceans was conducted in the northern Gulf of Mexico. Survey lines were stratified in relation to depth and the location of the Loop Current. The abundance estimate for Risso's dolphins in oceanic waters during 2009 was 2,442 (CV=0.57; Table 1).

Month/Year	Area	N_{best}	CV
Jun-Aug 2009	Oceanic waters	2,442	0.57

Minimum Population Estimate

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate. This is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by Wade and Angliss (1997). The best estimate of abundance for Risso's dolphins is 2,442 (CV=0.57). The minimum population estimate for the northern Gulf of Mexico is 1,563 Risso's dolphins.

Current Population Trend

A trend analysis has not been conducted for this stock. The statistical power to detect a trend in abundance for this stock is poor due to the relatively imprecise abundance estimates and long intervals between surveys. For example, the power to detect a precipitous decline in abundance (i.e., 50% decrease in 15 years) with estimates of low precision (e.g., CV > 0.30) remains below 80% ($\alpha = 0.30$) unless surveys are conducted on an annual basis (Taylor *et al.* 2007). Four point estimates of Risso's dolphin abundance have been made based on data from surveys covering 1991-2009. The estimates vary by a maximum factor of nearly two. Nevertheless, differences in temporal abundance estimates will still be difficult to interpret without a Gulf of Mexico-wide understanding of Risso's dolphin abundance. The 2 cases of satellite-linked tracking of Risso's dolphins in the Gulf of Mexico both showed movements out of the U.S. Gulf of Mexico EEZ (Wells *et al.* 2008a, 2009). The oceanography of the Gulf of Mexico is quite dynamic, and the spatial scale of the Gulf is small relative to the ability of most cetacean species to travel. Studies based on abundance and distribution surveys restricted to U.S. waters are unable to detect temporal shifts in distribution beyond U.S. waters that might account for any changes in abundance.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. For purposes of this assessment, the maximum net productivity rate was assumed to be 0.04. This value is based on theoretical modeling showing that cetacean populations may not grow at rates much greater than 4% given the constraints of their reproductive history (Barlow *et al.* 1995).

POTENTIAL BIOLOGICAL REMOVAL

Potential Biological Removal (PBR) is the product of the minimum population size, one half the maximum net productivity rate and a recovery factor (MMPA Sec. 3.16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is 1,563. The maximum productivity rate is 0.04, the default value for cetaceans. The recovery factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP), is assumed to be 0.5 because the stock is of unknown status. PBR for the northern Gulf of Mexico Risso's dolphin is 16.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The estimated annual average fishery-related mortality or serious injury for this stock during 2008-2012 is 7.9 Risso's dolphins (CV=0.76; Table 2).

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.

Fisheries Information

The commercial fisheries that could potentially interact with this stock in the Gulf of Mexico are the Category I Atlantic Ocean, Caribbean, Gulf of Mexico large pelagic longline fishery and the Atlantic Highly Migratory Species (high seas longline) fishery (Appendix III). There is very little effort within the Gulf of Mexico by the high seas longline fishery, and no takes of Risso’s dolphins within high seas waters of the Gulf of Mexico have been observed or reported thus far. Pelagic swordfish, tunas and billfish are the targets of the longline fishery operating in the northern Gulf of Mexico. There were no reports of mortality or serious injury to Risso’s dolphins in the northern Gulf of Mexico by this fishery during 1998-2007 or during 2009-2010 (Yeung 1999; 2001; Garrison 2003; Garrison and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Fairfield-Walsh and Garrison 2007; Fairfield and Garrison 2008; Garrison and Stokes 2010; 2012a). In 2008 and 2011-2012, 1 mortality and 4 serious injuries of Risso’s dolphins were observed during interactions with the pelagic longline fishery. These interactions occurred during the first and second quarters of 2008, during the second quarter of 2011 and during the fourth quarter of 2012 (Table 2; Garrison *et al.* 2009; Garrison and Stokes 2010; Garrison and Stokes 2012a,b; 2013). For the 5-year period 2008-2012, the estimated annual combined serious injury and mortality attributable to the pelagic longline fishery in the northern Gulf of Mexico was 7.9 (CV=0.76). During 15 April – 15 June, in 2008-2012, observer coverage in the Gulf of Mexico was greatly enhanced to collect more robust information on the interactions between pelagic longline vessels and spawning bluefin tuna. Resulting observer coverage for this time and area is very high (approaching 55%). Therefore, the high observer coverage during 2008-2012 primarily reflects high coverage rates during the second quarter of each year. During 2011, 1 Risso’s dolphin was observed entangled and released alive in the northern Gulf of Mexico. The animal was not hooked, but was entangled in mainline around its head and a flipper. All gear was removed and the animal immediately swam away and dove. During 2005, a Risso’s dolphin was observed entangled and released alive in the northern Gulf of Mexico. The animal was not hooked, but was entangled with mainline and leader around its flukes. All gear was removed and the animal dove immediately. Both animals were presumed to have not been seriously injured (Fairfield Walsh and Garrison 2006; Garrison and Stokes 2012b). There is a high likelihood that releases of dolphins that have ingested gear or with multi-wrap entanglements of appendages near their insertions will lead to mortality (Wells *et al.* 2008b).

Table 2. Summary of the incidental mortality and serious injury of northern Gulf of Mexico Risso’s dolphins in the pelagic longline commercial fishery including the years sampled (Years), the number of vessels active within the fishery (Vessels), the type of data used (Data Type), the annual observer coverage (Observer Coverage), the observed mortalities and serious injuries recorded by on-board observers, the estimated annual mortality and serious injury, the combined annual estimates of mortality and serious injury (Estimated Combined Mortality), the estimated CV of the combined estimates (Estimated CVs) and the mean of the combined estimates (CV in parentheses).

Fishery	Years	Vessels ^a	Data Type ^b	Observer Coverage ^c	Observed Serious Injury	Observed Mortality	Estimated Serious Injury	Estimated Mortality	Estimated Combined Mortality	Est. CVs	Mean Annual Mortality
Pelagic Longline	08-12	53, 47, 46, 42, 47	Obs. Data Logbook	.26, .22, .28, .18, .11	2,0,0,1,1	1,0,0,0,0	3,9,0,0, 1,5,29.8	4,4,0,0,0, 0	8,3,0,0, 1,5,29.8	.63,NA, NA,1.0, 1.0	7.9 (0.76)

^a Number of vessels in the fishery is based on vessels reporting effort to the pelagic longline logbook.

^b Observer data (Obs. Data) are used to measure bycatch rates, and the data are collected within the Northeast Fisheries Observer Program. Mandatory logbook data were used to measure total effort for the longline fishery. These data are collected at the Southeast Fisheries Science Center (SEFSC). Observer coverage in the GOM is dominated by very high coverage rates during April-June associated with efforts to improve estimates of Bluefin Tuna bycatch.

^c Proportion of sets observed.

Other Mortality

There were 6 reported strandings of Risso’s dolphins in the Gulf of Mexico during 2008-2012 (Table 3; NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 30 September 2013). This includes one mass stranding of 2 animals in Florida during January 2009. No evidence of human interactions was detected for 2 of the stranded animals, and it could not be determined if there was evidence of human interactions for the remaining 4 stranded animals. Stranding data probably underestimate the extent of human-related mortality and serious injury because not all of the marine mammals which die or are seriously injured in human interactions wash ashore, not all that wash ashore are discovered, reported or investigated, nor will all of those that do wash ashore necessarily show signs of entanglement or other human interaction. Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of human interactions.

Since 1990, there have been 13 bottlenose dolphin or cetacean die-offs or Unusual Mortality Events (UMEs) in the northern Gulf of Mexico, and 2 of these included a Risso’s dolphin. Between August 1999 and May 2000, 152 bottlenose dolphins died coincident with *Karenia brevis* blooms and fish kills in the Florida Panhandle. Additional strandings included 3 Atlantic spotted dolphins, *Stenella frontalis*, 1 Risso’s dolphin, 2 Blainville’s beaked whales, *Mesoplodon densirostris*, and 4 unidentified dolphins. An UME was declared for cetaceans in the northern Gulf of Mexico beginning 1 February 2010, and as of 2013, the event is still ongoing. It includes cetaceans that stranded prior to the Deepwater Horizon oil spill (see “Habitat Issues” below), during the spill, and after. During 2010 and 2011, no animals from this stock were considered to be part of the UME, but during 2012, 1 stranded Risso's dolphin was included in the UME.

Table 3. Risso’s dolphin (*Grampus griseus*) strandings along the northern Gulf of Mexico coast, 2008-2012.

STATE	2008	2009	2010	2011	2012	TOTAL
Alabama	0	0	0	0	0	0
Florida	0	2 ^a	0	1	1 ^b	4
Louisiana	0	0	0	0	0	0
Mississippi	0	0	1	0	0	1
Texas	0	1	0	0	0	1
TOTAL	0	3	1	1	1	6

^a Includes Florida mass stranding of 2 animals in January 2009.

^b This stranding is included in the Northern Gulf of Mexico UME.

HABITAT ISSUES

The Deepwater Horizon (DWH) MC252 drilling platform, located approximately 50 miles southeast of the Mississippi River Delta in waters about 1500 m deep, exploded on 20 April 2010. The rig sank, and over 87 days ~4.9 million barrels of oil were discharged from the wellhead until it was capped on 15 July 2010 (McNutt *et al.* 2012). During the response effort dispersants were applied extensively at the seafloor and at the sea surface (Lehr *et al.* 2010; OSAT 2010). In-situ burning, or controlled burning of oil at the surface, was also used extensively as a response tool (Lehr *et al.* 2010). The oil, dispersant and burn residue compounds present ecological concerns. The magnitude of this oil spill was unprecedented in U.S. history, causing impacts to wildlife, natural habitats and human communities along coastal areas from western Louisiana to the Florida Panhandle (NOAA 2011). It could be years before the entire scope of damage is ascertained (NOAA 2011).

Shortly after the oil spill, the Natural Resource Damage Assessment (NRDA) process was initiated under the Oil Pollution Act of 1990. A variety of NRDA research studies are being conducted to determine potential impacts of the spill on marine mammals. These studies have focused on identifying the type, magnitude, severity, length and impact of oil exposure to oceanic, continental shelf, coastal and estuarine marine mammals. The research is ongoing and likely will continue for some time. For continental shelf and oceanic cetaceans, the NOAA-led efforts include: aerial surveys to document the distribution, abundance, species and exposure of marine mammals and turtles relative to oil from DWH spill; and ship surveys to evaluate exposure to oil and other chemicals and to assess changes in animal behavior and distribution relative to oil exposure through visual and acoustic surveys, deployment of passive acoustic monitoring systems, collection of tissue samples, and deployment of satellite-linked tags on sperm and Bryde’s whales.

Aerial surveys have observed Risso's dolphins, spinner dolphins, pantropical spotted dolphins, striped dolphins, bottlenose dolphins and sperm whales swimming in oil in offshore waters. The effects of oil exposure on marine mammals depend on a number of factors including the type and mixture of chemicals involved, the amount, frequency and duration of exposure, the route of exposure (inhaled, ingested, absorbed, or external) and biomedical risk factors of the particular animal (Geraci 1990). In general, direct external contact with petroleum compounds or dispersants with skin may cause skin irritation, chemical burns and infections. Inhalation of volatile petroleum compounds or dispersants may irritate or injure the respiratory tract, which could lead to pneumonia or inflammation. Ingestion of petroleum compounds may cause injury to the gastrointestinal tract, which could affect an animal's ability to digest or absorb food. Absorption of petroleum compounds or dispersants may damage kidney, liver and brain function in addition to causing immune suppression and anemia. Long term chronic effects such as lowered reproductive success and decreased survival may occur (Geraci 1990).

STATUS OF STOCK

Risso's dolphins are not listed under the Endangered Species Act, and the northern Gulf of Mexico stock is not considered strategic under the MMPA. Total fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR and therefore cannot be considered to be insignificant and approaching zero mortality and serious injury rate. The average annual human-related mortality and serious injury does not exceed PBR. The status of Risso's dolphins in the northern Gulf of Mexico, relative to OSP, is unknown. There are insufficient data to determine the population trends for this species.

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