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SHORT-FINNED PILOT WHALE (*Globicephala macrorhynchus*): Northern Gulf of Mexico Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The short-finned pilot whale is distributed worldwide in tropical to temperate waters (Leatherwood and Reeves 1983). Sightings of these animals in the northern Gulf of Mexico (i.e., U.S. Gulf of Mexico) occur primarily on the continental slope west of 89˚W (Figure 1; Mullin and Fulling 2004; Maze-Foley and Mullin 2006). Short-finned pilot whales 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).

Because there are many confirmed records from Gulf of Mexico waters beyond U.S. boundaries (e.g., Jefferson and Schiro 1997, Ortega Ortiz 2002), short-finned pilot whales almost certainly occur throughout the oceanic Gulf of Mexico (Jefferson *et al.* 2008), which is also composed of waters belonging to Mexico and Cuba where there is currently little information on cetacean species abundance and distribution. U.S. waters comprise about 40% of the entire Gulf of Mexico and 35% of the oceanic (i.e., >200 m) Gulf of Mexico.

A May 2011 mass stranding of 23 short-finned pilot whales in the Florida Keys has been considered to be Gulf of Mexico stock whales based on stranding location, yet two tagged and released individuals from this stranding travelled directly into the Atlantic (Wells *et al.* 2013). Studies are currently being conducted at the Southeast Fisheries Science Center to evaluate genetic population structure in short-finned pilot whales. Pending these results, the *Globicephala macrorhynchus* population occupying northern Gulf of Mexico waters is considered separate from both the U.S. western North Atlantic stock and short-finned pilot whales occupying Caribbean waters.

POPULATION SIZE

The best abundance estimate available for northern Gulf of Mexico short-finned pilot whales is 2,415 (CV=0.66; Table 1). This estimate is from a summer 2009 oceanic survey covering waters from the 200m isobath to the seaward 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.

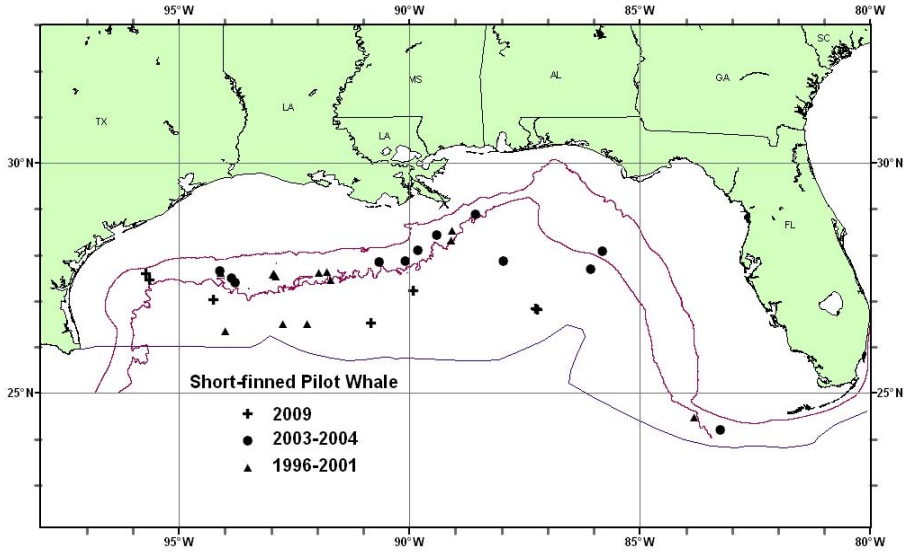

Figure 1. *Distribution of short-finned pilot whale sightings from SEFSC vessel surveys during spring 1996-2001, summer 2003 and spring 2004, and summer 2009. All the on-effort sightings are shown, though not all were used to estimate abundance. Solid lines indicate the 100m and 1,000m isobaths and the offshore extent of the U.S. EEZ.*

Recent survey and abundance estimate

During summer 2009, a 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 short-finned pilot whales in oceanic waters during 2009 was 2,415 (CV=0.66; Table 1).

Table 1. Summary of abundance estimates for northern Gulf of Mexico short-finned pilot whales. Month, year and area covered during each abundance survey, and resulting abundance estimate (N_{best}) and coefficient of variation (CV).

Month/Year	Area	N_{best}	CV
Apr-Jun 1991-1994	Oceanic waters	353	0.89
Apr-Jun 1996-2001 (excluding 1998)	Oceanic waters	2,388	0.48
Jun-Aug 2003, Apr-Jun 2004	Oceanic waters	716	0.34
Jun-Aug 2009	Oceanic waters	2,415	0.66

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 short-finned pilot whales is 2,415 (CV=0.66). The minimum population estimate for the northern Gulf of Mexico is 1,456 short-finned pilot whales.

Current Population Trend

A trend analysis has not been conducted for this stock. Four point estimates of short-finned pilot whale abundance have been made based on data from surveys covering 1991-2009 (Table 1). The estimates vary by a maximum factor of nearly seven. To determine whether changes in abundance have occurred over this period, an analysis of all the survey data needs to be conducted which incorporates covariates (e.g., survey conditions, season) that could potentially affect estimates. It should be noted that since this is a transboundary stock and the abundance estimates are for U.S. waters only, it will be difficult to interpret any detected trends.

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 1,456. The maximum productivity rate is 0.04, the default value for cetaceans. The recovery factor is 0.5 because the stock is of unknown status. PBR for the northern Gulf of Mexico short-finned pilot whale is 15.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

The estimated mean annual fishery-related mortality and serious injury for this stock during 2009–2013 was 0.5 short-finned pilot whales (CV=1.00; Table 2) due to interactions with the pelagic longline fishery.

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 fishery that interacts with this stock in the Gulf of Mexico is the Atlantic Ocean, Caribbean, Gulf of Mexico large pelagic longline fishery (Appendix III). Pelagic swordfish, tunas and billfish are the targets of the longline fishery operating in the northern Gulf of Mexico. The average annual serious injury and mortality in the Gulf of Mexico pelagic longline fishery for the 5-year period from 2009 to 2013 is 0.5 (CV=1.00; Table 2). During 2013, 1 short-finned pilot whale was observed to be seriously injured, and 1 additional short-finned pilot whale was released alive with no presumed serious injuries (both during quarter 2) (Garrison and Stokes 2014). There were no

reports of mortality or serious injury to short-finned pilot whales by this fishery during 1998-2012 (Yeung 1999; Yeung 2001; Garrison 2003; Garrison and Richards 2004; Garrison 2005; Fairfield Walsh and Garrison 2006; Fairfield-Walsh and Garrison 2007; Fairfield and Garrison 2008; Garrison *et al.* 2009; Garrison and Stokes 2010; 2012a,b; 2013). Prior to the 2013 interactions, the most recent interaction documented occurred during 2006 when 1 short-finned pilot whale was observed entangled and released alive with no serious injury (Fairfield-Walsh and Garrison 2007). There was 1 logbook report of a fishery-related injury of a pilot whale in the northern Gulf of Mexico in 1991.

During the second quarters (15 April – 15 June) of 2009–2013, observer coverage in the Gulf of Mexico pelagic longline fishery was greatly enhanced (approaching 55%) to collect more robust information on the interactions between pelagic longline vessels and spawning bluefin tuna. Therefore, the high annual observer coverage rates during 2009–2013 (Table 2) primarily reflect high coverage rates during the second quarter of each year. During the second quarter, this elevated coverage results in an increased probability that relatively rare interactions will be detected. Species within the oceanic Gulf of Mexico are presumed to be resident year-round; however, it is unknown if the bycatch rate observed during the second quarter is representative of that which occurs throughout the year.

Table 2. Summary of the incidental mortality and serious injury of northern Gulf of Mexico short-finned pilot whales 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	09-13	47, 46, 42, 47, 47	Obs. Data Logbook	.22, .28, .18, .11, .25	0, 0, 0, 0, 1	0, 0, 0, 0, 0	0, 0, 0, 0, 2.5	0, 0, 0, 0, 0	0, 0, 0, 0, 2.5	NA, NA, NA, NA, 1.0	0.5 (1.00)

[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 have been 3 reported stranding events of short-finned pilot whales in the Gulf of Mexico during 2009–2013 (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 11 June 2014). During May 2011 there was a mass stranding of 23 short-finned pilot whales in the Florida Keys, including 8 live animals and 15 dead animals. During November 2013 there was 1 stranding of a single short-finned pilot whale in Florida. During December 2013 there was a mass stranding of an estimated 51 short-finned pilot whales, both alive and dead, in the Florida Keys. Twenty-three of the estimated 51 whales were examined or handled by NMFS and included in the stranding database. It could not be determined if there was evidence of human interaction for any of the stranded whales. Stranding data probably underestimate the extent of human and fishery-related mortality and serious injury, particularly for offshore species such as pilot whales, because not all of the whales that die or are seriously injured in human interactions wash ashore, or, if they do, they are not all recovered (Peltier *et al.* 2012; Wells *et al.* 2015). Additionally, not all carcasses will show evidence of human interaction, entanglement or other fishery-related interaction due to decomposition, scavenger damage, etc. (Byrd *et al.* 2014). Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of human interaction.

An Unusual Mortality Event (UME) was declared for cetaceans in the northern Gulf of Mexico beginning 1 February 2010, and as of September 2014, the event is still ongoing (Litz *et al.* 2014). It includes cetaceans that

stranded prior to the *Deepwater Horizon* oil spill (see "Habitat Issues" below), during the spill, and after. One short-finned pilot whale stranding from 2013 in Florida was considered to be part of the 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 up to ~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 (Buist *et al.* 1999; NOAA 2011). 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. For continental shelf and oceanic cetaceans, the NOAA-led efforts include: aerial surveys to document the distribution, abundance, species and exposure relative to oil from the 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 tags on sperm and Bryde's whales.

Vessel and aerial surveys documented bottlenose dolphins, Atlantic spotted dolphins, rough-toothed dolphins, spinner dolphins, pantropical spotted dolphins, Risso's dolphins, striped dolphins, sperm whales, dwarf/pygmy sperm whales and a Cuvier's beaked whale swimming in oil or potentially oil-derived substances (e.g., sheen, mousse) in offshore waters of the northern Gulf of Mexico following the DWH oil spill. 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

Short-finned pilot whales are not listed as threatened or endangered 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 less than 10% of PBR and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate. The status of short-finned pilot whales in the northern Gulf of Mexico, relative to OSP, is unknown. There are insufficient data to determine the population trends for this stock.

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