

COMMON BOTTLENOSE DOLPHIN (*Tursiops truncatus truncatus*) Florida Bay Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The coastal morphotype of common bottlenose dolphins is continuously distributed along the Atlantic coast south of Long Island, New York, to the Florida peninsula, including inshore waters of the bays, sounds and estuaries. Several lines of evidence support a distinction between dolphins inhabiting coastal waters near the shore and those present in the inshore waters of the bays, sounds and estuaries. Photo-identification (photo-ID) and genetic studies support the existence of resident estuarine animals in several inshore areas of the southeastern United States (Caldwell 2001; Gubbins 2002; Zolman 2002; Mazzoil *et al.* 2005; Litz *et al.* 2012), and similar patterns have been observed in bays and estuaries along the Gulf of Mexico coast (Wells *et al.* 1987; Balmer *et al.* 2008). Recent genetic analyses using both mitochondrial DNA and nuclear microsatellite markers found significant differentiation between animals biopsied in coastal and estuarine areas along the Atlantic coast (Rosel *et al.* 2009), and between those biopsied in coastal and estuarine waters at the same latitude (NMFS unpublished data). Similar results have been found off the west coast of Florida (Sellas *et al.* 2005).

Florida Bay is a shallow estuarine system that lies between the mainland of Florida and the Florida Keys and encompasses 2,200 km² of interconnected basins, grassy mud banks and mangrove islands. Florida Bay is bordered by the Florida mainland to the north, by the Florida Keys and Atlantic Ocean to the southeast, and by the Gulf of Mexico to the west. The western boundary of the Everglades National Park is generally considered to be the boundary between Florida Bay and the Gulf of Mexico. Here, Barnes Sound is not considered to be part of Florida Bay (Figure 1). Florida Bay was historically fed by runoff from the Everglades through marsh-like prairies called sloughs and a number of nearby creeks or inlets. The Bay connects through smaller inlets to Biscayne Bay, between Blackwater Sound and Barnes Sound. Freshwater flow from the Everglades is a major influence on the conditions within the Bay, particularly since tides have little effect on water levels due to mud banks that restrict water flow (Fourqurean and Robblee 1999).

Live capture fisheries for bottlenose dolphins are known to have occurred throughout the southeastern U.S. , including Florida Bay. An active bottlenose dolphin live-capture fishery operating between 1962 and 1973 in the Florida Keys permanently removed 70 bottlenose dolphins for display in marine parks. Thirteen of these dolphins were confirmed removals from Florida Bay, and it is likely the remaining animals were from Florida Bay as well, but the absence of specific geographic data in the marine mammal inventory makes it difficult to confirm the remaining removal locations. No dolphins have been removed from Florida Bay or the Florida Keys since 1973 (NMFS Marine Mammal Inventory, July 24, 2004).

During 1995-1997, aerial surveys were conducted in Florida Bay to census bird populations, and opportunistic sightings of bottlenose dolphins were recorded. While these surveys did not estimate the abundance of bottlenose dolphins, the surveys documented the presence of dolphins in Florida Bay throughout the year (McClellan *et al.* 2000). Biopsy sampling was conducted in 1998 and 2002 for contaminant analyses (Fair *et al.* 2003). Sub-samples were later used for genetic analysis which revealed significant genetic differentiation between Florida Bay and Biscayne Bay to the north (Litz *et al.* 2012).

Dolphins in Florida Bay have been the subject of an ongoing photo-ID study by the Dolphin Ecology Project since 1999. From 1999 to 2000, preliminary information was collected focusing on the eastern, Atlantic, and central areas of the Bay, and in 2001 the surveys were expanded to include the western portion of the Bay including the region of transition to the Gulf of Mexico. Typically, photo-ID surveys were conducted during the 2 seasons of most extreme rainfall levels in Florida Bay, summer (the wet season, May-October) and winter (the dry season, November-April), allowing for the assessment of seasonal variation in the distribution of dolphins (Engleby *et al.* 2002). Surveys were conducted by a small vessel using standard photo-ID methods. Through 2007, the photo-ID catalog included 577 unique individuals. Sighting data confirm that dolphins range throughout the Bay and are present year-round (Engleby, unpublished data.)

During the summer (June-August) from 2002 to 2005, a study to investigate top predator (sharks and dolphins) distribution and foraging ecology was conducted in Florida Bay. The sighting histories of 437 unique individual dolphins further confirmed that dolphins are present in all areas of the Bay and demonstrate high individual site and foraging tactic fidelity (Torres 2007).

The Florida Bay resident stock of bottlenose dolphins is considered to occur both within the bounds of Florida Bay and within the Gulf of Mexico-side portion of the Florida Keys National Marine Sanctuary (FKNMS)

southwest to Marathon, Florida (Figure 1). The actual range of the resident animals is unknown, but it likely extends beyond the boundaries of Florida Bay at times. For example, the range of Florida Bay dolphins may extend north into Barnes Sound; however, there have been few surveys of this area. A preliminary comparison of the Biscayne Bay and Florida Bay photo-ID catalogs revealed 13 matched animals with approximately 25% of these matched animals documented only near the Barnes Sound boundary between Florida Bay and Biscayne Bay (NMFS unpublished data; Dolphin Ecology Project unpublished data). This initial comparison suggests there may be some spatial overlap of these two genetically distinct stocks at the stock boundary. It is also likely that transient animals occur within the Florida Bay boundaries, including perhaps offshore morphotype animals that move onshore from nearby oceanic waters. The boundaries for the Florida Bay Stock are subject to change upon further study of dolphin home ranges within the Florida Bay estuarine system.

POPULATION SIZE

Population size estimates for this stock are greater than 8 years old and therefore the current population size for the stock is considered unknown (Wade and Angliss 1997). The first mark-recapture abundance survey of bottlenose dolphins in Florida Bay was conducted during May 2003 using photo-ID methods (Read *et al.*, in review). This survey resulted in a best estimate for abundance of bottlenose dolphins in Florida Bay of 514 (CV=0.17; Read *et al.*, in review). This estimate accounts for the proportion of the population with unmarked fins. The mark-recapture abundance estimate is comparable to a direct count of known individuals from a long-term photo-ID catalog (n=577) and work by Torres (2007), which documented 437 individuals during summer months. Each of these counts or estimates of population size does not effectively distinguish resident from non-resident animals in the Bay and so are likely overestimates of the resident population.

Minimum Population Estimate

Present data are insufficient to calculate a minimum population estimate for the Florida Bay Stock of bottlenose dolphins.

Current Population Trend

There are insufficient data to determine the population trends for this stock.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. 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 life history (Barlow *et al.* 1995).

POTENTIAL BIOLOGICAL REMOVAL

Potential Biological Removal (PBR) is the product of the minimum population size, one-half the maximum productivity rate and a “recovery” factor (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size of the Florida Bay Stock of bottlenose dolphins is unknown. 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 this stock is of unknown status. PBR for the Florida Bay Stock of bottlenose dolphins is undetermined.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

There was 1 documented report of a fishery-related mortality or serious injury to this stock between 2007 and 2011. The report was an at-sea observation of a dolphin seriously injured due to an interaction with the hook and line fishery (Maze-Foley and Garrison in prep.).

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

Most of Florida Bay lies within the boundaries of the Everglades National Park with a smaller portion that lies within the FKNMS. Commercial fishing in the Everglades National Park is prohibited. The majority of recreational fishing is hook and line, although dip nets, cast nets and landing nets are also used. The predominant commercial fishery in the FKNMS is stone crab and spiny lobster. The Florida Bay Stock has the potential to interact with the Category II Florida spiny lobster trap/pot and Southeastern U.S. Atlantic, Gulf of Mexico stone crab trap/pot fisheries and the Category III Atlantic commercial passenger fishing vessel (hook and line) fishery.

Crab and Lobster Pots

There are no documented mortalities or serious injuries of bottlenose dolphins in crab or lobster pot fisheries in Florida Bay between 2007 and 2011. During 2003, 1 bottlenose dolphin was reported entangled in a lobster pot in the southern, FKNMS portion of Florida Bay. The animal was disentangled and released alive, but due to its condition had to be taken shortly thereafter to rehab. It was re-released 2 weeks later. Since there is no systematic observer program, it is not possible to estimate the total number of interactions or mortalities associated with crab and lobster pots.

Hook and Line Fishery

During 2007-2011, there was 1 at-sea observation (in 2011) of a bottlenose dolphin entangled in monofilament line which was cutting off nearly half of its dorsal fin and trailing behind the animal. This animal was considered seriously injured (Maze-Foley and Garrison in prep.).

Other Mortality

From 2007 to 2011, there were 5 stranded bottlenose dolphins within the boundaries of the Florida Bay Stock (NOAA National Marine Mammal Health and Stranding Response Database unpublished data, accessed 13 September 2012). Evidence of human interaction was found for 1 animal in the form of an old propeller scar. For the remaining 4 animals, it could not be determined if there was evidence of human interactions. The majority of stranding reports came from the portion of Florida Bay contained within the FKNMS, likely associated with the higher human population in this area. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals that die or are seriously injured in fishery interactions are discovered, reported or investigated, nor will all of those that are found necessarily show signs of entanglement or other fishery interaction. Finally, the level of technical expertise among stranding network personnel varies widely as does the ability to recognize signs of fishery interactions.

Over the past several decades, large areas of the Everglades ecosystem have been significantly altered by engineered flood control and water distribution for urban and agricultural development. These alterations of freshwater flow into Florida Bay have resulted in increased algal blooms, mangrove and seagrass die-offs, trophic community shifts and changes in salinity. In response, multiple federal, state, county and local agencies are working on a Comprehensive Everglades Restoration Program with the objective of restoring the natural flows of water, water quality and more natural hydro-periods within the ecosystem. As one of the largest ecosystem restoration efforts in the United States, projects are on-going and will likely impact physical and biotic parameters in Florida Bay. While it is unknown how alterations in water flow historically affected bottlenose dolphin abundance and distribution, it is known that bottlenose dolphins are a good indicator species to monitor the future health of this ecosystem due to the overlap between dolphin foraging behavior and abundant fish populations (see Torres and Urban 2005).

There is some concern about the potential effect of contaminants on the health of bottlenose dolphins in Florida Bay, due to their proximity to large agricultural and industrial operations. Contaminants of concern include persistent organic pollutants and heavy metals such as mercury. The agricultural pesticide endosulfan is of particular concern, with the majority (76%) of endosulfan used in the southeast discharging into the Everglades and Florida Bay watershed (Pait *et al.* 1992). A study in 2003 collected remote biopsy samples and provided the first baseline data on levels of exposure to toxic persistent organic contaminants for dolphins in Florida Bay. Pesticides such as endosulfan were found at low or non-detectable concentrations (Fair *et al.* 2003). A review of available organochlorine exposure data from both dart biopsy and live-capture health assessment studies along the southeast U.S. coast indicate that contaminant levels were lowest for dolphins sampled in Florida Bay when compared to all other sites in the southeast U.S. Measured concentrations of total DDTs were lowest for dolphins sampled in Florida Bay. Reported total PCB concentrations were also lowest in Florida Bay and this was the only location in the southeast where samples fell below the toxic threshold value for total PCBs (Schwacke *et al.* 2004). There are no estimates of indirect human-caused mortality from pollution or habitat degradation.

STATUS OF STOCK

Bottlenose dolphins in the western North Atlantic are not listed as threatened or endangered under the Endangered Species Act, and the Florida Bay Stock is not considered strategic under the Marine Mammal Protection Act. There are no documented human-caused mortalities to this stock for 2007 – 2011. There are commercial crab and lobster trap/pot fisheries operating within the boundaries of this stock but the level of fishing effort is low and few animals strand with evidence of fishery interactions. There is insufficient information available to determine whether the total fishery-related mortality and serious injury for this stock is insignificant and approaching a zero mortality and serious injury rate. The status of this stock relative to OSP is unknown. There are insufficient data to determine the population trends for this stock.

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