

**STUDY TITLE:** Distribution and Abundance of Endangered and Vulnerable Mammals, Birds, and Turtles

**REPORT TITLE:** A Review of the Ecology, Behavior, and Life History of the Bottlenose Dolphin

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**KEY WORDS:** South Atlantic; Straits of Florida; Eastern Gulf; Central Gulf; Western Gulf; endangered species; bottlenose dolphin; *Tursiops*; literature review; behavior; life history; range; population; oil spill; industrial sound; impacts

**BACKGROUND:** The bottlenose dolphin, *Tursiops truncatus*, is perhaps the marine mammal species most likely to be affected by oil and gas exploration and production in the Gulf of Mexico. Despite the fact that this species is relatively well known among the Cetacea, serious gaps remain in our understanding of the animal and our ability to predict the effects of oil and gas development.

**OBJECTIVES:** (1) To assess our current level of knowledge concerning *Tursiops truncatus* in order to guide future avenues of research.

**DESCRIPTION:** Existing literature was reviewed to discuss the behavior, social organization, movement patterns, and ecology of bottlenose dolphin. Based on the available data, discussions were presented concerning the potential impacts from oil and gas development. The applicability and usefulness of research techniques was also determined from the available data.

**SIGNIFICANT CONCLUSIONS:** In spite of the availability of a large volume of information on the ecology, behavior, and physiology of the bottlenose dolphin, it is not yet possible to predict the potential impacts of offshore oil and gas development. It is suggested from the data that oil exploration and drilling could have effects ranging from positive to neutral to adverse. This uncertainty is largely due to a lack of baseline data on populations likely to be affected by the oil and gas operations.

**STUDY RESULTS:** There is a need to determine the discreteness of bottlenose dolphin stocks through consideration of behavior, morphology, and biochemical genetic factors. This need is due to the fact that impacts from oil and gas development would be much different on a small, local, discrete population than it would be on a large population over a wide area.

Bottlenose dolphins appear to have quite complex patterns of social organization. Relatively permanent social units that are closely tied to definable home ranges seem to be formed in at least some portions of the species' range. Within populations, social associations and individual movements are based on the age and sex of the individuals. Displacement of dolphins from particular portions of their ranges could affect social structure and population recruitment. Learning within the context of the social unit is also critical.

Group size for dolphins varies according to the physiography of an area and the activity of the group. Group size can change frequently during the course of the day as well as seasonally. Group size increases with water depth or openness of the habitat and is possibly related to foraging techniques and protection from predation.

Potential impacts that should be avoided include disturbance of feeding, reproduction, and other types of behavior; displacement from critical habitat; disruption of food resources; and physical damage such as auditory injury and effects from direct contact with oil.

Some generalizations exist concerning the behavior of bottlenose dolphin. Dolphins appear to be active both day and night. Feeding peaks have been noted in early morning and late afternoon. Time devoted to feeding increases in fall and winter. Feeding strategies are flexible and adapted to habitat and food available. Social behavior is a major component of the daily regime.

Short-term and long-term movements appear to be related to food availability, protection from predators, reproduction, and thermoregulation. The overriding theme in these movements is variability. At least some coastal bottlenose dolphins maintain home ranges which can include individual and herd as well as permanent and seasonal ranges. The social mechanisms which exist between dolphin populations to maintain home range boundaries are not known. Animals could be severely affected if they are forced from an area which is familiar to them and which supplies their needs.

Due to the confused state of *Tursiops* taxonomy, it is difficult to determine normal reproduction and growth patterns. This information is of utmost importance in

assessing the potential impacts of oil and gas development on dolphin populations. Reproduction occurs in spring to early summer in the Gulf of Mexico with a secondary peak in October to November in southern Florida. The number of years of reproductive activity is unknown. Males mature at about 10 years and females at 5 years. Gestation is 11 to 12 months with a single calf born every 2 to 3 years. Both sexes live about 25 years.

If dolphins use particular regions within their ranges for protection from predators, then loss of these areas could be detrimental. In areas where large group size is critical for protection from predation, activities which disrupt group behavior could also decrease survival rates. Additionally, activities which introduce disabilities through water pollution or acoustic activities could also increase susceptibility to predation.

Human-dolphin interactions result from boats, capture, fisheries activities, direct contact, and from habitat alteration.

Existing data suggest that short-term exposure to oil may have minimal effects. Chronic oil ingestion and chronic exposure to noise may pose potentially greater threats. Field observations contradict laboratory findings that dolphins will avoid oil spills.

Dolphins may prove to be a good indicator species for assessing potential impacts on other marine mammals less amenable to study. However, due to the bottlenose dolphin's adaptability and flexibility, they may be less affected by potential disturbance than other more specialized cetaceans. In order to assess impacts from oil and gas development, research projects should be designed to study behavior in areas of established petroleum activities, planned activities, and unaffected areas. Comparisons should be made in each area of respiration rates, times at and below the surface, and time spent in basic behaviors such as traveling, feeding, resting, and socializing. Also needed are observations on shifts in group size, group composition movement patterns, and home range use. The most profitable study technique will involve long-term monitoring of behavior and social patterns using photographic recognition, capture, tagging, and radio tracking.

**STUDY PRODUCT:** Shane, S. H., R. S. Wells, B. Würsig, and D. K. Odell. 1982. A Review of the Ecology, Behavior, and Life History of the Bottlenose Dolphin. A final report by the U.S. Fish and Wildlife Service for the U.S. Department of the Interior, Minerals Management Service Gulf of Mexico OCS Office, Metairie, LA. NTIS No. PB84-117613. MMS-GM-PT-83-011. Contract No. 14-12-0001-29118. 72 pp.

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