

## **KILLER WHALE (*Orcinus orca*): Western North Atlantic Stock**

### **STOCK DEFINITION AND GEOGRAPHIC RANGE**

Killer whales are characterized as uncommon or rare in waters of the U.S. Atlantic Exclusive Economic Zone (EEZ) (Katona *et al.* 1988). The 12 killer whale sightings constituted 0.1% of the 11,156 cetacean sightings in the 1978-81 CETAP surveys (CETAP 1982). The same is true for eastern Canadian waters, where the species has been described as relatively uncommon and numerically few (Mitchell and Reeves 1988). Their distribution, however, extends from the Arctic ice-edge to the West Indies. They are normally found in small groups, although 40 animals were reported from the southern Gulf of Maine in September 1979, and 29 animals in Massachusetts Bay in August 1986 (Katona *et al.* 1988). In the U.S. Atlantic EEZ, while their occurrence is unpredictable, they do occur in fishing areas, perhaps coincident with tuna, in warm seasons (Katona *et al.* 1988; NMFS unpublished data). In an extensive analysis of historical whaling records, Reeves and Mitchell (1988) plotted the distribution of killer whales in offshore and mid-ocean areas. Their results suggest that the offshore areas need to be considered in present-day distribution, movements, and stock relationships.

Stock definition is unknown. Results from other areas (e.g., the Pacific Northwest and Norway) suggest that social structure and territoriality may be important.

### **POPULATION SIZE**

The total number of killer whales off the eastern U.S. coast is unknown.

#### **Minimum Population Estimate**

Present data are insufficient to calculate a minimum population estimate.

#### **Current Population Trend**

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

### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock. The maximum net productivity rate was assumed to be 0.04 for purposes of this assessment. This value is based on theoretical calculations showing that cetacean populations may not generally 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 minimum population size, one-half the maximum productivity rate, and a "recovery" factor (Wade and Angliss 1997). The minimum population size 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. PBR for the western North Atlantic killer whale is unknown because the minimum population size cannot be determined.

### **ANNUAL HUMAN-CAUSED MORTALITY**

In 1994, one killer whale was caught in the New England multispecies sink gillnet fishery but released alive. No takes were documented in a review of Canadian gillnet and trap fisheries (Read 1994).

### **Fishery Information**

Data on current incidental takes in U.S. fisheries are available from several sources. In 1986, NMFS established a mandatory self-reported fishery information system for large pelagic fisheries. Data files are maintained at the Southeast Fisheries Science Center (SEFSC). The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program was initiated in 1989, and since that year several fisheries have been covered by the program. In late 1992 and

in 1993, the SEFSC provided observer coverage of pelagic longline vessels fishing off the Grand Banks (Tail of the Banks) and provides observer coverage of vessels fishing south of Cape Hatteras.

There have been no observed mortalities or serious injuries by NMFS Sea Samplers in the pelagic drift gillnet, pelagic longline, pelagic pair trawl, New England multispecies sink gillnet, mid-Atlantic coastal sink gillnet, and North Atlantic bottom trawl fisheries.

#### **STATUS OF STOCK**

The status of killer whales relative to OSP in U.S. Atlantic EEZ is unknown. Because there are no observed mortalities or serious injury between 1990 and 1995, the total fishery-related mortality and serious injury for this stock is considered insignificant and approaching zero mortality and serious injury rate. The species is not listed as threatened or endangered under the Endangered Species Act. In Canada, the Cetacean Protection Regulations of 1982, promulgated under the standing Fisheries Act, prohibit the catching or harassment of all cetacean species. There are insufficient data to determine the population trends for this species. This is not a strategic stock because, although PBR could not be calculated, there is no evidence of human-induced mortality.

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## **PYGMY KILLER WHALE (*Feresa attenuata*): Western North Atlantic Stock**

### **STOCK DEFINITION AND GEOGRAPHIC RANGE**

The pygmy killer whale is distributed worldwide in tropical and subtropical waters (Ross and Leatherwood 1994). Sightings of these animals in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf (NMFS unpublished data). There is no information on stock differentiation for the Atlantic population.

### **POPULATION SIZE**

A single sighting of this species was made during a 1992 winter, visual sampling, line-transect vessel survey of the U.S. Atlantic Exclusive Economic Zone (EEZ) from Miami, Florida, to Cape Hatteras, North Carolina (Hansen *et al.* 1994). This sighting, of a herd of six animals, was not made during visual sampling effort; therefore, the sighting could not be used to estimate abundance of pygmy killer whales, but it does confirm the presence of this species in the U.S. Atlantic EEZ.

### **Minimum Population Estimate**

The minimum population estimate based on the count of animals in the single sighting, was six pygmy killer whales (Hansen *et al.* 1994).

### **Current Population Trend**

No information was available to evaluate trends in population size.

### **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 life history (Barlow *et al.* 1995).

### **POTENTIAL BIOLOGICAL REMOVAL**

Potential Biological Removal (PBR) is the product of minimum population size, one-half the maximum productivity rate, and a “recovery” factor (Wade and Angliss 1997). The minimum population size is six (6). 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 western North Atlantic pygmy killer whale is 0.1.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of pygmy killer whales in the U.S. Atlantic EEZ is unknown; however, there has historically been some take of this species in small cetacean fisheries in the Caribbean (Caldwell and Caldwell 1971). Available information indicates there likely is little, if any, fisheries interaction with pygmy killer whales in the U.S. Atlantic EEZ. There have been no logbook reports of fishery-related mortality or serious injury and no observed fishery-related mortality or serious injury has been observed.

There have been no documented strandings of pygmy killer whales in the along the U.S. Atlantic coast during 1987-present which have been classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the dolphins which die or are seriously injured in fishery interactions wash ashore, nor will all of those that do wash ashore 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 interaction.

### **Fishery Information**

Data on current incidental takes in U.S. fisheries are available from several sources. In 1986, NMFS established a mandatory self-reported fishery information system for large pelagic fisheries. Data files are maintained at the Southeast Fisheries Science Center (SEFSC). The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program was initiated in 1989, and since that year several fisheries have been covered by the program. In late 1992 and in 1993, the SEFSC provided observer coverage of pelagic longline vessels fishing off the Grand Banks (Tail of the Banks) and provides observer coverage of vessels fishing south of Cape Hatteras.

There have been no observed mortalities or serious injuries by NMFS Sea Samplers in the pelagic drift gillnet, pelagic longline, pelagic pair trawl, New England multispecies sink gillnet, mid-Atlantic coastal sink gillnet, and North Atlantic bottom trawl fisheries.

### **Other Mortality**

This stock may be subjected to human-induced mortality caused by habitat degradation (e.g., industrial and agricultural pollution) and indirect effects of fisheries on prey. There have been, however, no studies to date which have determined the amount, if any, of indirect human-induced mortality resulting from habitat degradation or competition for prey.

### **STATUS OF STOCK**

The status of pygmy killer whales relative to OSP in U.S. Atlantic EEZ is unknown. The species is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine the population trends for this species. The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. The western North Atlantic pygmy killer whale is considered a non-strategic stock.

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## **NORTHERN BOTTLENOSE WHALE (*Hyperoodon ampullatus*): Western North Atlantic Stock**

### **STOCK DEFINITION AND GEOGRAPHIC RANGE**

Northern bottlenose whales are characterized as extremely uncommon or rare in waters of the U.S. Atlantic Exclusive Economic Zone. The two sightings of three individuals constituted less than 0.1% of the 11,156 cetacean sightings in the 1978-82 CETAP surveys. Both sightings were in the spring, along the 2,000 m isobath (CETAP 1982). In 1993 and 1996, two sightings of single animals, and in 1996, a single sighting of six animals (one juvenile), were made during summer shipboard surveys conducted along the southern edge of Georges Bank (Anon. 1993; Anon. 1996).

Northern bottlenose whales are distributed in the North Atlantic from Nova Scotia to about 70° in the Davis Strait, along the east coast of Greenland to 77° and from England to the west coast of Spitzbergen. It is largely a deep-water species and is very seldom found in waters less than 2,000 m deep (Mead 1989).

There are two main centers of bottlenose whale distribution in the western north Atlantic, one in the area called "The Gully" just north of Sable Island, Nova Scotia, and the other in Davis Strait off northern Labrador (Reeves *et al.* 1993). Studies at the entrance to the Gully from 1988-1995 identified 237 individuals and estimated the local population size at about 230 animals (95% C.I. 160-360) (Whitehead *et al.* 1997). These individuals are believed to be year-round residents and all age and sex classes are present (Gowans and Whitehead 1998). Mitchell and Kozicki (1975) documented stranding records in the Bay of Fundy and as far south as Rhode Island. Stock definition is unknown.

### **POPULATION SIZE**

The total number of northern bottlenose whales off the eastern U.S. coast is unknown.

#### **Minimum Population Estimate**

Present data are insufficient to calculate a minimum population estimate.

#### **Current Population Trend**

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

### **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 life history (Barlow *et al.* 1995).

### **POTENTIAL BIOLOGICAL REMOVAL**

Potential Biological Removal (PBR) is the product of 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 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 western North Atlantic northern bottlenose whale is unknown because the minimum population size cannot be determined.

### **ANNUAL HUMAN-CAUSED MORTALITY**

No mortalities have been reported in U.S. waters. A fishery for northern bottlenose whales existed in Canadian waters during both the 1800s and 1900s. Its development was due to the discovery that bottlenose whales contained spermaceti. A Norwegian fishery expanded from east to west (Labrador and Newfoundland) in several episodes. The fishery peaked in 1965. Decreasing catches led to the cessation of the fishery in the 1970s, and provided evidence that the population was depleted. A small fishery operated by Canadian whalers from Nova Scotia operated in the Gully, and took 87 animals from 1962 to 1967 (Mead 1989; Mitchell 1977).

#### **Fishery Information**

Data on current incidental takes in U.S. fisheries are available from several sources. In 1986, NMFS established a mandatory self-reported fishery information system for large pelagic fisheries. Data files are maintained at the Southeast Fisheries Science Center (SEFSC). The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program was initiated in 1989, and since that year several fisheries have been covered by the program. In late 1992 and in 1993, the SEFSC provided observer coverage of pelagic longline vessels fishing off the Grand Banks (Tail of the Banks) and provides observer coverage of vessels fishing south of Cape Hatteras.

There have been no observed mortalities or serious injuries by NMFS Sea Samplers in the pelagic drift gillnet, pelagic longline, pelagic pair trawl, New England multispecies sink gillnet, mid-Atlantic coastal sink gillnet, and North Atlantic bottom trawl fisheries.

## STATUS OF STOCK

The status of northern bottlenose whales relative to OSP in U.S. Atlantic EEZ is unknown; however, a depletion in Canadian waters in the 1970's may have impacted U.S. distribution and may be relevant to current status in U.S. waters. The species is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine the population trends for this species. Because there are no observed mortalities or serious injury, the total fishery-related mortality and serious injury for this stock is considered to be approaching zero mortality and serious injury rate. This is not a strategic stock because there are no recent records of fishery-related mortality or serious injury.

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## WHITE-BEAKED DOLPHIN (*Lagenorhynchus albirostris*): Western North Atlantic Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

White-beaked dolphins are the more northerly of the two species of *Lagenorhynchus* in the Northwest Atlantic (Leatherwood *et al.* 1976). The species is found in waters from southern New England, north to western and southern Greenland and Davis Straits (Leatherwood *et al.* 1976; CETAP 1982), in the Barents Sea and south to at least Portugal (Reeves *et al.*, in press). Differences in skull features indicate that there are at least two separate stocks, one in the eastern and one in the western North Atlantic (Mikkelsen and Lund 1994). No genetic analyzes have been conducted to distinguish the stock structure.

In waters off the northeastern U.S. coast, white-beaked dolphin sightings have been concentrated in the western Gulf of Maine and around Cape Cod (CETAP 1982). The limited distribution of this species in U.S. waters has been attributed to opportunistic feeding (CETAP 1982). Prior to the 1970's, white-sided dolphins (*L. acutus*) in U.S. waters were found primarily offshore on the continental slope, while white-beaked dolphins were found on the continental shelf. During the 1970's, there was an apparent switch in habitat use between these two species. This shift may have been a result of the increase in sand lance in the continental shelf waters (Katona *et al.* 1993; Kenny *et al.* 1996).

### POPULATION SIZE

The total number of white-beaked dolphins in U.S. and Canadian waters is unknown, although one abundance estimate is available for part of the known habitat in U.S. waters, and two estimates are from Canadian waters (Table 1).

A population size of 573 white-beaked dolphins (CV=0.69) was estimated from an aerial survey program conducted from 1978 to 1982 on the continental shelf and shelf edge waters between Cape Hatteras, North Carolina and Nova Scotia (Table 1; CETAP 1982). The estimate is based on spring data because the greatest proportion of the population off the northeast U.S. coast appeared in the study area during this season. This estimate does not include a correction for dive-time or  $g(0)$ , the probability of detecting an animal group on the track line. This estimate may not reflect the current true population size because of its high degree of uncertainty (e.g., large CV), its old age, and it was estimated just after cessation of extensive foreign fishing operations in the region.

A population size of 5,500 white-beaked dolphins was based on an aerial survey off eastern Newfoundland and southeastern Labrador (Table 1; Alling and Whitehead 1987).

A population size of 3,486 white-beaked dolphins [95% confidence interval (CI) = 2,001-4,971] was estimated from a ship-based survey of a small segment of the Labrador Shelf in August 1982 (Table 1; Alling and Whitehead 1987). A CV was not given, but, assuming a symmetric CI, it would be 0.22.

There are no abundance estimates for this species in waters between the Gulf of Maine and the Newfoundland/Labrador region.

Table 1. Summary of abundance estimates for western North Atlantic white-beaked dolphins. Month, year, and area covered during each abundance survey, and resulting abundance estimate ( $N_{best}$ ) and coefficient of variation (CV). Unk=unknown.

Month/Year	Area	$N_{best}$	CV
spring 1978-82	Cape Hatteras, NC to Nova Scotia	573	0.69
1980's	E. Newfoundland and SE Labrador	5,500	None reported
August 1982	Labrador shelf	3,486	0.22

### Minimum Population Estimate

Present data are insufficient to calculate a minimum population estimate in U.S. Exclusive Economic Zone (EEZ) waters.

#### **Current Population Trend**

There are insufficient data to determine population trends for this species.

#### **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 life history (Barlow *et al.* 1995).

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential Biological Removal (PBR) is the product of minimum population size, one-half the maximum productivity rate, and a “recovery” factor (Wade and Angliss 1997). The minimum population size of white-beaked 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 western North Atlantic white-beaked dolphin is unknown.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

White-beaked dolphins have been taken in cod traps and the Canadian groundfish gillnet fisheries off Newfoundland and Labrador and in the Gulf of St. Lawrence (Alling and Whitehead 1987; Read 1994; Hai *et al.* 1996); however, the total number of animals taken is not known.

There are no documented reports of fishery-related mortality or serious injury to this stock in the U.S. EEZ.

#### **Fishery Information**

Because of the absence of observed fishery-related mortality and serious injury to this stock in the U.S. EEZ, no U.S. fishery information is provided.

The Canadian Atlantic groundfish gillnet fishery is important and widespread. Many fisherman hold groundfish gillnet licenses but the number of active fishermen is unknown. In 1989, approximately 6,800 licenses were issued to fishermen along the southern coast of Labrador, and northeast and southern coast of Newfoundland. About 3,900 licenses were issued in 1989 in the Gulf of St. Lawrence and 659 licenses were issued in the Bay of Fundy and southwestern Nova Scotia.

#### **Other Mortality**

White-beaked dolphins were hunted for food by residents in Newfoundland and Labrador (Alling and Whitehead 1987). These authors, based on interview data, estimated that 366 white-beaked dolphins were taken each year. The same authors reported that 25-50% of the killed dolphins were lost.

#### **STATUS OF STOCK**

The status of white-beaked dolphins, relative to OSP, in U.S. Atlantic coast waters is unknown. They are not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine population trends for this species. Because there are insufficient data to calculate PBR it is not possible to determine if stock is strategic and if the total fishery-related mortality and serious injury for this stock is significant and approaching zero mortality and serious injury rate. However, because this stock has a marginal occurrence in U.S. waters and there are no documented takes in U.S. waters, this stock has been designated as not strategic.



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## **SPINNER DOLPHIN (*Stenella longirostris*): Western North Atlantic Stock**

### **STOCK DEFINITION AND GEOGRAPHIC RANGE**

Spinner dolphins are distributed in oceanic and coastal tropical waters (Leatherwood *et al.* 1976). This is presumably an offshore, deep-water species (Schmidly 1981; Perrin and Gilpatrick 1994), and its distribution in the Atlantic is very poorly known. In the western North Atlantic, these dolphins occur in deep water along most of the U.S. coast south to the West Indies and Venezuela, including the Gulf of Mexico. Spinner dolphin sightings have occurred exclusively in deeper (>2,000 m) oceanic waters (CETAP 1982; Waring *et al.* 1992) off the northeast U.S. coast. Stranding records exist from North Carolina, South Carolina, and Florida in the Atlantic and in Texas and Florida in the Gulf of Mexico. The North Carolina strandings represent the northernmost documented distribution of this species in the Atlantic. Stock structure in the western North Atlantic is unknown.

### **POPULATION SIZE**

The number of spinner dolphins inhabiting the U.S. Atlantic Exclusive Economic Zone (EEZ) is unknown and seasonal abundance estimates are not available for this species since it was rarely seen in any of the surveys.

#### **Minimum Population Estimate**

Present data are insufficient to calculate a minimum population estimate.

#### **Current Population Trend**

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

### **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 life history (Barlow *et al.* 1995).

### **POTENTIAL BIOLOGICAL REMOVAL**

Potential Biological Removal (PBR) is the product of 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 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 western North Atlantic spinner dolphin is unknown because the minimum population size is unknown.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

Total average annual estimated average fishery-related mortality and serious injury to this stock in the Atlantic during 1992-1996 was 0.38 spinner dolphin (CV = 0.35).

#### **Fishery Information**

There was no documentation of spinner dolphin mortality or serious injury in distant-water fleet (DWF) activities off the northeast U.S. coast (Waring *et al.* 1990). No takes were documented in a review of Canadian gillnet and trap fisheries (Read 1994).

Data on current incidental takes in U.S. fisheries are available from several sources. In 1986, NMFS established a mandatory self-reported Fishery information system for large pelagic fisheries. Data files are maintained at the Southeast Fisheries Science Center (SEFSC). The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program was initiated in 1989 and since that year several fisheries have been covered by the program. In late 1992 and in 1993, the SEFSC provided observer coverage of pelagic longline vessels fishing off the Grand Banks (Tail of the Banks) and provides observer coverage of vessels fishing south of Cape Hatteras.

By-catch has been observed by NMFS Sea Samplers in the pelagic drift gillnet fishery, but no mortalities or serious injuries have been documented in the pelagic longline, pelagic pair trawl, Northeast multispecies sink gillnet, mid-Atlantic coastal gillnet, and North Atlantic bottom trawl fisheries.

The estimated total number of hauls in the pelagic drift gillnet fishery increased from 714 in 1989 to 1,144 in 1990; thereafter, with the introduction of quotas, effort was severely reduced. The estimated number of hauls in 1991, 1992, 1993, 1994, 1995, and 1996 were 233, 243, 232, 197, 164, and 149 respectively. Fifty-nine different vessels participated in this fishery at one time or another between 1989 and 1993. Since 1994, between 10-12 vessels have participated in the fishery (Table 2). Observer coverage, expressed as percent of sets observed, was 8% in 1989, 6% in 1990, 20% in 1991, 40% in 1992, 42% in 1993, 87% in 1994, 99% in 1995, and 64% in 1996. Effort was concentrated along the southern edge of Georges Bank and off Cape Hatteras. Examination of the species composition of the catch and locations of the fishery throughout the year, suggested that the pelagic drift gillnet fishery be stratified into two strata, a southern or winter stratum, and a northern or summer stratum. Estimates of the total by-catch, from 1989 to 1993, were obtained using the aggregated (pooled 1989-1993) catch rates, by strata (Northridge 1996). Estimates of total annual by-catch for 1994 and 1995 were estimated from the sum of the observed caught and the product of the average bycatch per haul and the number of unobserved hauls as recorded in self-reported Fishery information. Variances were estimated using bootstrap re-sampling techniques. One spinner dolphin mortality was observed between 1989 and 1993 and occurred east of Cape Hatteras in March 1993. Estimated annual fishery-related mortality and serious injury attributable to this fishery (CV in parentheses) was 0.7 in 1989 (1.00), 1.7 in 1990 (1.00), 0.7 in 1991 (1.00), 1.4 in 1992 (0.31), 0.5 in 1993 (1.00), and zero from 1994-1996. Total average annual estimated average fishery-related mortality and serious injury to this stock in the Atlantic during 1992-1996 was 0.38 spinner dolphin (CV = 0.35) (Table 1). The 1992-1996 period provides a better characterization of this fishery (i.e., fewer vessels and increased observer coverage).

Table 1. Summary of the incidental mortality of spinner dolphins (*Stenella longirostris*) by 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 mortalities recorded by on-board observers (Observed Mortality), the estimated annual mortality (Estimated Mortality), the estimated CV of the annual mortality (Estimated CVs) and the mean annual mortality (CV in parentheses).

Fishery	Years	Vessels <sup>1</sup>	Data Type <sup>2</sup>	Observer Coverage <sup>3</sup>	Observed Mortality	Estimated Mortality <sup>4</sup>	Estimated CVs <sup>4</sup>	Mean Annual Mortality
Pelagic Drift Gillnet	92-96	1994=12 1995=11 1996=10	Obs. Data Logbook	.40, .42, .87, .99, .64	1, 0, 0, 0, 0	1.4, 0.5, 0, 0 <sup>5</sup> , 0	.31, 1.0, 0, 0, 0	0.31 (.35)
TOTAL								0.31 (.35)

<sup>1</sup> 1994 and 1995 - 1996 shown, other years not available on an annual basis.

<sup>2</sup> Observer data (Obs. Data) are used to measure bycatch rates, and the data are collected within the Northeast Fisheries Science Center (NEFSC) Sea Sampling Program. Mandatory logbook (Logbook) data are used to measure total effort, and the data are collected at the Southeast Fisheries Science Center (SEFSC).

<sup>3</sup> The observer coverage and unit of effort for the Pelagic Drift Gillnet is a set.

<sup>4</sup> For 1991-1993, pooled bycatch rates were used to estimate bycatch in months that had fishing effort but did not have observer coverage. This method is described in Northridge (1996). In 1994 and 1995, observer coverage increased substantially, and bycatch rates were not pooled for this period.

<sup>5</sup> One vessel was not observed and recorded 1 set in a 10 day trip in the SEFSC mandatory logbook. If you assume the vessel fished 1.4 sets per day as estimated from the 1995 SS data, the point estimate may increase by 0.8 animals. However, the SEFSC mandatory logbook data was taken at face value, and therefore it was assumed that 1 set was fished within this trip, and the point estimate would then increase by 0.1 animals.

## STATUS OF STOCK

The status of spinner dolphins relative to OSP in the U.S. Atlantic EEZ is unknown. The species is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine the population trends for this species. PBR cannot be calculated for this stock, but no fishery-related mortality and serious injury has been observed since 1992; therefore, total fishery-related mortality and serious injury can be considered insignificant and approaching zero mortality and serious injury rate. Population size and PBR cannot be estimated, but fishery-related mortality is very low; therefore, this stock is not a strategic stock.

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## HOODED SEAL (*Cystophora cristata*): Western North Atlantic Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

The hooded seal occurs throughout much of the North Atlantic and Arctic Oceans (King 1983) preferring deeper water and occurring farther offshore than harp seals (Lavigne and Kovacs 1988; Stenson *et al.* 1996). Hooded seals tend to wander far out of their range and have been seen as far south as Puerto Rico, with increased occurrences from Maine to Florida. These appearances usually occur between January and May. Although it is not known which stock these seals come from, it is known that during this time frame, the Northwest Atlantic stock of hooded seals are at their southern most point of migration in the Gulf of St. Lawrence. The world's hooded seal population is divided into three separate stocks, each identified with a specific breeding site (Lavigne and Kovacs 1988). In the northwest Atlantic, whelping occurs in the Davis Strait, off Newfoundland and in Gulf of St. Lawrence (Stenson *et al.* 1996). One stock, which whelps off the coast of eastern Canada, is divided into two breeding herds (Front and Gulf) which breed on the pack ice. The Front herd (largest) breeds off the coast of Newfoundland and Labrador and the Gulf herd breeds in the Gulf of St. Lawrence. The second stock breeds in the Davis Strait, and the third stock occurs on the West Ice off eastern Greenland.

Hooded seals are a highly migratory species. Hooded seals remain on the Newfoundland continental shelf during winter/spring (Stenson *et al.* 1996). Breeding occurs at about the same time in March for each stock. Adults from all stocks then assemble in the Denmark Strait to molt between late June and August (King 1983; Anon 1995), and following this, the seals disperse widely. Some move south and west around the southern tip of Greenland, and then north along the west coast of Greenland. Others move to the east and north between Greenland and Svalbard during late summer and early fall (Lavigne and Kovacs 1988). Little else is known about the activities of hooded seals during the rest of the year until they assemble again in February for breeding.

Hooded seals are rarely found in the U.S. Atlantic Exclusive Economic Zone. Small numbers of hooded seals at the extreme southern limit of their range occur in the winter and spring seasons. The influx of harp seals and geographic distribution in New England to mid-Atlantic waters is based on stranding data.

### POPULATION SIZE

The number of hooded seals in the western North Atlantic is unknown. Seasonal abundance estimates are available based on a variety of analytical methods based on commercial catch data, and including aerial surveys. These methods often include surveying the whelping concentrations and modeling the pup production. Several estimates of pup production at the Front are available. Hooded seal pup production between 1966 and 1977 was estimated between 25,000 - 32,000 annually (Benjaminsen and Oritsland 1975; Sergeant 1976; Lett 1977; Winters and Bergflodt 1978; Stenson *et al.* 1996). Estimated pup production dropped to 26,000 hooded seal pups in 1978 (Winters and Bergflodt 1978). Pup production estimates began to increase after 1978, reaching 62,000 (95% CI. 43,700 - 89,400) by 1984 (Bowen *et al.* 1987). Bowen *et al.* (1987) also estimated pup production in the Davis Strait at 18,600 (95% C.I. 14,000 - 23,000). A 1985 survey at the Front (Hay *et al.* 1985) produced an estimate of 61,400 (95% C.I. 16,500 - 119,450). Hammill *et al.* (1992) estimated pup production to be 82,000 (SE=12,636) in 1990. No recent population estimate is available, but assuming a ratio of pups to total population of 1:5, pup production in the Gulf and Front herds would represent a total population of approximately 400,000-450,000 hooded seals (Stenson 1993). Based on the 1990 survey, Stenson *et al.* (1996) suggests that pup production may have increased at about 5% per year since 1984. However, because of exchange between the Front and the Davis Strait stocks, the possibility of a stable or slightly declining level of pup production are also likely (Stenson 1993; Stenson *et al.* 1996). It appears that the number of hooded seals is increasing.

Table 1. Summary of pup production estimates for western North Atlantic hooded seals. Year and area covered during each abundance survey, and resulting abundance estimate ( $N_{min}$ ) and coefficient of variation (CV).

Month/Year	Area	$N_{min}$	CV
1978	Front herd: Newfoundland/ Labrador	26,000	None reported
1984	Front herd: Newfoundland/Labrador	62,000	None reported
1984	Davis Strait	18,600	None reported
1985	Front herd: Newfoundland/Labrador	61,400	None reported
1990	Front herd: Newfound/Labrador	82,100	None reported

#### Minimum population estimate

Present data are insufficient to calculate the minimum population estimate for U.S. waters. It is estimated that there are approximately 400,000 hooded seals (5:1 ratio of adults to pups) in Canadian waters (Stenson *et al.* 1993).

#### Current population trend

The population appears to be increasing in U.S. Atlantic EEZ, judging from stranding records, although the actual magnitude of this increase is unknown. The Canadian population appears to be increasing but, because different methods have been used over time to estimate population size, the magnitude of this increase has not been quantified.

#### CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. The most appropriate data are based on Canadian studies. Pup production in Canada may be increasing slowly (5% per annum), but due to the wide confidence intervals and lack of understanding regarding stock dynamics, it is possible that pup production is stable or declining (Stenson 1993).

For purposes of this assessment, the maximum net productivity rate was assumed to be 0.12. This value is based on theoretical modeling showing that pinniped populations may not grow at rates much greater than 12% given the constraints of their reproductive life history (Barlow *et al.* 1995).

#### POTENTIAL BIOLOGICAL REMOVAL

Potential Biological Removal (PBR) is the product of 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 is unknown. The maximum productivity rate is 0.12, the default value for pinnipeds. The recover factor ( $F_R$ ) for this stock is 1.0, the value for stocks with unknown population status, but know to be increasing. PBR for the western North Atlantic hooded seal in U.S. waters is unknown. Applying the formula to abundance estimates (400,000) in Canadian waters results in a PBR= 24,000 hooded seals.

#### ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

In Atlantic Canada, hooded seals have been commercially hunted at the Front since the late 1800's. In 1974 total allowable catch (TAC) was set at 15,000, and reduced to 12,000 in 1983 and to 2,340 in 1984 (Stenson 1993; Anon 1998). From 1991- 1992 the TAC was increased to 15,000. A TAC of 8,000 was set for 1993, and held at that level through 1997. From 1974 through 1982, the average catch was 12,800 animals, mainly pups. Since 1983 catches ranged from 33 in 1986 to 6,425 in 1991, with a mean catch of 1,001 between 1983 and 1995. In 1996 catches (25,754) were more than three times the allowable quota (Anon 1998). The high catch was attributable to good ice conditions and strong market demand. Catches in 1997 were 7,058, slightly below the TAC.

Hunting in the Gulf of St. Lawrence (below 50°N) has been prohibited since 1964. No commercial hunting of hooded seals is permitted in the Davis Strait.

Total annual estimated average fishery-related mortality or serious injury to this stock in U.S. waters during 1992-1996 was 5.6 hooded seals (CV = 0.96; Table 2).

#### Fishery Information

##### USA

Data on current incidental takes in U.S. fisheries are available from several sources. In 1986, NMFS established a mandatory self-reported fishery information system for large pelagic fisheries. Data files are maintained at the Southeast Fisheries Science Center (SEFSC). The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program was initiated in 1989, and since that year several fisheries have been covered by the program. In late 1992 and in 1993, the SEFSC provided observer coverage of pelagic longline vessels fishing off the Grand Banks (Tail of the Banks) and provides observer coverage of vessels fishing south of Cape Hatteras.

Recent by-catch has been observed by NMFS Sea Samplers in the New England multispecies sink gillnet fisheries, but no mortalities have been documented in the Mid-Atlantic coastal gillnet, Atlantic drift gillnet, pelagic pair trawl or pelagic longline fisheries.

In 1993, there were approximately 349 full and part-time vessels in the New England multispecies sink gillnet fishery, which covered the Gulf of Maine and southern New England (Table 2). An additional 187 vessels were reported to occasionally fish in the Gulf of Maine with gillnets for bait or personal use; however, these vessels were not covered by the observer program (Walden 1996) and their fishing effort was not used in estimating mortality. Observer coverage in terms of trips has been 1%, 6%, 7%, 5%, 7%, 5%, and 4% for 1990 to 1996, respectively. The fishery has been observed in the Gulf of Maine and in Southern New England. There was one hooded seal mortality observed in the New England multispecies sink gillnet fishery between 1990 and 1996. Annual estimates of hooded seal by-catch in the New England multispecies sink gillnet fishery reflect seasonal distribution of the species and of fishing effort. Estimated annual mortalities (CV in parentheses) from this fishery during 1990-1996 was zero (1990-1994), and 28 in 1995 (0.96), and zero in 1996. The 1995 by-catch includes five animals from the estimated number of unknown seals (based on observed mortalities of seals that could not be identified to species). The unknown seals were prorated, based on spatial/temporal patterns of by-catch of harbor seals, gray seals, harp seals, and hooded seals. Average annual estimated fishery-related mortality and serious injury to this stock attributable to this fishery during 1992-1996 was 5.6 hooded seals (CV = 0.96). The stratification design used is the same as that for harbor porpoise (Bravington and Bisack 1996). The by-catch occurred only in winter (January-May) and was in waters between Cape Ann and New Hampshire.

## **CANADA**

An unknown number of hooded seals have been taken in Newfoundland and Labrador groundfish gillnets (Read 1994).

There were 3,121 cod traps operating in Newfoundland and Labrador during 1979, and about 7,500 in 1980 (Read 1994). This fishery was closed at the end of 1993 due to collapse of Canadian groundfish resources.

Hooded seals are being taken in Canadian lumpfish and groundfish gillnets and trawls; however, estimates of total removals have not been calculated to date.

Table 2. Summary of the incidental mortality of hooded seal (*Cystophora cristata*) by 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 mortalities recorded by on-board observers (Observed Mortality), the estimated annual mortality (Estimated Mortality), the estimated CV of the annual mortality (Estimated CVs) and the mean annual mortality (CV in parentheses).

Fishery	Years	Vessels	Data Type <sup>1</sup>	Observer Coverage <sup>2</sup>	Observed Mortality	Estimated Mortality	Estimated CVs	Mean Annual Mortality
New England Multispecies Sink Gillnet	92-96	349	Obs. Data Weighout, Logbooks	.07, .05, .07, .05, .04	0, 0, 0, 1, 0	0, 0, 0, 28, 0	0, 0, 0, .96, 0	5.6 (.96)
<b>TOTAL</b>								<b>5.6 (.96)</b>

<sup>1</sup> Observer data (Obs. Data) are used to measure by-catch rates, and the data are collected within the Northeast Fisheries Science Center (NEFSC) Sea Sampling Program. NEFSC collects Weighout (Weighout) landings data, and total landings are used as a measure of total effort for the sink gillnet fishery. Mandatory logbook (Logbook) data are used to determine the spatial distribution of some fishing effort in the New England multispecies sink gillnet fishery.

<sup>2</sup> The observer coverage for the New England multispecies sink gillnet fishery is measured in trips.

### Other Mortality

In 1988-93, strandings were less than 20 per year, and from 1994-1996 they increased to about 50 per annum (Rubinstein 1994; Rubinstein, pers. comm). Carcasses were recovered from Massachusetts, Connecticut, and New York (Rubinstein 1994), North Carolina and U.S. Virgin Islands (NMFS, unpubl. data). The increased number of strandings may indicate a possible shift in distribution or range expansion southward into U.S. waters; if so, fishery interactions may increase.

### STATUS OF STOCK

The status of hooded seals relative to OSP in U.S. Atlantic EEZ is unknown, but the population appears to be increasing in Canada. They are not listed as threatened or endangered under the Endangered Species Act. The total fishery-related mortality and serious injury for this stock is believed to be very low relative to the population size in Canadian waters and can be considered insignificant and approaching zero mortality and serious injury rate. This is not a strategic stock because the level of human-caused mortality and serious injury is believed to be very low relative to overall stock size.

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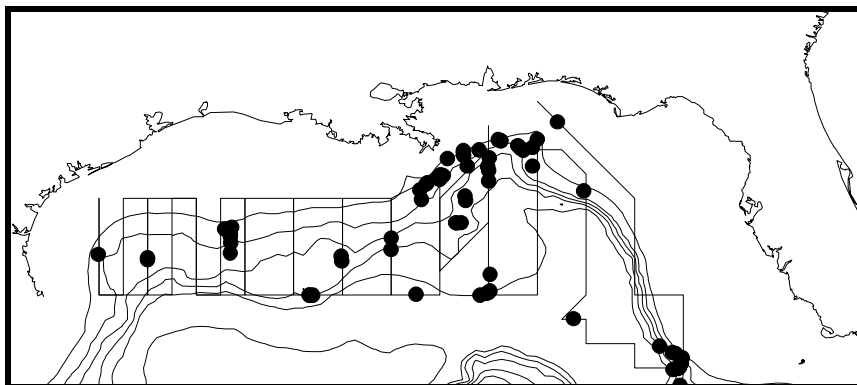
## SPERM WHALE (*Physeter macrocephalus*): Northern Gulf of Mexico Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

Sperm whales are found throughout the world's oceans in deep waters from between about 60° N and 60° S latitudes (Leatherwood and Reeves 1983; Rice 1989). There has been speculation, based on year round occurrence of strandings, opportunistic sightings, and whaling catches, that sperm whales in the Gulf of Mexico may constitute a distinct stock (Schmidly 1981), but there is no information on stock differentiation. Seasonal aerial surveys confirm that sperm whales are present in the northern Gulf of Mexico in all seasons, but sightings are more common during the summer months (Mullin et al. 1991; Davis et al., in preparation).

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of sperm whales by survey year [coefficient of variation (CV) in parentheses] was 143 in 1991 (0.58), 931 in 1992 (0.48), 229 in 1993 (0.52), and 771 in 1994 (0.42) (Hansen et al. 1995). Survey effort-weighted estimated average abundance of sperm whales for all surveys combined was 530 (CV = 0.31) (Hansen et al. 1995).



**Figure 1.** Distribution of sperm whale sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two ship surveys and are examples of typical ship survey transects. Isobaths are in 183 m (100 fm) intervals.

### 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, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate was calculated from the 1991-1994 average abundance estimate of 530 sperm whales (CV = 0.31) (Hansen et al. 1995) and is 411 sperm whales.

### Current Population Trend

No trend was discernable in the average annual abundance estimates. All of the log-normal 95% confidence intervals of the annual estimates overlap, indicating that the estimates were not significantly different at that level. The variation in abundance estimates may represent inter-annual variation in distribution, rather than a change in abundance.

## **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

## **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was 0.10 because sperm whales are an endangered species. The resulting PBR for this stock is 0.8 sperm whales.

## **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

A commercial fishery for sperm whales operated in the Gulf of Mexico during the late 1700's to the early 1900's, but the exact number of whales taken is not known (Townsend 1935).

The level of current, direct, human-caused mortality and serious injury of sperm whales in the northern Gulf of Mexico is unknown, but available information indicates there likely is little, if any, fisheries interaction with sperm whales in the northern Gulf of Mexico.

There were no documented strandings of sperm whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

## **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury to sperm whales by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

## **Other Mortality**

A total of nine sperm whale strandings were documented in the northern Gulf of Mexico during 1987-1994. One of the whales had deep, parallel cuts posterior to the dorsal ridge that were believed to be caused by the propeller of a large vessel. This trauma was assumed to be the proximate cause of this stranding.

Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

## **STATUS OF STOCK**

Stock size is considered to be low relative to OSP and the species is therefore listed as endangered under the Endangered Species Act (ESA). There are insufficient data to determine population trends. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant; however, because this species is listed as endangered and there is presently no recovery plan in place, any fishery-related mortality would be unlawful. This is a strategic stock because the sperm whale is listed as an endangered species under the ESA.

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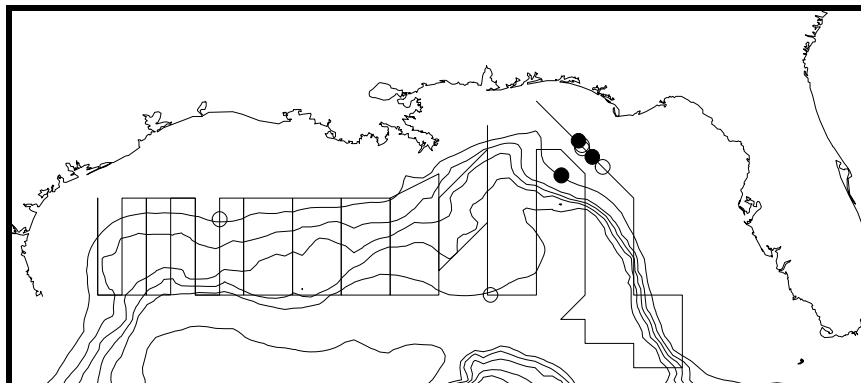
## **BRYDE'S WHALE (*Balaenoptera edeni*): Northern Gulf of Mexico Stock**

### **STOCK DEFINITION AND GEOGRAPHIC RANGE**

Bryde's whales are considered the tropical and sub-tropical baleen whale of the world's oceans. In the western Atlantic, Bryde's whales are reported from off the southeastern United States and the southern West Indies to Cabo Frio, Brazil (Leatherwood and Reeves 1983). It is postulated that the Bryde's whales found in the Gulf of Mexico may represent a resident stock (Schmidly 1981; Leatherwood and Reeves 1983), but there is no information on stock differentiation. Most sightings of Bryde's whales have occurred during the spring-summer months (Hansen et al. 1995; Davis et al., in preparation), but strandings have occurred throughout the year (Jefferson et al. 1992).

### **POPULATION SIZE**

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. The estimated abundance of Bryde's whales by survey year was 218 in 1991 (coefficient of variation, CV = 1.01) and zero in 1992, 1993, and 1994 (Hansen et al. 1995). Survey effort-weighted estimated average abundance of Bryde's whales for all surveys combined was 35 (CV = 1.10) (Hansen et al. 1995) and was based on only three sightings, all of which occurred in 1991.



**Figure 1.** Distribution of Bryde's whale sightings (filled circles) and unidentified balaenopterid whales (unfilled circles) during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two ship surveys and are examples of typical ship survey transects. Isobaths are in 183 m (100 fm) intervals.

### **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, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate was based on the 1991-1994 average estimated abundance of Bryde's whales which was 35 (CV = 1.10) (Hansen et al. 1995) and is 17 Bryde's whales.

### **Current Population Trend**

The abundance estimates decreased to zero for survey years 1992-1994 because Bryde's whales were not sighted during vessel surveys those years. This could be due to chance rather than to a decrease in population size and the result of a relatively small population size and low sampling intensity or it could be due to inter-annual variation in distribution.

## **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

## **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. The resulting PBR for this stock is 0.2 Bryde's whales.

## **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of Bryde's whales in the northern Gulf of Mexico is unknown, but available information indicates there is little fisheries interaction with Bryde's whales in the northern Gulf of Mexico. There was one report of a Bryde's whale entangled in line, but the line was removed and the animal released alive.

There were no documented strandings of Bryde's whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

## **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury to Bryde's whales by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

## **Other Mortality**

No human-caused mortality has been reported for this stock.

## **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant; therefore, this is not a strategic stock.

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## CUVIER'S BEAKED WHALE (*Ziphius cavirostris*): Northern Gulf of Mexico Stock

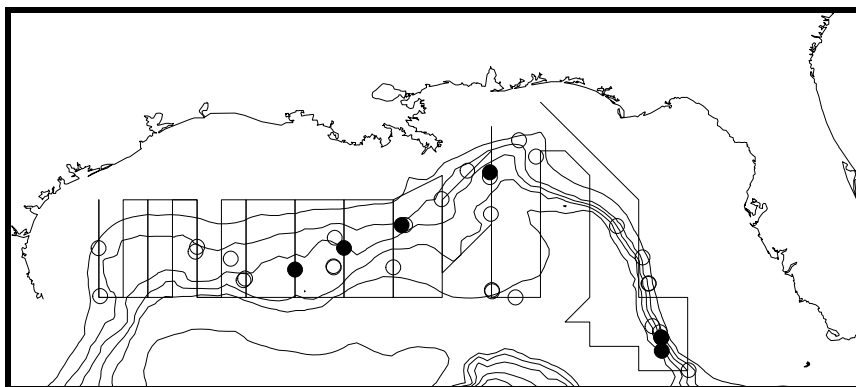
### STOCK DEFINITION AND GEOGRAPHIC RANGE

Cuvier's beaked whales are distributed throughout the world's oceans except for the polar regions (Leatherwood and Reeves 1983; Heyning 1989). Strandings have occurred in all months along the United States east coast (Schmidly 1981) and have been documented throughout the year in the Gulf of Mexico. Strandings of Cuvier's beaked whales along the west coast of North America, based on skull characteristics, are thought to represent members of a panmictic population (Mitchell 1968), but there is no information on stock differentiation in the Gulf of Mexico and nearby waters.

Beaked whales were seen in all seasons during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico (Davis et al., in preparation). Some of the aerial survey sightings may have included Curvier's beaked whale, but identification of beaked whale species from aerial surveys is problematic.

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. The estimated abundance [coefficient of variation (CV) in parentheses] by survey year was zero in 1991 and 1992, 70 in 1993 (0.63), and 38 in 1994 (0.80) (Hansen et al. 1995). Survey effort-weighted estimated average abundance average abundance of Cuvier's beaked whales was 30 (CV = 0.50) (Hansen et al. 1995). The estimated abundance of Curvier's beaked whales is probably low because only sightings of beaked whales which could be positively identified to species were used.



**Figure 1.** Distribution of Curvier's beaked whale sightings (filled circles) and unidentified beaked whale sightings (unfilled circles) during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical ship survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

The minimum population estimate was based on average estimated abundance of Cuvier's beaked whales for all surveys combined which was 30 whales (CV = 0.50) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 20 Cuvier's beaked whales.

### Current Population Trend

The abundance estimates were zero in 1991 and 1992, and then increased for 1993 and 1994. Cuvier's beaked whales were not sighted during the 1991 and 1992 vessel surveys. This could be due to chance given the small estimated population size and sampling intensity or inter-annual variation in distribution, rather than a change in population size.

### CURRENT AND MAXIMUM NET PRODUCTIVITY RATES



Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 0.2 Cuvier's beaked whales.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

Cuvier's beaked whales were taken occasionally in a small, directed fishery for cetaceans that operated out of the Lesser Antilles (Caldwell and Caldwell 1971).

The actual level of past or current, direct, human-caused mortality of Cuvier's beaked whales in the northern Gulf of Mexico is unknown, but there have been no reports of fishery-related mortality or serious injury to beaked whales by U.S. fisheries in the Gulf of Mexico. Available information indicates there likely is little, if any, fisheries interaction with Cuvier's beaked whales in the northern Gulf of Mexico.

There were no documented strandings of Cuvier's beaked whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

Total fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury to Cuvier's or any beaked whales by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant; therefore, this is not a strategic stock.

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## BLAINVILLE'S BEAKED WHALE (*Mesoplodon densirostris*): Northern Gulf of Mexico Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

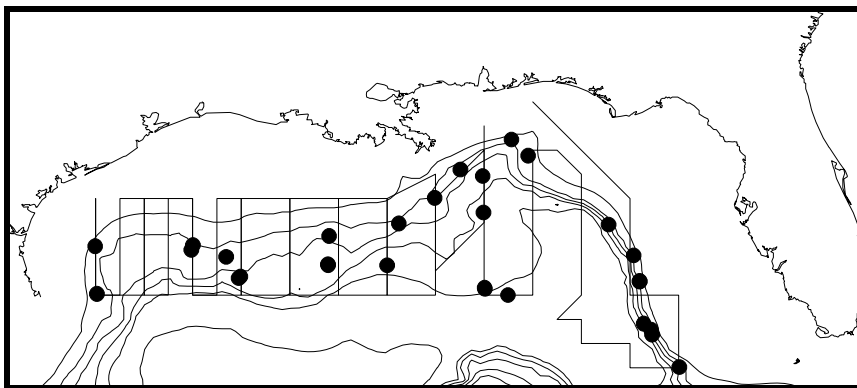
Only three species of *Mesoplodon* are known, from strandings and/or sightings, to occur in the Gulf of Mexico (Jefferson et al. 1992; Hansen et al. 1995). These are Blainville's beaked whale (*M. densirostris*), Gervais' beaked whale (*M. europaeus*), and Sowerby's beaked whale (*M. bidens*). The occurrence of Sowerby's beaked whale in the Gulf of Mexico is considered extralimital because there is only one known stranding of this species in the Gulf of Mexico (Bonde and O'Shea 1989) and because it normally occurs in northern temperate waters of the North Atlantic (Mead 1989).

Identification of *Mesoplodon* species at sea is problematic; therefore, nearly all sightings of these species are identified as beaked whales and may include sightings of *Ziphius cavirostris* that were not identified as such. Beaked whales were seen in all seasons during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico (Davis et al., in preparation).

Blainville's beaked whales appear to be widely but sparsely distributed in warm temperate and tropical waters of the world's oceans (Leatherwood et al. 1976; Leatherwood and Reeves 1983). Strandings have occurred along the northwestern Atlantic coast from Florida to Nova Scotia (Schmidly 1981), and there have been two documented strandings of this species in the northern Gulf of Mexico and one sighting (Jefferson et al. 1992; Hansen et al. 1995). There is no information on stock differentiation.

### POPULATION SIZE

Estimates of abundance of beaked whales were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Survey effort-weighted estimated average abundance of beaked whales not identified to species for all surveys combined was 117 (coefficient of variation, CV = 0.38) (Hansen et al. 1995). Estimated beaked whale abundance (CV in parentheses) by survey year was 129 in 1991 (0.78), 18 in 1992 (1.27), 53 in 1993 (0.78), and 287 in 1994 (0.48) (Hansen et al. 1995). These estimates may also include an unknown number of Cuvier's beaked whales (*Ziphius cavirostris*) and abundance of Blainville's beaked whale cannot be estimated due to uncertainty of species identification at sea.



**Figure 1.** Distribution of beaked whale sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

A minimum population estimate was not calculated because of uncertainty of species identification of sightings.

### Current Population Trend

The abundance estimates of beaked whales for 1991-1993 were lower than 1994, but there was considerable overlap of the log-normal 95% confidence intervals, which indicates the estimates were not significantly different at that

level. Any differences in abundance estimates could be due to chance given the small estimated population size and sampling intensity or a change in distribution, rather than a change in population size.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was not calculated because the minimum population size cannot be calculated.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of beaked whales in the northern Gulf of Mexico is unknown, but there have been no documented reports of fishery-related mortality or serious injury to beaked whales by U.S. fisheries in the Gulf of Mexico. Available information indicates there likely is little, if any, fisheries interaction with beaked whales in the northern Gulf of Mexico.

There were no documented strandings of beaked whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

Although PBR cannot be calculated, the total known fishery-related mortality and serious injury for this stock is zero and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant; therefore, this is not a strategic stock.

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## GERVAIS' BEAKED WHALE (*Mesoplodon europaeus*): Northern Gulf of Mexico Stock

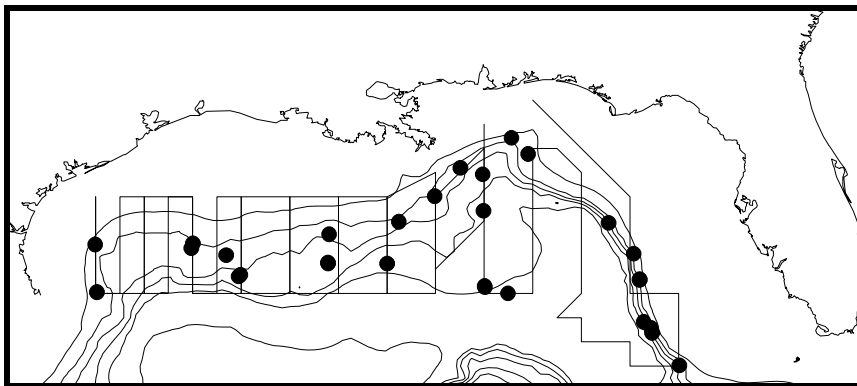
### STOCK DEFINITION AND GEOGRAPHIC RANGE

Only three species of *Mesoplodon* are known, from strandings and/or sightings, to have occurred in the Gulf of Mexico (Jefferson et al. 1992; Hansen et al. 1995). These are Blainville's beaked whale (*M. densirostris*), Gervais' beaked whale (*M. europaeus*), and Sowerby's beaked whale (*M. bidens*). The occurrence of Sowerby's beaked whale in the Gulf of Mexico is considered extralimital because there is only one known stranding of this species in the Gulf of Mexico (Bonde and O'Shea 1989), and because it normally occurs in northern temperate waters of the North Atlantic (Mead 1989). Identification of *Mesoplodon* species at sea is problematic. Therefore, nearly all sightings of these species are identified as beaked whales and may include sightings of *Ziphius cavirostris* which were not identified as such. Beaked whales were seen in all seasons during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico (Davis et al., in preparation).

Strandings of Gervais' beaked whales have occurred along the northwestern Atlantic coast from Florida to New York (Mead 1989), and there have been at least ten documented strandings of this species in the Gulf of Mexico (Jefferson et al. 1992). There is no information on stock differentiation.

### POPULATION SIZE

Estimates of abundance of beaked whales were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Survey effort-weighted estimated average abundance of beaked whales not identified to species for all surveys combined was 117 (coefficient of variation, CV = 0.38) (Hansen et al. 1995). Estimated beaked whale abundance (CV in parentheses) by survey year was 129 in 1991 (0.78), 18 in 1992 (1.27), 53 in 1993 (0.78), and 287 in 1994 (0.48) (Hansen et al. 1995). These estimates may also include an unknown number of Cuvier's beaked whales (*Ziphius cavirostris*) and abundance of Gervais' beaked whale cannot be estimated due to uncertainty of species identification at sea.



**Figure 1.** Distribution of beaked whale sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

A minimum population estimate could not be calculated because of uncertainty of species identification of sightings.

### Current Population Trend

The abundance estimates of beaked whales for 1991-1993 were lower than 1994, but there was considerable overlap of the log-normal 95% confidence intervals, which indicates the estimates were not significantly different at that level. Any differences in abundance estimates could be due to chance given the small estimated population size and sampling intensity or a change in distribution, rather than a change in population size.

## **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

## **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was not calculated because the minimum population size cannot be calculated.

## **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of beaked whales in the northern Gulf of Mexico is unknown, but there have been no documented reports of fishery-related mortality or serious injury to beaked whales by U.S. fisheries in the Gulf of Mexico. Available information indicates there likely is little, if any, fisheries interaction with beaked whales in the northern Gulf of Mexico.

There were no documented strandings of beaked whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

Although PBR cannot be calculated, the total known fishery-related mortality and serious injury for this stock is zero and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

## **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

## **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant; therefore, this is not a strategic stock.

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## BOTTLENOSE DOLPHIN (*Tursiops truncatus*): Gulf of Mexico Outer Continental Shelf Stock

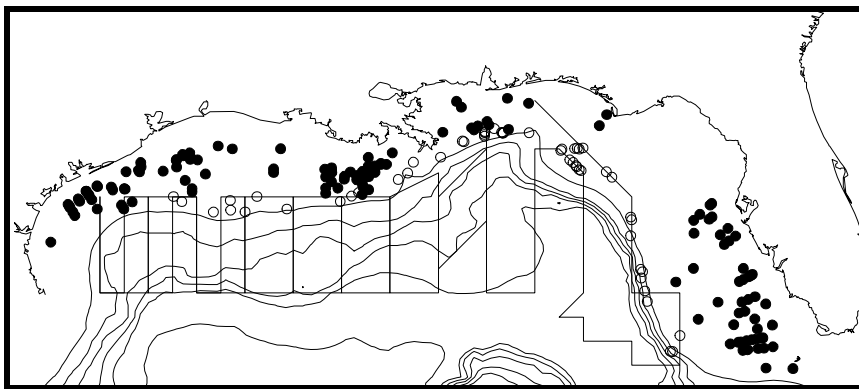
### STOCK DEFINITION AND GEOGRAPHIC RANGE

The Gulf of Mexico Outer Continental Shelf (OCS) bottlenose dolphin stock is assumed to consist of the shallow, warm water bottlenose dolphin ecotype hypothesized by Hersh and Duffield (1990) inhabiting waters over the U.S. OCS in the northern Gulf of Mexico from approximately 9 km seaward of the 18 m isobath to approximately 9 km seaward of the 183 m isobath and from the U.S.-Mexican border to the Florida Keys. The stock range may extend into Mexican and Cuban territorial waters; however, there are no available estimates of either abundance or mortality from those countries. As a working hypothesis, the bottlenose dolphins inhabiting the 0-18 m depth stratum are believed to constitute coastal stocks in the western, northern, and eastern U.S. Gulf of Mexico separate from the OCS stock; however, the OCS stock may overlap with coastal stocks in some areas and may be genetically indistinguishable from those stocks. The OCS stock may be combined with some or all of the coastal stocks when additional data become available.

In addition, the aerial surveys from which the current abundance estimates were derived overlapped the outer continental shelf edge which is believed to be inhabited by the OCS edge and continental slope stock (Fig. 1). This stock is believed to consist of the deep, cold water ecotype described by Hersh and Duffield for the Atlantic (1990). It is not currently possible to differentiate the two ecotypes visually during aerial surveys.

### POPULATION SIZE

Preliminary estimates of abundance were derived using distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) with sighting data collected during Gulf of Mexico regional aerial line-transect surveys in September-October 1992 and 1993 (Blaylock and Hoggard 1994) and 1994 (NMFS unpublished data). Transects providing systematic coverage of the area and assumed to be randomly placed with respect to bottlenose dolphin distribution extended orthogonally from approximately 9 km past the 18 m isobath to approximately 9 km past the 183 m isobath. Approximately 3.3% of the total area was visually sampled. Preliminary analyses provided a bottlenose dolphin abundance estimate of 50,247 dolphins with coefficient of variation (CV)=0.18. The survey area overlapped with a portion of the area occupied by the OCS edge and continental slope stock which was assumed to occur in waters over the OCS edge and beyond to the seaward limits of the U.S. Exclusive Economic Zone. This would tend to inflate the abundance estimate, but it is not currently possible to estimate the amount of potential bias.



**Figure 1.** Sightings of U.S. Gulf of Mexico outer continental shelf (OCS) bottlenose dolphin stock during GOMEX regional aerial surveys (filled circles). Bottlenose dolphin sightings along the OCS edge and continental slope during NOAA Ship Oregon II surveys (unfilled circles), shown for comparison, are believed to be a separate stock. The straight lines show transects during two ship surveys and are examples of typical ship survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

The minimum population estimate was based on the abundance estimate of 50,247 dolphins (CV = 0.18). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distribution as specified by NMFS (Anon. 1994). The minimum population estimate is 43,233 bottlenose dolphins.

### Current Population Trend

The data are insufficient to determine population trends. Aerial surveys conducted during autumn 1983 and 1985 by the Southeast Fisheries Science Center (SEFSC) produced an abundance estimate of 31,519 bottlenose dolphins (CV = 0.08) for this stock (Scott et al. 1989). This population thus appears to have increased from earlier estimated levels; however, a valid statistical comparison of the historical and present estimated population sizes is not presently possible because of the preliminary nature of the recent population size estimate and the possible biases caused by overlap of the survey area with the OCS edge and continental slope stock.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock. The maximum net productivity rate was assumed to be 0.04 for purposes of this assessment. This value is based on theoretical calculations showing that cetacean populations may not generally grow at rates much greater than 4% given the constraints of their reproductive life history (Reilly and Barlow 1986).

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal (PBR) was specified as the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because of the stock's status relative to its OSP level is unknown. PBR for this stock is 432 bottlenose dolphins.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

There are no observed cases of human-caused mortality and serious injury in this stock; however, based on an observed non-lethal take in U.S. Atlantic waters in 1993 in the pelagic longline fishery, this stock may be subject to incidental take resulting in serious injury or mortality. Fishery interactions have been reported to occur between bottlenose dolphins and the longline swordfish/tuna fishery in the Gulf of Mexico (SEFSC unpublished logbook data) and annual fishery-related mortality and serious injury to bottlenose dolphins is estimated to be 2.8 per year (CV = 0.74) during 1992-1993. This could include bottlenose dolphins from the outer continental shelf edge and continental slope stock.

Total fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fishery Information**

Annual fishing effort for the shrimp trawl fishery in the U.S. Gulf of Mexico OCS during 1988-1993 averaged approximately 2.58 million hours of tows (CV = 0.07) (NMFS unpublished data). This fishery was monitored by NMFS observers in 1992 and 1993, but less than 1% of the fishing effort was observed (NMFS unpublished data). There have been no reports of incidental mortality or injury associated with the shrimp trawl fishery in this area.

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. Estimated take was based on a generalized linear model (Poisson error assumption) fit to the available observed incidental take and self-reported incidental take and effort data for the fishery. The following estimates were based on observed takes across the Atlantic longline swordfish/tuna fishery (which includes the Gulf of Mexico). All observed takes were used because the species occurs generally throughout the area of the fishery, but observed takes were infrequent in any given region of the fishery. There were no lethal takes of bottlenose dolphins observed or reported in 1992 and 1993, and only one non-lethal take was reported in 1993, which is assumed to have caused serious injury. The estimated level of fishery-related mortality and serious injury for the entire fishery, including waters outside of the Gulf of Mexico, in 1993 was 16 bottlenose dolphins (CV = 0.19). No take was observed in the Gulf of Mexico, but interactions between bottlenose dolphins and this fishery in the Gulf of Mexico have been reported under the Marine Mammal Protection Act Interim Exemption Program (NMFS 1993).

Given the fact that fishery interactions have been reported to occur between bottlenose dolphins and the longline swordfish/tuna fishery in the Gulf of Mexico, a probable level of fishery-related mortality and serious injury rate can be

estimated. Under the assumption that the probability of an incidental take is proportional to fishing effort (number of sets), the estimated level of incidental mortality and serious injury partitioned to include only the Gulf of Mexico stock would be 5.5 bottlenose dolphins in 1993 (CV = 0.19). Average annual fishery-related mortality and serious injury during 1992-1993 would be 2.8 bottlenose dolphins (CV = 0.74). This estimate could include dolphins from the OCS edge and continental slope stock.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration in the Gulf of Mexico.

A trawl fishery for butterfish was monitored by NMFS observers for a short period in the 1980's with no records of incidental take of marine mammals (Burn and Scott 1988; NMFS unpublished data), although an experimental set by NMFS resulted in the death of two bottlenose dolphins (Burn and Scott 1988). There are no other data available.

#### **Other Human-Related Mortality or Serious Injury**

The use of explosives to remove oil rigs in the portions of the OCS in the western Gulf of Mexico has the potential to cause serious injury or mortality to marine mammals. These activities have been closely monitored by NMFS observers since 1987 (Gitschlag and Hale, in press) and Gitschlag and Herczeg (in press) described the monitoring activities that occurred in 1992. There have been no reports of either serious injury or mortality to bottlenose dolphins (NMFS unpublished data).

#### **STATUS OF STOCK**

The status of this stock relative to OSP is not known and the population trend cannot be determined due to insufficient data. This species is not listed as threatened or endangered under the Endangered Species Act. This is not a strategic stock because fishery-related mortality and serious injury does not exceed PBR.

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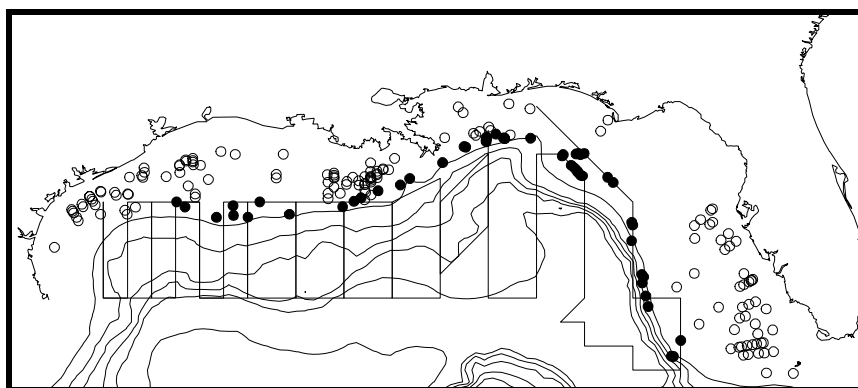
## **BOTTLENOSE DOLPHIN (*Tursiops truncatus*): Gulf of Mexico Continental Shelf Edge and Continental Slope Stock**

### **STOCK DEFINITION AND GEOGRAPHIC RANGE**

This bottlenose dolphin stock is defined as the stock which occupies the outer edge of the U.S. Gulf of Mexico Outer Continental Shelf (OCS) and waters over the continental slope within the U.S. Exclusive Economic Zone (EEZ), from the latitude and longitude of the U.S. EEZ off the U.S.-Mexico border to the latitude of the U.S. EEZ south of Key West, Florida. Close observation by experienced NMFS observers from shipboard surveys conducted throughout much of its range (Fig. 1) indicates that most of the dolphins sighted during ship-based surveys over the continental shelf edge and continental slope were the relatively large and robust dolphins assumed to be of the deep water ecotype hypothesized by Hersh and Duffield (1990). These dolphins were reported to be larger and darker in color than bottlenose dolphins seen over the continental shelf closer to shore (NMFS unpublished data). This stock's range may extend into Mexican and Cuban waters; however, there are no estimates available for bottlenose dolphin abundance or mortality from those countries.

### **POPULATION SIZE**

Preliminary estimates of abundance were derived using distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) with sighting data collected during shipboard line-transect surveys conducted during the spring of 1992-1994 (Fig. 1). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Average bottlenose dolphin abundance over six surveys was estimated at 5,618 dolphins with coefficient of variation (CV) = 0.26. In this analysis, it was assumed that all of the bottlenose dolphins sighted during the ship-based surveys were of this stock. The survey area overlapped in some areas with the OCS stock which was assumed to occur from approximately 9 km seaward of the 18 m isobath to approximately 9 km seaward of the 183 m isobath; however, the amount of overlap is considered insignificant and its effect on the abundance estimate is not known.



**Figure 1.** Distribution of sightings of bottlenose dolphins during NOAA Ship Oregon II marine mammal surveys in the Gulf of Mexico outer continental shelf (OCS) edge and continental slope waters (filled circles). Sightings of the OCS bottlenose dolphin stock made during GOMEX regional aerial surveys (unfilled circles) are shown for comparison. The bottlenose dolphin on the OCS are believed to be a separate stock. The straight lines show transects during two ship surveys and are examples of typical ship survey transects. Isobaths are in 183 m (100 fm) intervals.

### **Minimum Population Estimate**

The minimum population estimate was based on the average bottlenose dolphin abundance estimate of 5,618 bottlenose dolphins (CV = 0.26). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distribution as specified by NMFS (Anon. 1994). The minimum population estimate is 4,530 bottlenose dolphins.

### **Current Population Trend**

The data are insufficient to determine population trends.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates for this stock are unknown. The maximum net productivity rate for purposes of this assessment, was assumed to be 0.04. This value is based on theoretical calculations showing that cetacean populations may not generally grow at rates much greater than 4% given the constraints of their reproductive life history (Reilly and Barlow, 1986).

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal (PBR) has been specified as the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP). The recovery factor was 0.50 because of the stock's unknown status relative to OSP. PBR for this stock is 45 bottlenose dolphins.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

There are no observed cases of human-caused mortality and serious injury in this stock; however, based on an observed non-lethal take in U.S. Atlantic waters in 1993 in the pelagic longline fishery, this stock may be subject to incidental take resulting in serious injury or mortality. Fishery interactions have been reported to occur between bottlenose dolphins and the longline swordfish/tuna fishery in the Gulf of Mexico [Southeast Fisheries Science Center (SEFSC) unpublished logbook data] and annual fishery-related mortality and serious injury to bottlenose dolphins is estimated to be 2.8 per year (CV = 0.74) during 1992-1993. This estimate could include bottlenose dolphins from the OCS stock.

The total fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fishery Interaction**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. Estimated take was based on a generalized linear model (Poisson error assumption) fit to the available observed incidental take and self-reported incidental take and effort data for the fishery. The following estimates were based on observed takes across the Atlantic longline swordfish/tuna fishery (which includes the Gulf of Mexico). All observed takes were used because the species occurs generally throughout the area of the fishery, but observed takes were infrequent in any given region of the fishery. There were no lethal takes of bottlenose dolphins observed or reported in 1992 and 1993, and only one non-lethal take was reported in 1993, which is assumed to have caused serious injury. The estimated level of fishery-related mortality and serious injury for the entire fishery, including waters outside of the Gulf of Mexico, in 1993 was 16 bottlenose dolphins (CV = 0.19). No take was observed in the Gulf of Mexico, but there are logbook reports of interactions between bottlenose dolphins and this fishery (SEFSC unpublished logbook data).

Given the fact that fishery interactions have been reported to occur between bottlenose dolphins and the longline swordfish/tuna fishery in the Gulf of Mexico, a probable level of fishery-related mortality and serious injury rate can be estimated. Under the assumption that the probability of an incidental take is proportional to fishing effort (number of sets), the estimated level of incidental mortality and serious injury partitioned to include only the Gulf of Mexico stock would be 5.5 bottlenose dolphins in 1993 (CV = 0.19). Average annual fishery-related mortality and serious injury during 1992-1993 would be 2.8 bottlenose dolphins (CV = 0.74). This estimate could include dolphins from the OCS stock.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

A trawl fishery for butterfish was monitored by NMFS observers for a short period in the 1980's with no records of incidental take of marine mammals (Burn and Scott 1988; NMFS unpublished data), although an experimental NMFS set resulted in the death of two bottlenose dolphins (Burn and Scott 1988). There are no other data available.

#### **Other Mortality**

No direct or indirect human-caused mortality has been reported for this stock.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is not known and the population trend cannot be determined due to insufficient data. This species is not listed as threatened or endangered under the Endangered Species Act. This is not a strategic stock because fishery-related mortality or serious injury does not exceed PBR.

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## BOTTLENOSE DOLPHIN (*Tursiops truncatus*): Western Gulf of Mexico Coastal Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

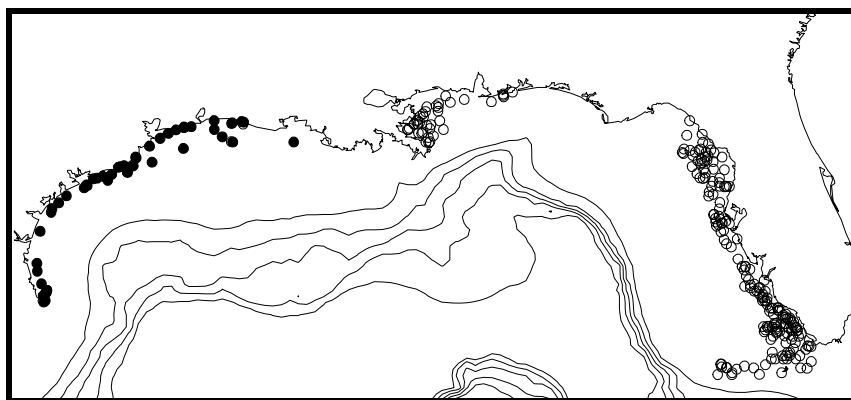
The western Gulf of Mexico coastal bottlenose dolphin stock has been defined for management purposes as the bottlenose dolphins inhabiting the nearshore coastal waters in the U.S. Gulf of Mexico from the Texas border to the Mississippi River mouth, from shore or presumed bay boundaries to 9.3 km seaward of the 18.3 m isobath (Fig. 1). As a working hypothesis, it is assumed that the dolphins occupying habitats with dissimilar climactic, coastal, and oceanographic characteristics might be restricted in their movements between habitats and, thus, constitute separate stocks. The western coastal area is characterized by an arid to temperate climate, sand beaches, and low fresh water input. The northern coastal stock area which is characterized by a temperate climate, barrier islands, sand beaches, coastal marshes and marsh islands, and has a relatively high level of fresh water input from rivers and streams. The eastern coastal stock area is temperate to subtropical in climate, is bordered by a mixture of coastal marshes, sand beaches, marsh and mangrove islands, and has an intermediate level of freshwater input.

The stock occurs trans-boundary with Mexico; however, there is no information available for abundance estimation, nor for estimating fishery-related mortality in Mexican waters. The ratio of DDE to DDT was extraordinarily high in tissues of one bottlenose dolphin stranded on the Texas coast (Varanasi et al. 1992), suggesting recent exposure to DDT which is still in use in Mexico.

The Mississippi River outflow may constitute an effective ecological barrier to stock migration at the eastern boundary. This assumption has not been tested and interbreeding may, in fact, occur between this and the northern coastal stock at this boundary; therefore, the definition of this stock may be revised and the stock may be incorporated with the northern coastal stock when more data become available. There are data which suggest that there is considerable alongshore movement by some members of the western coastal stock (NMFS unpublished data), but the extent of this movement is unknown.

Some of this stock may co-occur with the resident bay, sound, and estuarine stocks, and breeding may occur among these stocks. For instance, two bottlenose dolphins previously seen in the South Padre Island area in Texas were seen in Matagorda Bay, 285 km north, in May 1992 and May 1993 (Lynn 1995). These sightings suggest that some bay stocks dolphins occasionally traverse the coastal stock area.

Portions of this stock may co-occur with the U.S. Gulf of Mexico outer continental shelf (OCS) stock. The seaward boundary for this stock corresponds to aerial survey strata (NMFS unpublished data) and thus, represents a management boundary rather than an ecological boundary. Anecdotal evidence suggests that both the coastal and OCS stocks consist of the shallow, warm water ecotype described by Hersh and Duffield (1990). Data are not currently available to determine genetically if the two stocks should be separated or, if so, where; and interbreeding may occur at the boundary interface.



**Figure 1.** Sightings of coastal bottlenose dolphins during GOMEX aerial surveys of the Gulf of Mexico in 1992-1994. Western Gulf of Mexico coastal bottlenose dolphin stock is shown with filled circles. Isobaths are in 183 m (100 fm) intervals.

## **POPULATION SIZE**

Preliminary abundance estimates were derived using distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) with sighting data collected during aerial line-transect surveys in September-October 1992 (Blaylock and Hoggard 1994). Sampling transects extended orthogonally from shore out to approximately 9 km past the 18 m isobath. The 1992 coastal survey area extended from the U.S. -Mexican border to the Mississippi River mouth. Systematic transects were placed randomly with respect to bottlenose dolphin distribution and provided approximately 5% visual coverage of the survey area. Bottlenose dolphin abundance was estimated to be 3,499 dolphins (CV = 0.21) (Blaylock and Hoggard 1994).

### **Minimum Population Estimate**

The minimum population estimate was based on the 1992 abundance estimate of 3,499 bottlenose dolphins (CV = 0.21) (Blaylock and Hoggard 1994). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). The minimum population estimate is 2,938 bottlenose dolphins.

### **Current Population Trend**

Aerial surveys of this area conducted by NMFS in autumn 1983 resulted in an estimated bottlenose dolphin abundance of 4,718 (CV = 0.10). The data are not sufficient to conduct a statistical trend analysis, but the current population size estimate is significantly lower than the 1983 estimate (Student's t-test,  $P < 0.001$ ) and suggests a decline in stock abundance.

This stock was subject to higher than usual mortality levels in 1990, 1992, and 1993-94, and the incidence of bottlenose dolphin strandings along the Texas coast in those years was significantly higher than the 1984-94 mean stranding rate (Southeast U.S. Marine Mammal Stranding Network unpublished data). Some of these mortalities may have been related to accumulation of anthropogenic hydrocarbon contaminants. A recent study indicated an inverse relationship between hydrocarbon contaminant levels and certain bacterial and viral antigen titers in bottlenose dolphins from Matagorda Bay, Texas (Reif et al., in review).

## **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known 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 minimum population size, one-half the maximum productivity rate, and a "recovery" factor (Wade and Angliss 1997). The "recovery" factor, which accounts for endangered, depleted, and 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, because of an undetermined level of fishery-related mortality, and because of the recent occurrence of three anomalous mortality events. PBR for this stock is 29 dolphins.

## **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of direct human-caused mortality in this stock is unknown. An annual mean of 13 (CV = 0.46) bottlenose dolphins stranded on the Texas coast during the period 1988-1993, showing signs of fishery interactions such as net entanglement, mutilation, gunshot wounds, etc. (Southeast U.S. Marine Mammal Stranding Network unpublished data). This was 10.3% of the total bottlenose dolphin strandings reported for this area. There were 283 reported bottlenose dolphin strandings in Texas (1994), of these 7 (2%) showed signs of human interaction. Three had evidence of fishery entanglement, one of which was found in a shrimp trawl, three were mutilated and one was shot. In 1995 the total number of reported bottlenose dolphins in Texas for 1995 was 110 and 3 (3%) were human interactions. One was found in a shrimp trawl. The total bottlenose



dolphin strandings from January through August 31, 1996 was 175 and 1 (0.5%) had evidence of human interaction (entanglement).

There are a number of difficulties associated with the interpretation of stranding data. It is possible that some or all of the stranded dolphins may have been from a bay, sound or estuarine stock; however, the proportion of the stranded dolphins belonging to another stock cannot be determined because of the difficulty of determining from where the stranded carcass originated. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the dolphins which die or are seriously injured in fishery interactions wash ashore, nor will all of those that do wash ashore 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 interaction.

### **Fisheries Information**

Annual fishing effort for the shrimp trawl fishery in the western Gulf of Mexico coastal stock area during 1988-1993 averaged approximately 0.35 million hours of tows (CV = 0.16) (NMFS unpublished data). This fishery was monitored by NMFS observers in 1992 and 1993, but less than 1% of the fishing effort was observed (NMFS unpublished data). There have been no reports of incidental mortality or injury in the western Gulf of Mexico coastal bottlenose dolphin stock associated with the shrimp trawl fishery in this area.

The menhaden purse seine fishery targets the Gulf menhaden, *Brevoortia patronus*, in Gulf of Mexico coastal waters approximately 3-18 m in depth (NMFS 1991). Seventy-five menhaden vessels operate within 1.6 km of shore from Apalachicola, Florida to Freeport, Texas, from April-October. Lethal takes of bottlenose dolphins reported by the menhaden fishery during the period 1982-1988 ranged between 0-4 dolphins annually (NMFS unpublished data).

Gillnets are not used in Texas, and gillnets over 46 m<sup>3</sup> in area will not be allowed in Florida past July 1995, but fixed and runaround gillnets are currently in use in Louisiana, Mississippi, and Alabama. These fisheries, for the most part, operate year around. They are state-controlled and licensed, and vary widely in intensity and target species. No marine mammal mortalities associated with gillnet fisheries have been reported in these states, but stranding data suggest that gillnet and marine mammal interaction does occur, causing mortality and serious injury.

The fishery for blue crabs operates in estuarine areas throughout the Gulf coast employing traps attached to a buoy with rope. Bottlenose dolphins have been reported stranded in Mississippi with polypropylene rope around their flukes indicating the possibility of entanglement with crab pot lines (NMFS 1991); however, this fishery has not been monitored by observers.

Two bottlenose dolphins were entangled and died in a scientific research net fishery for sea turtles in Sabine Pass in 1993 (A. Landry, Texas A&M University, report to Texas Marine Mammal Stranding Network, August 1993). The nets used in this Endangered Species Act (ESA) permitted research activity were two 4.9 m deep x 91.5 m in length stationary entanglement nets adjacent to each other. They were fished in shallow water (0.9-2.5 m depth), monitored continuously throughout the day, and removed at night.

### **Other Mortality**

The coast adjacent to the nearshore habitat occupied by this stock varies from agricultural to industrial and, in some places, such as Galveston Island, is dense in human population. Concentrations of chlorinated hydrocarbons and metals were relatively low in most of the bottlenose dolphins examined in conjunction with an anomalous mortality event in Texas bays in 1990; however, some had concentrations at levels of possible toxicological concern (Varanasi et al. 1992). Agricultural runoff following periods of high rainfall in 1992 was implicated in a high level of bottlenose dolphin mortalities in Matagorda Bay, which is adjacent to the western coastal stock area (NMFS unpublished data). A recent study of hydrocarbon contaminant levels was conducted in conjunction with a health assessment study of 35 live-captured bottlenose dolphins in Matagorda Bay which adjoins the coastal stock area. Alpha-HCB, p,p,DDE, and PCB concentrations were inversely related to the magnitude of the serum antibody titer to *Erysipelas* spp. and *Staphylococcus* spp. bacteria (Reif et al., in review.). A similar and more pronounced trend was seen in relationship to the pseudorabies virus; however, since pseudorabies virus is not known to infect bottlenose dolphins, the significance of this finding is not clear. Concentrations of contaminants were higher in dolphins having evidence of exposure to the cetacean morbillivirus. The reason for the difference in the relationship between antibody titers to bacteria and pseudorabies and antibody titers to cetacean morbillivirus is not understood.

## STATUS OF STOCK

The status of this stock relative to OSP is unknown. A population trend analysis is not available due to insufficient information. This species is not listed as threatened or endangered under the ESA. The occurrence of three anomalous mortality events among bottlenose dolphins along the Texas coast since 1990 (NMFS unpublished data) is cause for concern and the available evidence suggests that bottlenose dolphin stocks in the northern and western portion of the U.S. Gulf of Mexico may have experienced a morbillivirus epidemic in 1993 (Lipscomb 1993); however, the effects of these events on stock abundance has yet to be determined. The 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. This is not a strategic stock because the known level of fishery-related mortality or serious injury does not exceed PBR.

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## BOTTLENOSE DOLPHIN (*Tursiops truncatus*): Northern Gulf of Mexico Coastal Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

The northern Gulf of Mexico coastal bottlenose dolphin stock has been defined for management purposes as those bottlenose dolphins occupying the nearshore coastal waters in the U.S. Gulf of Mexico from the Mississippi River mouth to approximately 84° W longitude, from shore, barrier islands, or presumed bay boundaries to 9.3 km seaward of the 18.3 m isobath (Fig. 1). As a working hypothesis, it is assumed that the dolphins occupying habitats with dissimilar climactic, coastal, and oceanographic characteristics might be restricted in their movements between habitats and, thus, constitute separate stocks. The northern coastal stock area is characterized by a temperate climate, barrier islands, sand beaches, coastal marshes and marsh islands, and has a relatively high level of fresh water input from rivers and streams. It is bordered on the east by an extensive area of coastal marsh and marsh islands typical of Florida's Apalachee Bay. The western coastal area is characterized by an arid to temperate climate, sand beaches, and low fresh water input. The eastern coastal stock area is temperate to subtropical in climate, is bordered by a mixture of coastal marshes, sand beaches, marsh and mangrove islands, and has an intermediate level of freshwater input.

The definition of this stock may be changed and it may be incorporated with other Gulf of Mexico stocks when more data become available. Seasonal changes in bottlenose dolphin abundance in Mississippi Sound (NMFS unpublished data) suggests that there is interchange with at least that portion of the Gulf of Mexico bay and sound stocks; however, its extent and significance is not presently known.

Portions of this stock may co-occur with the U.S. Gulf of Mexico outer continental shelf (OCS) stock. The seaward boundary for this stock corresponds to aerial survey strata (NMFS unpublished data) and thus, represents a management boundary rather than an ecological boundary. Anecdotal evidence suggests that both the coastal and OCS stocks consist of the shallow, warm water ecotype described by Hersh and Duffield (1990). Data are not currently available to determine genetically if the stocks should be separated or, if so, where; and interbreeding may occur at the boundary interface.

### POPULATION SIZE

Preliminary estimates of abundance were derived using distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) with sighting data collected during aerial line-transect surveys in September-October 1993 (Blaylock and Hoggard 1994). Systematic sampling transects, placed randomly with respect to the bottlenose dolphin distribution, extended orthogonally from shore out to approximately 9 km past the 18 m isobath. The area surveyed extended from the Mississippi River mouth to approximately 84° W Longitude, and approximately 5% of the total area was visually searched. Bottlenose dolphin abundance was estimated to be 4,191 dolphins with coefficient of variation (CV) = 0.21 (Blaylock and Hoggard 1994).



**Figure 1.** Sightings of coastal bottlenose dolphins during GOMEX aerial surveys of the Gulf of Mexico in 1992-1994. Northern Gulf of Mexico coastal bottlenose dolphin stock is shown with filled circles. Isobaths are in 183 m (100 fm) intervals.

### **Minimum Population Estimate**

The minimum population estimate was based on the 1993 abundance estimate of 4,191 dolphins (CV = 0.21) (Blaylock and Hoggard 1994). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). The minimum population estimate is 3,518 bottlenose dolphins.

### **Current Population Trend**

Aerial surveys of this area conducted partly in autumn 1983 and partly in autumn 1985, by NMFS resulted in an estimated bottlenose dolphin abundance of 1,319 (CV = 0.10). The data are not sufficient to conduct a statistical trend analysis, but the current population size estimate is significantly higher than the 1983-85 estimate (Student's t-test,  $P < 0.005$ ).

### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known 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 minimum population size, one-half the maximum productivity rate, and a "recovery" factor (Wade and Angliss 1997). The "recovery" factor, which accounts for endangered, depleted, and 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, because the stock apparently sustains some unknown level of fishery-related mortality, and because of the unknown effects of the 1993 mortality event. PBR for this stock is 35 dolphins.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of direct human-caused mortality in this stock is unknown. An annual average of ten bottlenose dolphins (CV = 0.41) stranded on the coast of Louisiana, Mississippi, or Alabama during the period 1988-1993, showing signs of fishery interactions such as net entanglement, mutilation, gunshot wounds, etc. (Southeast U.S. Marine Mammal Stranding Network unpublished data). This was 8.2% of the total bottlenose dolphin strandings reported for this area. In 1994, the Stranding Network reported a total of 92 bottlenose dolphins in Mississippi, Louisiana and Alabama, four (4%) were reported as showing signs of human interaction. One was a boat strike, one entangled in fishing gear and 2 had gunshot wounds. There were 78 strandings reported in 1995 in the northern Gulf and 10 (12%) had evidence of human interaction; 6 were entanglements (2 were found wrapped in a square gillnet), two mutilations and 2 had gunshot wounds. A total of 120 bottlenose dolphin strandings was reported from January through August 31, 1996, and four (3%) of these were reported as human interactions (2 net entanglements, 1 boat strike and one mutilation).

There are a number of difficulties associated with the interpretation of stranding data. It is possible that some or all of the stranded dolphins may have been from a bay, sound or estuarine stock; however, the proportion of the stranded dolphins belonging to another stock cannot be determined because of the difficulty of determining from where the stranded carcass originated. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the dolphins which die or are seriously injured in fishery interactions wash ashore, nor will all of those that do wash ashore 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 interaction.

### **Fisheries Information**

Annual fishing effort for the shrimp trawl fishery in the northern Gulf of Mexico coastal stock area during 1988-1993 averaged approximately 2.17 million hours of tows (CV = 0.13) (NMFS unpublished data). This fishery was monitored by NMFS observers in 1992 and 1993, but less than 1% of the fishing effort was observed (NMFS unpublished data). There have been no reports of incidental mortality or injury in the northern Gulf of Mexico coastal bottlenose dolphin stock associated with the shrimp trawl fishery in this area.

The menhaden purse seine fishery targets the Gulf menhaden, *Brevoortia patronus*, in Gulf of Mexico coastal waters approximately 3-18 m in depth (NMFS 1991). Seventy-five menhaden vessels operate within 1.6 km of shore from Apalachicola, Florida to Freeport, Texas, from April-October. Lethal takes of bottlenose dolphins reported by the menhaden fishery during the period 1982-1988 ranged between 0-4 dolphins annually (NMFS unpublished data).

Other clupeid purse seiners opportunistically target Spanish sardine, thread herring, ladyfish, cigarfish, and blue runners. Single boat purse seiners, fishing for sardines and herrings, operate in coastal waters between the Mississippi River delta and Pascagoula, Mississippi and in the Florida panhandle between Pensacola and Apalachicola. It is estimated that ten vessels participate in this fishery between May-October. There are no estimates of dolphin mortality associated with this fishery.

Gillnets are not used in Texas, and gillnets over 46 m<sup>3</sup> in area will not be allowed in Florida past July 1995, but fixed and runaround gillnets are currently in use in Louisiana, Mississippi, and Alabama. These fisheries, for the most part, operate year around. They are state-controlled and licensed, and vary widely in intensity and target species. No marine mammal mortalities associated with gillnet fisheries have been reported in these states, but stranding data suggest that gillnet and marine mammal interaction does occur, causing mortality and serious injury.

The fishery for blue crabs operates in estuarine areas throughout the Gulf coast employing traps attached to a buoy with rope. Bottlenose dolphins have been reported stranded in Mississippi with polypropylene rope around their flukes indicating the possibility of entanglement with crab pot lines (NMFS 1991); however, this fishery has not been monitored by observers.

### **Other Mortality**

The nearshore habitat occupied by this stock is adjacent to areas of high human population. Two stranded dolphins from the northern Gulf coastal area (one from Mississippi and one from Alabama) had the highest levels of DDT derivatives of any of the bottlenose dolphin liver samples analyzed in conjunction with the 1990 mortality investigation conducted by NMFS (Varanasi et al. 1992). The significance of these findings are unclear, but there is some evidence that increased exposure to anthropogenic compounds may reduce immune function in bottlenose dolphins. A recent study found the magnitude of the serum antibody titer to *Erysipelas* spp. and *Staphylococcus* spp. bacteria in bottlenose dolphins was inversely related to  $\alpha$ -HCB, p,p,DDE, and PCB's concentrations (Reif et al., in review).

This stock was subject to a high incidence of mortality in 1993, which was suspected to have been the result of a morbillivirus epidemic. The effect of this mortality event on the stock cannot be determined, in part, because the mortality may have also affected the bay, sound and estuarine stock and the stock identity of the stranded animals could not be determined. The increase in mortalities began in the Florida panhandle area and moved westward during that period (NMFS unpublished data). Concentrations of contaminants were found to be higher in dolphins having evidence of exposure to the cetacean morbillivirus (Reif et al., in review). The reason for the relationship between cetacean morbillivirus antibody titers and high contaminant levels is not understood and the effect of the epidemic on this stock has not been determined.

### **STATUS OF STOCK**

The status of this stock relative to OSP is not known and population trends cannot be determined due to insufficient data. This species is not listed as threatened or endangered under the Endangered Species Act. The total fishery-related mortality and serious injury for this stock is unknown, but considering the evidence from stranding data, it may not be less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate. This is not a strategic stock because the known level of fishery-related mortality or serious injury does not exceed PBR.

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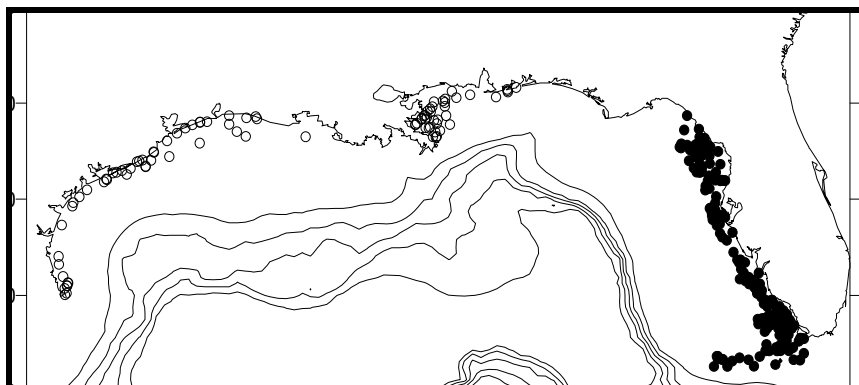
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## **BOTTLENOSE DOLPHIN (*Tursiops truncatus*): Eastern Gulf of Mexico Coastal Stock**

### **STOCK DEFINITION AND GEOGRAPHIC RANGE**

The eastern Gulf of Mexico coastal bottlenose dolphin stock has been defined for management purposes as the bottlenose dolphins occupying the area which extends from approximately 84° W Longitude to Key West, Florida, from shore, barrier islands, or presumed bay boundaries to 9.3 km seaward of the 18.3 m isobath (Fig. 1). As a working hypothesis, it is assumed that the dolphins occupying habitats with dissimilar climactic, coastal, and oceanographic characteristics might be restricted in their movements between habitats and, thus, constitute separate stocks. The eastern coastal stock area is temperate to subtropical in climate, is

bordered by a mixture of coastal marshes, sand beaches, marsh and mangrove islands, and has an intermediate level of freshwater input. It is bordered on the north by an extensive area of coastal marsh and marsh islands typical of Florida's Apalachee Bay. The western coastal area is characterized by an arid to temperate climate, sand beaches, and low fresh water input. The northern coastal stock area is characterized by a temperate climate, barrier islands, sand beaches, coastal marshes and marsh islands, and has a relatively high level of fresh water input from rivers and streams.



**Figure 1.** Sightings of coastal bottlenose dolphins during GOMEX aerial surveys of the Gulf of Mexico in 1992-1994. Eastern Gulf of Mexico coastal bottlenose dolphin stock is shown with filled circles. Isobaths are in 183 m (100 fm) intervals.

Portions of this stock may co-occur with the U.S. Gulf of Mexico outer continental shelf (OCS) stock. The seaward boundary for this stock corresponds to aerial survey strata (NMFS unpublished data) and thus, represents a management boundary rather than an ecological boundary. Anecdotal evidence suggests that both the coastal and OCS stocks consist of the shallow, warm water ecotype described by Hersh and Duffield (1990). Data are not currently available to determine genetically if the two stocks should be separated or, if so, where; and interbreeding may occur at the boundary interface.

### **POPULATION SIZE**

Preliminary estimates of abundance were derived using distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) with sighting data collected during aerial line-transect surveys conducted during autumn 1994 (NMFS unpublished data). Systematic sampling transects, placed randomly with respect to the bottlenose dolphin distribution, extended orthogonally from shore out to approximately 9 km past the 18 m isobath. Approximately 5% of the total survey area was visually searched. Bottlenose dolphin abundance was estimated to be 9,912 dolphins with coefficient of variation (CV) = 0.12.

### **Minimum Population Estimate**

The minimum population estimate was based on the 1994 abundance estimate of 9,912 (CV = 0.12) (NMFS unpublished data). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed abundance estimate. This is equivalent to the 20th percentile

of the log-normal distribution as specified by Wade and Angliss (1997). The minimum population estimate is 8,963 bottlenose dolphins.

### **Current Population Trend**

Aerial surveys of this area conducted by NMFS in autumn 1985, resulted in an estimated bottlenose dolphin abundance of 4,711 (CV = 0.05). The data are not sufficient to conduct a statistical trend analysis, but the current population size estimate is significantly higher than the 1985 estimate (Student's t-test,  $P < 0.0005$ ).

### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known 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 minimum population size, one-half the maximum productivity rate, and a "recovery" factor (Wade and Angliss 1997). The "recovery" factor, which accounts for endangered, depleted, and 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 this stock is 90 dolphins.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of direct human-caused mortality in this stock is unknown. An annual mean of eight bottlenose dolphins (CV = 0.41) stranded on the Florida Gulf coast during the period 1988-1993, showing signs of fishery interactions such as net entanglement, mutilation, gunshot wounds, etc. (Southeast U.S. Marine Mammal Stranding Network unpublished data). This was 8.9% of the total bottlenose dolphin strandings reported for this area. Morgan and Patton (1990) reported that 12.9% of 116 cetaceans examined by Mote Marine Laboratory's marine mammal stranding response program on the west coast of Florida between 1984 and 1990 exhibited evidence of human-caused mortality or serious injury. The stranding networks reported a total of 62 bottlenose dolphin strandings in 1994 with only one reported human interaction. Eighty-three strandings were reported in 1995 and 2 had evidence of human interactions. One was found entangled in a gillnet, and one was a boat strike. The network reported 111 bottlenose dolphins from January through August 31, 1996. Three showed signs of human interaction (one entanglement-gillnet, one boat strike and one mutilation).

There are a number of difficulties associated with the interpretation of stranding data. It is possible that some or all of the stranded dolphins may have been from a bay, sound or estuarine stock; however, the proportion of the stranded dolphins belonging to another stock cannot be determined because of the difficulty of determining from where the stranded carcass originated. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the dolphins which die or are seriously injured in fishery interactions wash ashore, nor will all of those that do wash ashore 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 interaction.

### **Fisheries Information**

Annual fishing effort for the shrimp trawl fishery in the eastern Gulf of Mexico coastal stock area during 1988-1993 averaged approximately 0.102 million hours of tows (CV = 0.30) (NMFS unpublished data). This fishery was monitored by NMFS observers in 1992 and 1993, but less than 1% of the fishing effort was observed (NMFS unpublished data). There was one report in 1992 of an incidental mortality in the eastern Gulf of Mexico coastal bottlenose dolphin stock which was associated with the shrimp trawl fishery in this area.

Gillnets are not used in Texas, and gillnets over 46 m<sup>3</sup> in area will not be allowed in Florida past July 1995, but fixed and runaround gillnets are currently in use in Louisiana, Mississippi, and Alabama. These



fisheries, for the most part, operate year around. They are state-controlled and licensed, and vary widely in intensity and target species. No marine mammal mortalities associated with gillnet fisheries have been reported in these states, but stranding data suggest that gillnet and marine mammal interaction does occur, causing mortality and serious injury. A coastal gillnet fishery for menhaden was reported to have taken one bottlenose dolphin in 1991 (NMFS unpublished data). There are no effort data available for this fishery.

The menhaden purse seine fishery targets the Gulf menhaden, *Brevoortia patronus*, in Gulf of Mexico coastal waters approximately 3-18 m in depth (NMFS 1991). Seventy-five menhaden vessels operate within 1.6 km of shore from Apalachicola, Florida to Freeport, Texas, from April-October. Lethal takes of bottlenose dolphins reported by the menhaden fishery during the period 1982-1988 ranged between 0-4 dolphins annually (NMFS unpublished data).

Other clupeid purse seiners opportunistically target Spanish sardine, thread herring, ladyfish, cigarfish, and blue runners. There are no effort data available for this fishery and there are no estimates of dolphin mortality associated with this fishery.

A fishery for blue crabs operates in estuarine areas throughout the Gulf coast employing traps attached to a buoy with rope. Bottlenose dolphins have been reported stranded in other coastal locations in the Gulf of Mexico with polypropylene rope around their flukes indicating the possibility of entanglement with crab pot lines (NMFS 1991); however, this fishery has not been monitored by observers.

### **Other Mortality**

The nearshore habitat occupied by this stock is adjacent to areas of high human population and in some areas of Florida, such as the Tampa Bay area, is highly industrialized. PCB concentrations in three stranded dolphins sampled from this stock ranged from 16-46 µg/g wet weight. Concentrations of  $\alpha$ -HCB, p,p,DDE, and PCB's were inversely related to the magnitude of the serum antibody titer to *Erysipelas* spp. and *Staphylococcus* spp. bacteria in a study of bottlenose dolphins in Texas (Reif et al., in review). A similar and more pronounced trend was seen in relationship to the pseudorabies virus; however, since pseudorabies virus is not known to infect bottlenose dolphins, the significance of this finding is not clear. Concentrations of contaminants were higher in dolphins having evidence of exposure to the cetacean morbillivirus. The reason for the difference in the relationship between antibody titers to bacteria and pseudorabies and antibody titers to cetacean morbillivirus is not understood.

### **STATUS OF STOCK**

The status of this stock relative to OSP is not known and population trends cannot be determined due to insufficient data. This species is not listed as threatened or endangered under the Endangered Species Act. The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate. This is not a strategic stock because the known level of fishery-related mortality or serious injury does not exceed PBR.

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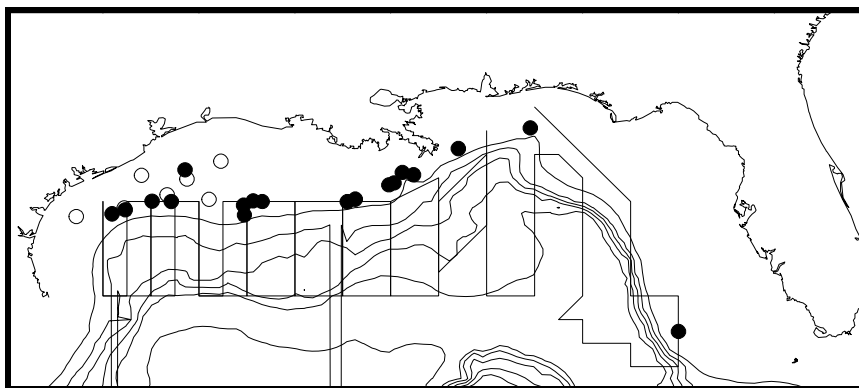
## ATLANTIC SPOTTED DOLPHIN (*Stenella frontalis*): Northern Gulf of Mexico Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

The Atlantic spotted dolphin is endemic to the Atlantic Ocean in warm temperate to tropical waters (Perrin et al. 1987, 1994). Sightings of this species are concentrated along the continental shelf edge and also occur over the continental shelf in the northern Gulf of Mexico [Fritts et al. 1983; Mullin et al. 1991; Southeast Fisheries Science Center (SEFSC) unpublished data], but they have been reported as occurring around oceanic islands and far offshore in other areas (Perrin et al. 1994). The island and offshore animals may be a different stock than those occurring on the continental shelf (Perrin et al. 1994). Atlantic spotted dolphins were seen in all seasons during seasonal recent GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). Atlantic spotted dolphins were seen in 1992 during regional aerial surveys conducted in the autumn of 1992-1994 over the U.S. continental shelf [see Blaylock and Hoggard (1994) for a description of the areas surveyed in 1992-1993]. These surveys were designed to estimate abundance of bottlenose dolphins and spotted dolphin abundance was not estimated. It has been suggested that there may be a seasonal movement of this species onto the continental shelf in the spring, but data supporting this hypothesis are limited (Caldwell and Caldwell 1966; Fritts et al. 1983).

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of Atlantic spotted dolphins [coefficient of variation (CV) in parentheses] by survey year was zero in 1991, 4,527 in 1992 (0.65), 4,618 in 1993 (0.62), and 2,186 in 1994 (0.85) (Hansen et al. 1995). Survey effort-weighted estimated average abundance of Atlantic spotted dolphins for all surveys combined was 3,213 (CV = 0.44) (Hansen et al. 1995).



**Figure 1.** Distribution of Atlantic spotted dolphin sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994 (filled circles) and during GOMEX regional aerial surveys during 1992-1994 (unfilled circles). The straight lines show transects during two ship surveys and are examples of typical ship survey transects. Isobaths are in 183 m (100 fm) intervals.

This is probably an underestimate and should be considered a partial stock estimate because the continental shelf areas were not generally covered by either the vessel or GulfCet aerial surveys.

### **Minimum Population Estimate**

The minimum population size was estimated using the average abundance estimate of Atlantic spotted dolphins for all surveys combined which was 3,213 (CV = 0.44) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 2,255 Atlantic spotted dolphins.

### **Current Population Trend**

No trend was identified in the annual abundance estimates. There were no sightings of this stock during 1991. The lack of sightings during 1991 may have been due to less sampling that year along the continental shelf edge where sightings of this species were concentrated. The difference in abundance estimates during 1992-1994 were not significant using the criteria of no overlap of log-normal 95 % confidence intervals.

### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. The resulting PBR, based on the partial estimate, for this stock is 23 dolphins.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of Atlantic spotted dolphins in the northern Gulf of Mexico is unknown; however, interactions between spotted dolphins and fisheries have been observed in the northern Gulf of Mexico.

There were two documented strandings of Atlantic spotted dolphins in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the dolphins which die or are seriously injured in fishery interactions wash ashore, nor will all of those that do wash ashore 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 interaction.

Total estimated average annual fishing-related mortality and serious injury of spotted dolphins (both species) is 1.5 spotted dolphins annually (CV = 0.33). Observed fishery-related mortality and serious injury for spotted dolphins is less than 10% of PBR and can be considered insignificant and approaching zero mortality and serious injury rate for this stock. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were two observed incidental takes and releases of spotted dolphins in the Gulf of Mexico during 1994, but no observed lethal takes of Atlantic spotted dolphins by this fishery in the Gulf of Mexico.

Estimates of fishery-related mortality and serious injury were based on a generalized linear model (Poisson error assumption) fit to the available observed incidental take for the entire Atlantic longline swordfish/tuna fishery (which includes the Gulf of Mexico) (SEFSC, unpublished data). Takes observed

throughout the range of this fishery were used because the species occurs generally throughout the area of the fishery, but observed takes were infrequent in any given region. Either spotted dolphin species may have been involved in the observed fishery-related mortality and serious injury incidents, but because of the difficulty of species identification by fishery observers, they cannot currently be separated. Estimated mortality and serious injury to spotted dolphins attributable to the longline fishery for the entire fishery (including waters outside of the Gulf of Mexico) for 1993 was 16 (CV = 0.19). Estimated fishery-related mortality and serious injury for the Gulf of Mexico, based on proportionality of fishing effort (number of sets) in 1993 was 4.4 spotted dolphins. Estimated average annual fishing-related mortality and serious injury of spotted dolphins attributable to this fishery during 1991-1993 was 1.5 annually (CV = 0.33).

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

### STATUS OF STOCK

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be low relative to PBR; therefore, this is not a strategic stock.

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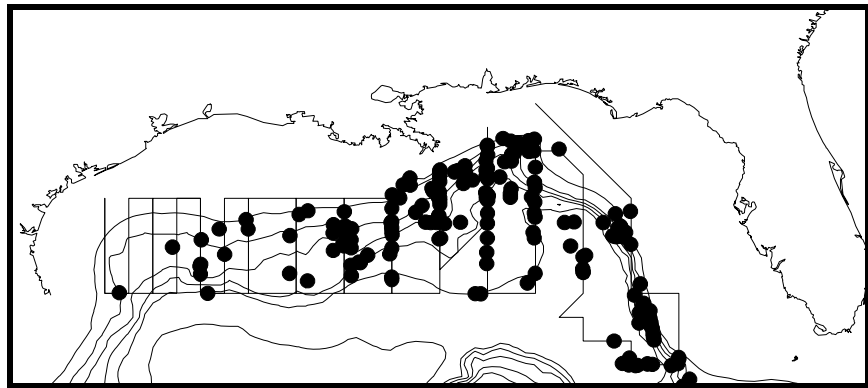
## PANTROPICAL SPOTTED DOLPHIN (*Stenella attenuata*): Northern Gulf of Mexico Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

The pantropical spotted dolphin is distributed worldwide in tropical and some sub-tropical oceans (Perrin et al. 1987; Perrin and Hohn 1994). Sightings of this species occurred over the deeper waters of the northern Gulf of Mexico, and rarely over the continental shelf or continental shelf edge [Mullin et al. 1991; Southeast Fisheries Science Center (SEFSC) unpublished data]. Pantropical spotted dolphins were seen in all seasons during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). Some of the Pacific populations have been divided into different geographic stocks based on morphological characteristics (Perrin et al. 1987; Perrin and Hohn 1994); however, there is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of pantropical spotted dolphins by survey year [coefficient of variation (CV) in parentheses] was 19,767 in 1991 (0.45), 15,280 in 1992 (0.36), 29,414 in 1993 (0.29), and 71,847 in 1994 (0.31) (Hansen et



**Figure 1.** Distribution of pantropical spotted dolphin sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

al. 1995). Survey effort-weighted estimated average abundance of pantropical spotted dolphins for all surveys combined was 31,320 (CV = 0.20) (Hansen et al. 1995).

### Minimum Population Estimate

The minimum population size was estimated from the average estimated abundance of pantropical spotted dolphins which was 31,320 (CV = 0.20) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 26,510 pantropical spotted dolphins.

### **Current Population Trend**

The 1994 abundance estimate was larger than the estimates for 1991-1993. The 1992 and 1994 estimates were significantly different using the criteria of no overlap of log-normal 95% confidence intervals, but differences within 1991-1993 estimates and differences between 1991, 1993, and 1994 were not significant. The observed differences in abundance estimates may have been caused by inter-annual variation in distribution patterns and spatial sampling, rather than changes in population size.

### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. The resulting PBR for this stock is 265 animals.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of pantropical spotted dolphins in the northern Gulf of Mexico is unknown; however, interactions between spotted dolphins and fisheries have been observed in the northern Gulf of Mexico.

There was one documented stranding of a pantropical spotted dolphin in the northern Gulf of Mexico during 1987-1994 which was classified as likely caused by fishery interactions. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the dolphins which die or are seriously injured in fishery interactions wash ashore, nor will all of those that do wash ashore 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 interaction.

Total estimated average annual fishing-related mortality and serious injury of spotted dolphins (both species) is 1.5 spotted dolphins annually (CV = 0.33). Observed fishery-related mortality and serious injury for spotted dolphins is less than 10% of PBR and can be considered insignificant and approaching zero mortality and serious injury rate for this stock. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were two observed incidental takes and releases of spotted dolphins in the Gulf of Mexico during 1994, but no observed lethal takes of Atlantic spotted dolphins by this fishery in the Gulf of Mexico.

Estimates of fishery-related mortality and serious injury were based on a generalized linear model (Poisson error assumption) fit to the available observed incidental take for the entire Atlantic longline swordfish/tuna fishery (which includes the Gulf of Mexico) (SEFSC, unpublished data). Takes observed throughout the range of this fishery were used because the species occurs generally throughout the area of the fishery, but observed takes were infrequent in any given region. Either spotted dolphin species may have been involved in the observed fishery-related mortality and serious injury incidents, but because of the difficulty of species identification by fishery observers, they cannot currently be separated. Estimated mortality and serious injury to spotted dolphins attributable to the longline fishery for the entire fishery (including waters outside of the Gulf of Mexico) for 1993 was 16 (CV = 0.19). Estimated fishery-related mortality and serious injury for



the Gulf of Mexico, based on proportionality of fishing effort (number of sets) in 1993 was 4.4 spotted dolphins. Estimated average annual fishing-related mortality and serious injury of spotted dolphins attributable to this fishery during 1991-1993 was 1.5 annually (CV = 0.33).

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore, this is not a strategic stock.

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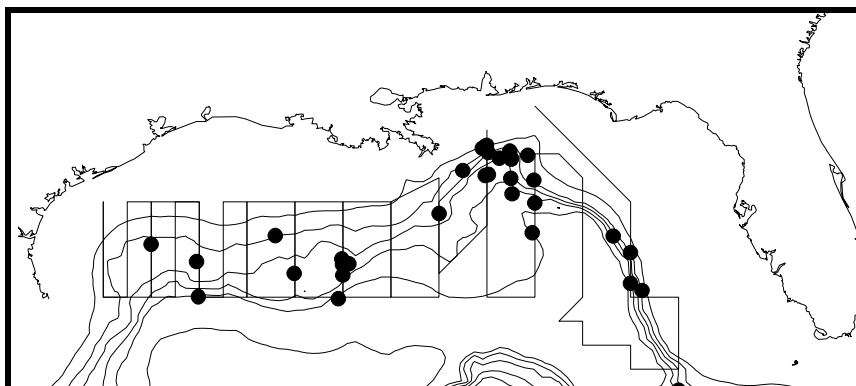
## STRIPED DOLPHIN (*Stenella coeruleoalba*): Northern Gulf of Mexico Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

The striped dolphin is distributed worldwide in tropical to warm temperate oceanic waters (Leatherwood and Reeves 1983; Perrin et al. 1994). Sightings of these animals in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf [Mullin et al. 1991; Southeast Fisheries Science Center (SEFSC) unpublished data]. Striped dolphins were seen in fall, winter, and spring during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). There is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of striped dolphins by survey year [coefficient of variation (CV) in parentheses] was 3,483 in 1991 (0.76), 2,574 in 1992 (0.52), 4,160 in 1993 (0.63), and 8,147 in 1994 (0.60) (Hansen et al. 1995). Survey effort-weighted estimated average abundance of striped dolphins for all surveys combined was 4,858 (CV = 0.44) (Hansen et al. 1995).



**Figure 1.** Distribution of striped dolphin sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

The minimum population size was estimated from the average estimate abundance which was 4,858 striped dolphins (CV = 0.44) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 3,409 striped dolphins.

### **Current Population Trend**

The abundance estimates for 1991-1993 were less than the 1994 estimate. The abundance estimates were not significantly different using the criteria of no overlap of log-normal 95% confidence intervals. The apparent differences in abundance estimates may have been caused by small sample sizes; only 29 observations of herds of striped dolphins were used in the distance sampling analysis. The differences in the estimates may also have been caused by inter-annual variation in distribution patterns and spatial sampling, rather than changes in population size.

### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 34 striped dolphins.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of striped dolphins in the northern Gulf of Mexico is unknown. Available information indicates there likely is little, if any, fisheries interaction with striped dolphins in the northern Gulf of Mexico. There have been no logbook reports of fishery-related mortality or serious injury and no fishery-related mortality or serious injury has been observed.

There were no documented strandings of striped dolphins in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the dolphins which die or are seriously injured in fishery interactions wash ashore, nor will all of those that do wash ashore 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 interaction.

Total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury to striped dolphins by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

## STATUS OF STOCK

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore, this is not a strategic stock.

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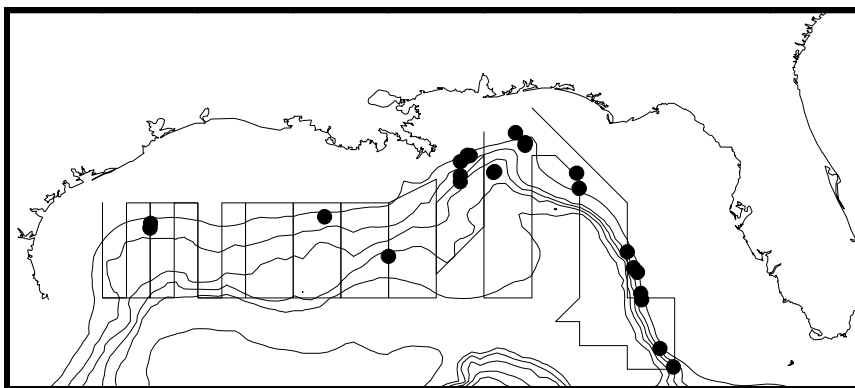
## SPINNER DOLPHIN (*Stenella longirostris*): Northern Gulf of Mexico Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

The spinner dolphin is distributed worldwide in tropical to warm temperate waters in the world's oceans (Leatherwood and Reeves 1983; Perrin and Gilpatrick 1994). Sightings of these animals in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf [Southeast Fisheries Science Center (SEFSC) unpublished data]. Spinner dolphins were seen in winter, spring and summer during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). Different geographic stocks have been identified in the Pacific based on morphological characteristics (Perrin and Gilpatrick 1994); however, there is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of spinner dolphins by survey year [coefficient of variation (CV) in parentheses] was zero in 1991, 2,593 in 1992 (0.63), 2,336 in 1993 (0.62), and 15,995 in 1994 (0.67) (Hansen et al. 1995). Survey effort-weighted estimated average abundance of spinner dolphins for all surveys combined was 6,316 (CV = 0.43) (Hansen et al. 1995).



**Figure 1.** Distribution of spinner dolphin sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

The minimum population size was estimated from the average estimate abundance which was 6,316 spinner dolphins (CV = 0.43) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 4,465 spinner dolphins.

### **Current Population Trend**

The abundance estimates for 1992 and 1993 were approximately the same and the 1994 estimate was considerably larger; however, the estimates were not significantly different using the criteria of no overlap of log-normal 95% confidence intervals. The apparent differences in abundance estimates may have been caused by less sampling effort during 1991 (Hansen et al. 1995), or by inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size.

### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates for this stock are not known; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 45 spinner dolphins.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of spinner dolphins in the northern Gulf of Mexico is unknown. Available information indicates there likely is little, if any, fisheries interaction with spinner dolphins in the northern Gulf of Mexico. There have been no logbook reports of fishery-related mortality or serious injury and no fishery-related mortality or serious injury has been observed.

There were no documented strandings of spinner dolphins in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the dolphins which die or are seriously injured in fishery interactions wash ashore, nor will all of those that do wash ashore 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 interaction.

The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury of spinner dolphins by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-

caused mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore, this is not a strategic stock.

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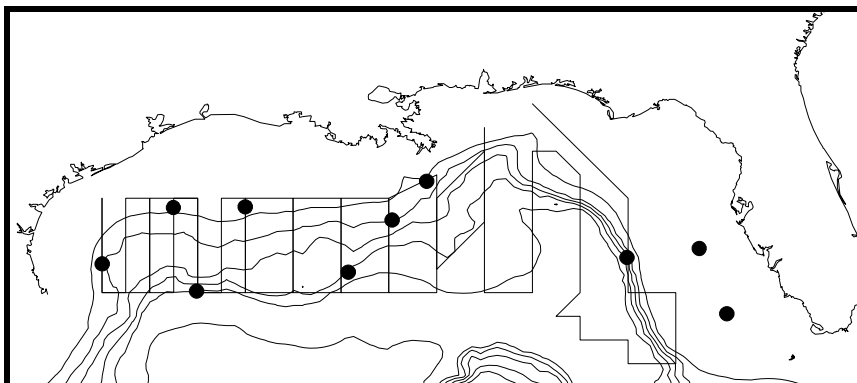
## ROUGH-TOOTHED DOLPHIN (*Steno bredanensis*): Northern Gulf of Mexico Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

The rough-toothed dolphin is distributed worldwide in tropical to warm temperate waters (Leatherwood and Reeves 1983; Miyazaki and Perrin 1994). Sightings of these animals in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf [Southeast Fisheries Science Center (SEFSC) unpublished data]. Rough-toothed dolphins were seen in all seasons during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). There is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of rough-toothed dolphins by survey year [coefficient of variation (CV) in parentheses] was 545 in 1991 (1.15), 758 in 1992 (0.58), 1,192 in 1993 (0.48), and 527 in 1994 (0.86) (Hansen et al. 1995).



**Figure 1.** Distribution of rough-toothed dolphin sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

Survey effort-weighted estimated average abundance of rough-toothed dolphins for all surveys combined was 852 (CV = 0.31) (Hansen et al. 1995).

### Minimum Population Estimate

The minimum population size was estimated from the average estimate abundance which was 852 rough-toothed dolphins (CV = 0.31) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 660 rough-toothed dolphins.

### Current Population Trend

The 1993 abundance estimate was greater than the 1991, 1992, and 1994 estimates; however, the abundance estimates were not significantly different using the criteria of no overlap of log-normal 95%



confidence intervals. The apparent differences in abundance estimates may have been caused by small sample sizes (Hansen et al. 1995) or by inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. The resulting PBR for this stock is 6.6 rough-toothed dolphins.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of rough-toothed dolphins in the northern Gulf of Mexico is unknown. Available information indicates there likely is little, if any, fisheries interaction with rough-toothed dolphins in the northern Gulf of Mexico. There have been no logbook reports of fishery-related mortality or serious injury and no fishery-related mortality or serious injury has been observed.

There were no documented strandings of rough-toothed dolphins in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

Total fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury of rough-toothed dolphins by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore, this is not a strategic stock.

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## CLYMENE DOLPHIN (*Stenella clymene*): Northern Gulf of Mexico Stock

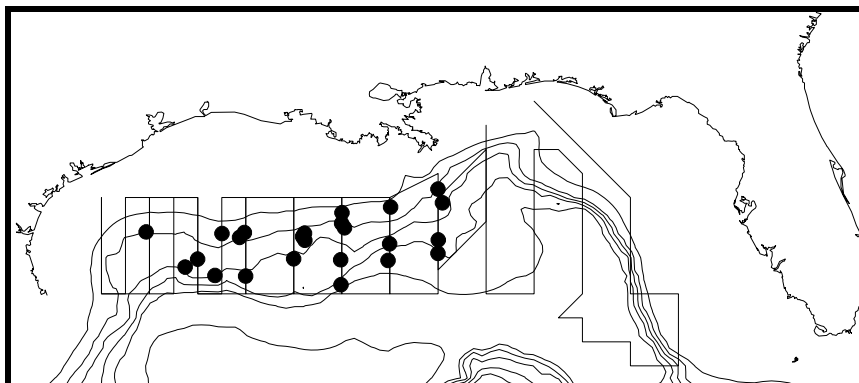
### STOCK DEFINITION AND GEOGRAPHIC RANGE

The Clymene dolphin is endemic to tropical and sub-tropical waters of the Atlantic (Leatherwood and Reeves 1983; Perrin and Mead 1994). Sightings of these animals in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf (Mullin et al. 1994). Clymene dolphins were seen in the winter, spring and summer during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). There is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of

the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of Clymene dolphins by survey year [coefficient of variation (CV) in parentheses] was 1,936 in 1991 (0.69), 3,390 in 1992 (0.48), 6,486 in 1993 (0.46), and 12,255 in 1994 (0.62) (Hansen et al. 1995). Survey effort-weighted estimated average abundance of Clymene dolphins for all surveys combined was 5,571 (CV = 0.37) (Hansen et al. 1995).



**Figure 1.** Distribution of clymene dolphin sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

The minimum population size was estimated from the average estimate abundance which was 5,571 Clymene dolphins (CV = 0.37) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 4,120 Clymene dolphins.

### Current Population Trend

The abundance estimates showed an increasing trend during 1991-1994; however, the estimates were not significantly different using the criteria of no overlap of log-normal 95% confidence intervals. The apparent differences in abundance estimates may have been caused by small sample sizes (Hansen et al. 1995) or by

inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 41 Clymene dolphins.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of Clymene dolphins in the northern Gulf of Mexico is unknown. Available information indicates there likely is little, if any, fisheries interaction with Clymene dolphins in the northern Gulf of Mexico. There have been no logbook reports of fishery-related mortality or serious injury and no fishery-related mortality or serious injury has been observed.

There were no documented strandings of Clymene dolphins in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury to Clymene dolphins by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore, this is not a strategic stock.

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## FRASER'S DOLPHIN (*Lagenodelphis hosei*): Northern Gulf of Mexico Stock

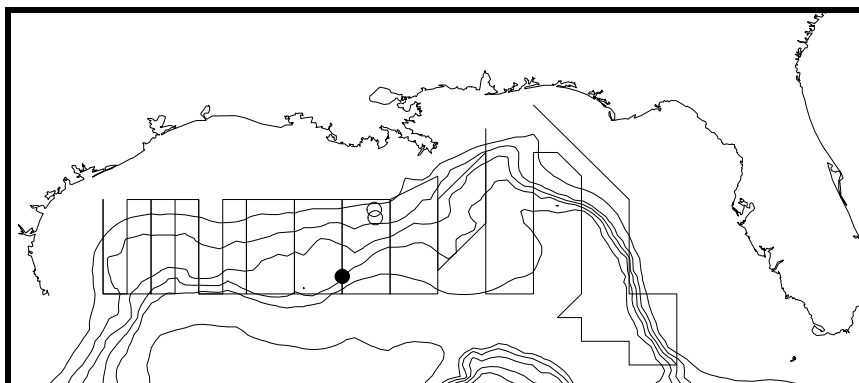
### STOCK DEFINITION AND GEOGRAPHIC RANGE

Fraser's dolphin is distributed worldwide in tropical waters (Perrin et al. 1994). Sightings of these animals in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf (Leatherwood et al. 1993). Fraser's dolphins have been observed recently in the northern Gulf of Mexico during the spring, summer, and fall (Leatherwood et al. 1993), and also were seen in the winter during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). There is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of

the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of Fraser's dolphins by survey year [coefficient of variation (CV) in parentheses] was zero in 1991, 443 in 1992 (0.92), and zero in 1993 and 1994 (Hansen et al. 1995). Survey effort-weighted estimated average abundance of Fraser's dolphins for all vessel surveys combined was 127 (CV = 0.90) (Hansen et al. 1995).



**Figure 1.** Distribution of Fraser's dolphin sightings during NOAA Ship Oregon II surveys during 1991-1994 (filled circle) and during GulfCet seasonal aerial surveys (unfilled circles). The straight lines show transects during two ship surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

The minimum population size was estimated from the average estimate abundance which was 127 Fraser's dolphins (CV = 0.90) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 66 Fraser's dolphins.

### Current Population Trend

No trend was identified in the annual abundance estimates. There were no observations of Fraser's dolphins during 1991 and 1993 vessel surveys, and the 1992 estimate is based on only one observation (Hansen et al. 1995); however, five other sightings of Fraser's dolphins were documented in the northern Gulf of Mexico during other surveys in 1992, 1993 and 1994 (Leatherwood et al. 1993, SEFSC unpublished data). The

apparent differences in abundance estimates may have been caused by low sampling intensity relative to population size (Hansen et al. 1995) or by inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 0.7 Fraser's dolphins.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of Fraser's dolphins in the northern Gulf of Mexico is unknown. Available information indicates there likely is little, if any, fisheries interaction with Fraser's dolphins in the northern Gulf of Mexico. There have been no logbook reports of fishery-related mortality or serious injury and no fishery-related mortality or serious injury has been observed.

There were no documented strandings of Fraser's dolphins in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

Available information indicates there likely is little, if any, fisheries interaction with Fraser's dolphins in the northern Gulf of Mexico. The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury of Fraser's dolphins by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore this is not a strategic stock.

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## **KILLER WHALE (*Orcinus orca*): Northern Gulf of Mexico Stock**

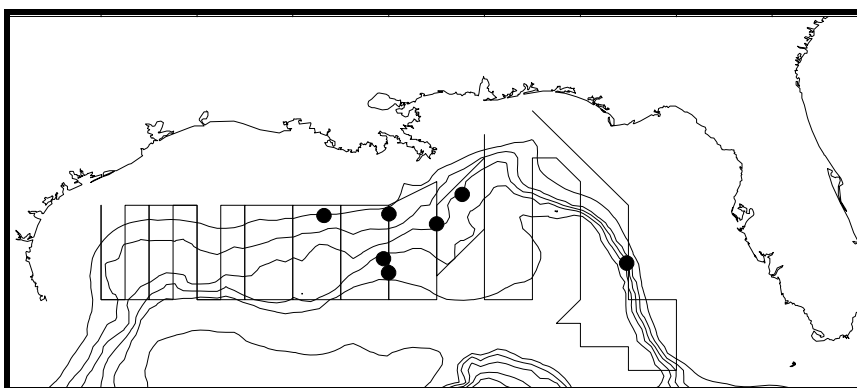
### **STOCK DEFINITION AND GEOGRAPHIC RANGE**

The killer whale is distributed worldwide from tropical to polar regions (Leatherwood and Reeves 1983). Sightings of these animals in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf [Southeast Fisheries Science Center (SEFSC) unpublished data]. Killer whales were seen only in the summer during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation) and in the late spring during vessel surveys (SEFSC unpublished data). Different stocks have been identified in the northeastern Pacific based on morphological, behavioral, and genetic characteristics (Bigg et al. 1990; Hoelzel 1991). There is no information on stock differentiation for the Atlantic population, although an analysis of vocalizations of killer whales from Iceland and Norway indicated that stocks from these areas may represent different stocks (Moore et al. 1988).

### **POPULATION SIZE**

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the

U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated killer whale abundance by survey year [coefficient of variation (CV) in parentheses] was zero in 1991, 138 in 1992 (0.96), 641 in 1993 (0.50), and 193 in 1994 (1.12) (Hansen et al. 1995). Survey effort-weighted estimated average abundance of killer whales for all surveys combined was 277 (CV = 0.42) (Hansen et al. 1995).



**Figure 1.** Distribution of killer whale sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### **Minimum Population Estimate**

The minimum population size was estimated from the average estimate abundance which was 277 killer whales (CV = 0.42) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 197 killer whales.

### **Current Population Trend**

The abundance estimates were highest during 1993; however, there were no observations of this species during 1991, and the 1992-1994 estimates were not significantly different using the criteria of no overlap of log-normal 95% confidence intervals. The apparent differences in abundance estimates may have been caused by lower sampling effort during 1991, and by low sampling intensity relative to population size (Hansen et al. 1995) or by inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size. Preliminary analysis of existing photo-identification data shows that some individual whales have been seen during more than one survey (SEFSC unpublished data).

### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates for this stock are not known; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 2.0 killer whales.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of killer whales in the northern Gulf of Mexico is unknown. Available information indicates there likely is little, if any, fisheries interaction with killer whales in the northern Gulf of Mexico. There have been no logbook reports of fishery-related mortality or serious injury and no fishery-related mortality or serious injury has been observed.

There were no documented strandings of killer whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury of killer whales by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore, this is not a strategic stock.

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## FALSE KILLER WHALE (*Pseudorca crassidens*): Northern Gulf of Mexico Stock

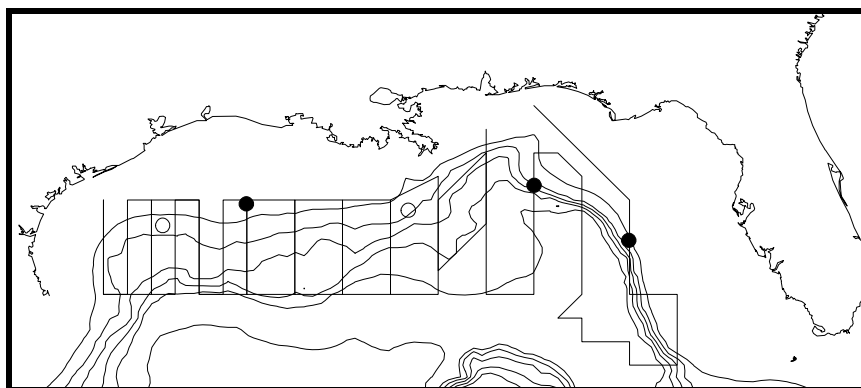
### STOCK DEFINITION AND GEOGRAPHIC RANGE

The false killer whale is distributed worldwide throughout warm temperate and tropical oceans (Leatherwood and Reeves 1983). Sightings of this species in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf [Southeast Fisheries Science Center (SEFSC) unpublished data]. False killer whales were seen only in the summer during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation) and in the late spring during vessel surveys (NMFS unpublished data). There is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of

the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of false killer whales by survey year [coefficient of variation (CV) in parentheses] was 661 in 1991 (0.88), 196 in 1992 (1.00), 77 in 1993 (1.08), and 744 in 1994 (1.14) (Hansen et al. 1995). Survey effort-weighted estimated average abundance of false killer whales for all surveys combined was 381 (CV = 0.62) (Hansen et al. 1995).



**Figure 1.** Distribution of false killer whale sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994 (filled circles) and during GulfCet seasonal aerial surveys (open circles). The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

The minimum population size was estimated from the average estimate abundance which was 381 false killer whales (CV = 0.62) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 236 false killer whales.

### Current Population Trend

No trend was identified in the annual abundance estimates, and the differences in the abundance estimates were not significant using the criteria of no overlap of log-normal 95% confidence intervals. The apparent differences in abundance estimates may have been caused by lower sampling effort during 1991, by

low sampling intensity relative to population size (Hansen et al. 1995), or by inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 2.4 false killer whales.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of false killer whales in the northern Gulf of Mexico is unknown. Available information indicates there likely is little, if any, fisheries interaction with false killer whales in the northern Gulf of Mexico. There have been no logbook reports of fishery-related mortality or serious injury and no fishery-related mortality or serious injury has been observed.

There were no documented strandings of false killer whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury of false killer whales by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore, this is not a strategic stock.

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## PYGMY KILLER WHALE (*Feresa attenuata*): Northern Gulf of Mexico Stock

### STOCK DEFINITION AND GEOGRAPHIC RANGE

The pygmy killer whale is distributed worldwide in tropical and subtropical waters (Ross and Leatherwood 1994). Sightings of these animals in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf [Southeast Fisheries Science Center (SEFSC) unpublished data]. Pygmy killer whales and melon-headed whales (*Peponocephala electra*) are difficult to distinguish and sightings of either species are often categorized as pygmy killer/melon-headed whales. Sightings of this category were documented in all seasons during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). There is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of

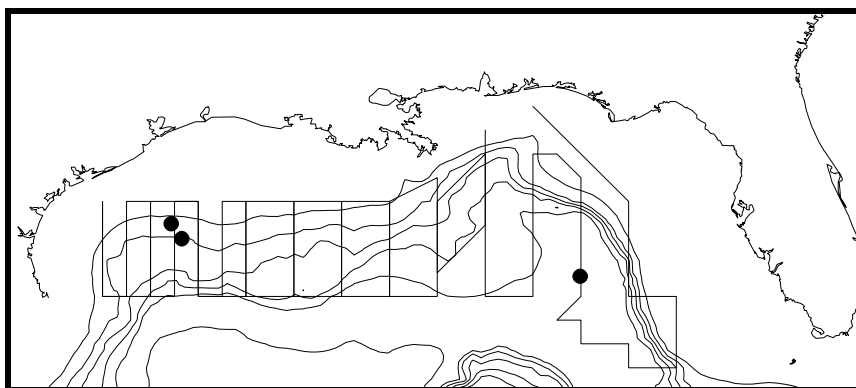
the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of pygmy killer whales by survey year [coefficient of variation (CV) in parentheses] was 2,347 in (0.81), 356 in 1992 (0.73), 153 in 1993 (1.13), and zero in 1994 (Hansen et al. 1995).

Survey effort-weighted

estimated average abundance of pygmy killer whales for all surveys combined was 518 (CV = 0.81) (Hansen et al. 1995).

### Minimum Population Estimate

The minimum population size was estimated from the average estimated abundance which was 518 pygmy killer whales (CV = 0.81) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 285 pygmy killer whales.



**Figure 1.** Distribution of pygmy killer whale sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### **Current Population Trend**

A declining trend was identified in the annual abundance estimates; however, the 1991-1993 abundance estimates were not significantly different using the criteria of no overlap of log-normal 95% confidence intervals. There were no observations of this species during the 1994 survey. The apparent differences in abundance estimates may have been caused by lower sampling effort during 1991, by low sampling intensity relative to population size (Hansen et al. 1995), or by inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size.

### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 2.8 pygmy killer whales.

### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

There has historically been some take of this species in small cetacean fisheries in the Caribbean (Caldwell and Caldwell 1971); however, the level of past or current, direct, human-caused mortality of pygmy killer whales in the northern Gulf of Mexico is unknown. Available information indicates there likely is little, if any, fisheries interaction with pygmy killer whales in the northern Gulf of Mexico. There have been no logbook reports of fishery-related mortality or serious injury and no fishery-related mortality or serious injury has been observed.

There were no documented strandings of pygmy killer whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury of pygmy killer whales by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.



## STATUS OF STOCK

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of human-caused mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore, this is not a strategic stock.

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## MELON-HEADED WHALE (*Peponocephala electra*): Northern Gulf of Mexico Stock

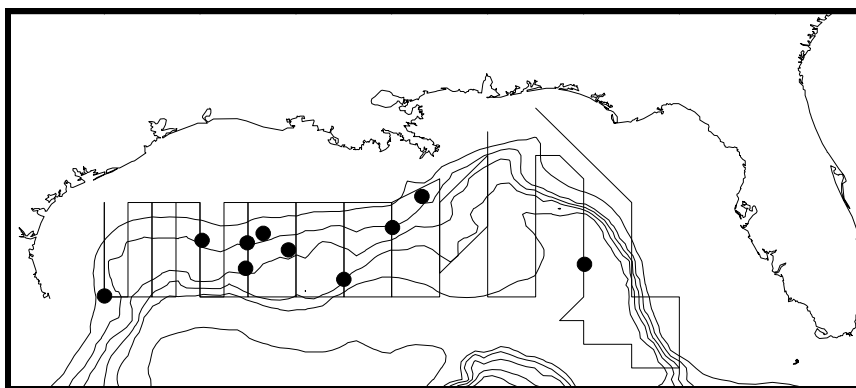
### STOCK DEFINITION AND GEOGRAPHIC RANGE

The melon-headed whale appears to be distributed worldwide in tropical to sub-tropical waters (Perryman et al. 1994). Sightings of these animals in the northern Gulf of Mexico occur primarily over the deeper waters off the continental shelf (Mullin et al. 1994). Melon-headed whales and pygmy killer whales (*Feresa attenuata*) are difficult to distinguish and sightings of either species are often categorized as pygmy killer/melon-headed whales. Sightings of this category were documented in all seasons during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). There is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Seasonal aerial survey data were insufficient for estimating abundance. Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig.1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone.

The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of melon-headed whales by survey year [coefficient of variation (CV) in parentheses] was zero in 1991, 3,174 in 1992 (0.54), 827 in 1993 (0.70) and 10,586 in 1994 (0.48) (Hansen et al. 1995). The survey effort-weighted estimated average abundance of melon-headed whales for all surveys combined was 3,965 (CV = 0.39) (Hansen et al. 1995).



**Figure 1.** Distribution of melon-headed whale sightings during NOAA Ship Oregon II marine mammal surveys in 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) depth intervals.

### Minimum Population Estimate

The minimum population size was estimated from the average abundance estimate which was 3,965 (CV = 0.39) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 2,888 melon-headed whales.

### Current Population Trend

No trend was identified in the annual abundance estimates; however, the 1994 estimate was more than ten times larger than the 1993 estimate and the difference was significant using the criteria of no overlap of log-

normal 95% confidence intervals. No melon-headed whales were sighted during 1991, and the differences between the 1992 and 1993 estimates and between the 1993 and 1994 estimates were not significant. The apparent differences in abundance estimates may have been caused by lower sampling effort during 1991, and by low sampling intensity relative to population size (Hansen et al. 1995), or by inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 29 melon-headed whales.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

There has historically been some take of this species in small cetacean fisheries in the Caribbean (Caldwell et al. 1976); however, the level of past or current, direct, human-caused mortality of melon-headed whales in the northern Gulf of Mexico is unknown. Available information indicates there likely is little, if any, fisheries interaction with melon-headed whales in the northern Gulf of Mexico. There have been no logbook reports of fishery-related mortality or serious injury and no fishery-related mortality or serious injury has been observed.

There were no documented strandings of melon-headed whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

The total known fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. There were no reports of mortality or serious injury to melon-headed whales by this fishery.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown. This species is not listed under the Endangered Species Act. There are insufficient data to determine population trends. The total level of fishery-related mortality and serious injury is unknown, but it is believed to be insignificant relative to PBR; therefore, this is not a strategic stock.

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

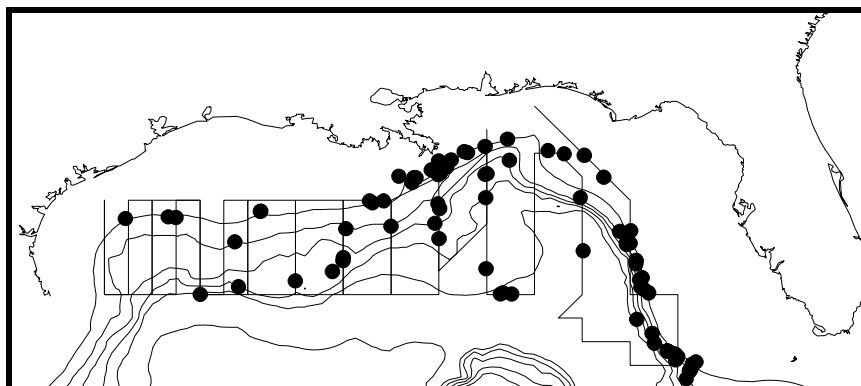
### STOCK DEFINITION AND GEOGRAPHIC RANGE

Risso's dolphin is distributed worldwide in tropical to warm temperate waters (Leatherwood and Reeves 1983). Sightings of these animals in the northern Gulf of Mexico occur primarily along the continental shelf and continental slope (Mullin et al. 1991; Southeast Fisheries Science Center, SEFSC, unpublished data). Risso's dolphin were seen in all seasons during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation) and in the late spring during vessel surveys (SEFSC, unpublished data). There is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Seasonal aerial survey data were insufficient for abundance estimation. Estimates of abundance were derived through the application of distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) to sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig.1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted

throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range and these data were not used for abundance estimation. Estimated abundance of Risso's dolphins by survey year [coefficient of variation (CV) in parentheses] was 667 in 1991 (0.95), 2,325 in 1992 (0.34), 1,408 in 1993 (0.41), and 6,332 in 1994 (0.45) (Hansen et al. 1995). Survey effort-weighted average abundance of Risso's dolphins estimated for all surveys combined was 2,749 (CV = 0.27) (Hansen et al. 1995).



**Figure 1.** Distribution of Risso's dolphin sightings during NOAA Ship Oregon II marine mammal surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

The minimum population size was estimated from the average abundance estimate which was 2,749 Risso's dolphins (CV = 0.27) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 2,199 Risso's dolphins.

### Current Population Trend

No trend was identified in the annual abundance estimates. The 1994 abundance estimate was greater than the other annual estimates, but no annual estimates differed significantly using the criteria of no overlap of log-normal 95% confidence intervals. The apparent differences in abundance estimates may have been

caused by lower sampling effort during 1991 (Hansen et al. 1995) or by inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates for this stock are not known; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 22 Risso's dolphins.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of Risso's dolphins in the northern Gulf of Mexico is unknown. This species has been taken in the U.S. longline swordfish/tuna fishery in the northern Gulf of Mexico and in the U.S. Atlantic (Lee et al. 1994). Estimated average annual fishery-related mortality and serious injury attributable to the longline swordfish/tuna fishery in the Gulf of Mexico during 1992-1993 was 19 Risso's dolphins annually (CV = 0.20).

There were no documented strandings of Risso' dolphins in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

The total estimated fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR and, therefore, cannot be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fisheries Information**

Interactions between the U.S. longline swordfish/tuna fishery and Risso' dolphins have been documented in the northern Gulf of Mexico (Lee et al. 1994). Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery has been monitored with about 5% observer coverage, in terms of trips observed, since 1992. One Risso's dolphin was observed taken and released alive during 1992; the extent of injury to the animal was unknown (SEFSC, unpublished data). One lethal take of a Risso's dolphin by the fishery was observed in the Gulf of Mexico during 1993 (SEFSC, unpublished data). Annual fishery-related mortality and incidental injury was estimated using a generalized linear model (Poisson error assumption) fit to the available observed incidental take data for the entire fishery and partitioned on the fishery effort (number of sets) in the Gulf of Mexico. Estimated total mortality and serious injury to Risso's dolphins (CV in parentheses) in the Gulf of Mexico in 1992 was 24 (0.19), and in 1993 it was 13 (0.20). Estimated average annual fishery-related mortality and serious injury attributable to the longline swordfish/tuna fishery in the Gulf of Mexico during 1992-1993 was 19 Risso's dolphins annually (CV = 0.20).

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

#### **STATUS OF STOCK**

The status of this stock relative to OSP is unknown. This species is not listed under the Endangered Species Act and there are insufficient data to determine population trends. This is not a strategic stock because fishery-related mortality and serious injury does not exceed PBR; however, fishery-related mortality and serious injury is very close to PBR and requires close monitoring.

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

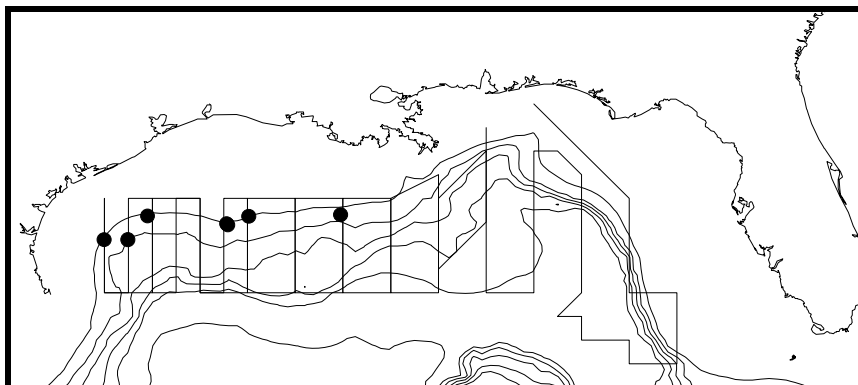
### STOCK DEFINITION AND GEOGRAPHIC RANGE

The short-finned pilot whale is distributed worldwide in tropical to warm temperate waters (Leatherwood and Reeves 1983). Sightings of these animals in the northern Gulf of Mexico occur primarily along the continental shelf and continental slope [Mullin et al. 1991; Southeast Fisheries Science Center (SEFSC) unpublished data]. Short-finned pilot whales were seen in all seasons during recent seasonal GulfCet aerial surveys of the northern Gulf of Mexico during 1993-1995 (Davis et al., in preparation). There is no information on stock differentiation for the Atlantic population.

### POPULATION SIZE

Abundance was estimated using distance sampling analysis (Buckland et al. 1993) and the computer program DISTANCE (Laake et al. 1993) with sighting data collected during 1991-1994 spring-summer, visual sampling, line-transect vessel surveys of the northern Gulf of Mexico (Hansen et al. 1995) (Fig. 1), which includes data collected as part of the GulfCet program (Davis et al., in preparation). These surveys were conducted throughout the area from approximately the 200 m isobath along the U.S. coast to the seaward extent of the U.S. Exclusive Economic Zone. The seasonal GulfCet aerial surveys included only a small portion of the stock range, so those data were not used for abundance estimation. Estimated abundance of short-finned pilot whales by survey year [coefficient of variation (CV) in parentheses] was zero in 1991, 909 in 1992 (0.62), 103 in 1993 (1.20), and 240 in 1994 (1.03) (Hansen et al. 1995). Survey effort-weighted estimated average abundance of short-finned pilot whales for all surveys combined was 353 (CV = 0.89) (Hansen et al. 1995).

Estimated abundance of short-finned pilot whales by survey year [coefficient of variation (CV) in parentheses] was zero in 1991, 909 in 1992 (0.62), 103 in 1993 (1.20), and 240 in 1994 (1.03) (Hansen et al. 1995). Survey effort-weighted estimated average abundance of short-finned pilot whales for all surveys combined was 353 (CV = 0.89) (Hansen et al. 1995).



**Figure 1.** Distribution of short-finned pilot whale sightings during NOAA Ship Oregon II surveys during 1991-1994. The straight lines show transects during two surveys and are examples of typical survey transects. Isobaths are in 183 m (100 fm) intervals.

### Minimum Population Estimate

The minimum population size was estimated from the average abundance estimate which was 353 pilot whales (CV = 0.89) (Hansen et al. 1995). The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normal distributed average abundance estimate, which is equivalent to the 20th percentile of the log-normal distributed abundance estimate as specified by NMFS (Anon. 1994). The minimum population estimate is 186 pilot whales.

### Current Population Trend

The annual abundance estimates were not significantly different using the criteria of no overlap of log-normal 95% confidence intervals. The variation in abundance estimates that was observed may have been caused by lower sampling effort during 1991, by low sampling intensity relative to population size (Hansen et



al. 1995), or by inter-annual variation in distribution patterns or spatial sampling patterns, rather than changes in population size.

#### **CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

Current and maximum net productivity rates are not known for this stock; therefore, the default maximum net productivity rate of 0.04 (Anon. 1994) was used for purposes of this assessment.

#### **POTENTIAL BIOLOGICAL REMOVAL**

Potential biological removal level (PBR) was specified as the product of the minimum population size, one half the maximum net productivity rate, and a recovery factor for endangered, threatened, or depleted stocks, or stocks of unknown status relative to optimum sustainable population (OSP) (Anon. 1994). The recovery factor was set at 0.50 because the status of the stock relative to OSP is unknown. PBR for this stock is 1.9 short-finned pilot whales.

#### **ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

The level of past or current, direct, human-caused mortality of short-finned pilot whales in the northern Gulf of Mexico is unknown. This species has been taken in the U.S. longline swordfish/tuna fishery in U.S. Atlantic waters (Lee et al. 1994) and there is a logbook report of a fishery-related mortality or serious injury in the northern Gulf of Mexico (NMFS unpublished data); however, fishery-related mortality or serious injury has not been observed. Total known fishery-related mortality or serious injury is estimated to be 0.3 short-finned pilot whales per year based upon the logbook report.

There were no documented strandings of short-finned pilot whales in the northern Gulf of Mexico during 1987-1994 which were classified as likely caused by fishery interactions or other human-related causes. Stranding data probably underestimate the extent of fishery-related mortality and serious injury because not all of the marine mammals which die or are seriously injured may wash ashore, nor will all of those that do wash ashore 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 interaction.

The total known fishery-related mortality and serious injury for this stock is greater than 10% of the calculated PBR and, therefore, cannot be considered insignificant and approaching zero mortality and serious injury rate. This determination cannot be made for specific fisheries until the implementing regulations for Section 118 of the MMPA have been reviewed by the public and finalized.

#### **Fisheries Information**

Pelagic swordfish, tunas, and billfish are the targets of the longline fishery operating in the U.S. Gulf of Mexico. Interactions between the U.S. longline swordfish/tuna fishery and short-finned pilot whales have been reported in the northern Gulf of Mexico (SEFSC, unpublished logbook data), but have not been observed by NMFS fishery observers. Total longline effort for the Gulf of Mexico pelagic fishery, including OCS edge, continental slope, and Mexican territorial waters, based on mandatory logbook reporting, was 4,400 sets in 1991, 4,850 sets in 1992, and 3,260 sets in 1993 (Cramer 1994). This fishery was been monitored with about 5% observer coverage in both the Atlantic Ocean and the Gulf of Mexico, in terms of trips observed, in 1992-1993. There was one logbook report of a fishery-related injury of a pilot whale in the northern Gulf of Mexico in 1991, but no fishery interactions were observed during 1992-1993. Total known fishery-related mortality or serious injury is estimated to be 0.3 short-finned pilot whales per year based upon the logbook report.

Pair trawl fishing gear has the potential to capture marine mammals, but there have been no reports of mortality or serious injury to marine mammals in the Gulf of Mexico. This fishery has not been observed by NMFS observers, and there are no other data available as to the extent of this fishery in the Gulf of Mexico. It is assumed that it is very limited in scope and duration.

## STATUS OF STOCK

The status of this stock relative to OSP is unknown and there are insufficient data to determine population trends. This species is not listed under the Endangered Species Act. The total level of estimated fishery-related mortality and serious injury is unknown, but because there is a record of a fishery-related mortality or serious injury and because of the extremely low estimated stock size, this is a strategic stock.

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