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COMMON DOLPHIN (*Delphinus delphis*): Western North Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The common dolphin may be one of the most widely distributed cetacean species, as it is found world-wide in temperate, tropical, and subtropical seas. In the North Atlantic, common dolphins occur over the continental shelf along the 200-2000 m isobaths and over prominent underwater topography from 50º N to 40º S latitude (Evans 1994). The species is less common south of Cape Hatteras, although schools have been reported as far south as eastern Florida (Gaskin 1992). NMFS is currently funding genetic and skull morphometric studies, which will provide information on common dolphin stock structure in the western North Atlantic. Preliminary work indicated a high variance in skull morphometric measurements suggesting the existence of more than a single stock. In waters off the northeastern USA coast, common dolphins are distributed along the continental slope (100 to 2,000 meters) and are associated with Gulf Stream (CETAP 1982; Selzer and Payne 1988; Waring *et al.* 1992). They occur from Cape Hatteras northeast to Georges Bank (35˚ to 42˚N) during mid-January to May (Hain *et al.* 1981; CETAP 1982; Payne *et al.* 1984). Common dolphins move onto Georges Bank and the Scotian Shelf from mid-summer to autumn (Figure 1). Selzer and Payne (1988) reported very large aggregations (greater than 3,000 animals) on Georges Bank in autumn. Common dolphins are occasionally found in the Gulf of Maine (Selzer and Payne 1988). Migration onto the Scotian Shelf and continental shelf off Newfoundland occurs during summer and autumn when water temperatures exceed 11ºC (Sergeant *et al.* 1970; Gowans and Whitehead 1995).

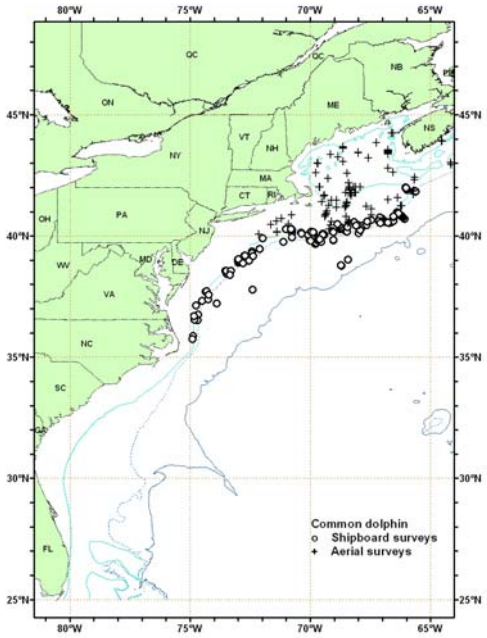

Figure 1. *Distribution of common dolphin sightings from NEFSC and SEFSC shipboard and aerial surveys during the summers of 1998, 1999, and 2004. Isobaths are the 100m, 1000m and 4000m depth contours.*

POPULATION SIZE

The total number of common dolphins off the U.S. or Canadian Atlantic coast is unknown, although several abundance estimates are available from selected regions for selected time periods. Sightings have been almost exclusively in the continental shelf edge and continental slope areas (Figure 1). An abundance of 29,610 common dolphins (CV=0.39) 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 (CETAP 1982). An abundance of 22,215 (CV=0.40) common dolphins was estimated from a June and July 1991 shipboard line-transect sighting survey conducted primarily between the 200 and 2,000 m isobaths from Cape Hatteras to Georges Bank (Waring *et al.* 1992; Waring 1998). As recommended in the GAMMS Workshop Report (Wade and Angliss 1997), estimates older than eight years are deemed unreliable, and should not be used for PBR determinations. Further, due to changes in survey methodology the earlier data should not be used to make comparisons with more current estimates.

An abundance estimate of 1,645 (CV=0.47) common dolphins was obtained from a June and July 1993 shipboard line-transect sighting survey conducted principally between the 200 and 2,000 m isobaths from the southern edge of Georges Bank, across the Northeast Channel, to the southeastern edge of the Scotian Shelf (NMFS 1993). Data were collected by two alternating teams that searched with 25x150 binoculars and were analyzed using DISTANCE (Buckland *et al.* 1993; Laake *et al.* 1993). Estimates include school size-bias, if applicable, but do not include corrections for *g(0)* or dive-time. Variability was estimated using bootstrap resampling techniques.

An abundance estimate of 6,741 (CV=0.69) common dolphins was obtained from a July to September 1995 sighting survey conducted by two ships and an airplane that covered waters from Virginia to the mouth of the Gulf of St. Lawrence (Table 1; NMFS unpublished data). Total track line length was 32,600 km. The ships covered waters between the 50 - 1000 fathom depth contour lines, the northern edge of the Gulf Stream, and the northern Gulf of Maine/Bay of Fundy region. The airplane covered waters in the Mid-Atlantic from the coastline to the 50 fathom depth contour, the southern Gulf of Maine, and shelf waters off Nova Scotia from the coastline to the 1000 fathom isobath. Data collection and analysis methods used were described in Palka (1996).

An abundance estimate of 30,768 (CV=0.32) common dolphins was derived from a line transect sighting survey conducted during 6 July to 6 September 1998 by a ship and plane that surveyed 15,900 km of track line in waters north of Maryland (38ºN) (Table 1; NMFS unpublished data; Palka 2006). Shipboard data were analyzed using the modified direct duplicate method (Palka 1995) which accounts for school size bias and *for g(0)*, the probability of detecting a group on the track line. Aerial data were not corrected for *g(0)*.

No common dolphins were encountered during the southern component of the shipboard line transect sighting survey which was conducted between 8 July and 17 August 1998 and surveyed 4,163 km of track line in waters south of Maryland (38ºN) (Mullin and Fulling 2003).

The 1998 data (as well as the data from earlier surveys) suggest that, seasonally, at least several thousand common dolphins occur in continental shelf edge waters, with perhaps the highest abundance in the Georges Bank region.

An abundance estimate of 90,547 (CV= 0.244) common dolphins was obtained from a line transect sighting survey conducted during 12 June to 4 August 2004 by a ship and plane that surveyed 10,761 km of track line in waters north of Maryland (38ºN) (Table 1; Palka 2006). Shipboard data were collected using the two independent team line transect method and analyzed using the modified direct duplicate method (Palka 1995) accounting for biases due to school size and other potential covariates, reactive movements (Palka and Hammond 2001), and *g(0)*, the probability of detecting a group on the track line. Aerial data were collected using the Hiby circle-back line transect method (Hiby 1999) and analyzed accounting for *g(0)* and biases due to school size and other potential covariates (Table 1; Palka 2005).

An abundance estimate of 30,196 (CV=0.537) common dolphins was derived from a shipboard survey of the U.S. Atlantic outer continental shelf and continental slope (water depths > 50m) between Florida and Maryland (27.5 and 38º N latitude) conducted during June-August, 2004. The survey employed two independent visual teams searching with 50x bigeye binoculuars. Survey effort was stratified to include increased effort along the continental shelf break and Gulf Stream front in the Mid-Atlantic. The survey included 5,659 km of track line, and accomplished a total of 473 cetacean sightings. Sightings were most frequent in waters north of Cape Hatteras, North Carolina along the shelf break. Data were corrected for visibility bias (*g(0)*) and group-size bias and analyzed using line-transect distance analysis (Palka, 1995; Buckland *et al.*, 2001). The resulting abundance estimate for common dolphins between Florida and Maryland was 30,196 animals (CV =0.537).

The best abundance estimate for common dolphins is the sum of the estimates from the two 2004 U.S. Atlantic surveys. This joint estimate (90,574+30,196=120,743) is considered best because the two surveys together have the most complete coverage of the species' habitat.

Table 1. Summary of abundance estimates for western North Atlantic stock of common dolphin. Month, year, and area covered during each abundance survey, and resulting abundance estimate (N_{best}) and coefficient of variation (CV).

Month/Year	Area	N_{best}	CV
Jul-Sep 1998	Maryland to Gulf of St. Lawrence	30,768	0.32
Jun-Aug 2004	Maryland to Bay of Fundy	90,547	0.24
Jun-Aug 2004	Florida to Maryland	30,196	0.54
Jun-Aug 2004	Florida to Bay of Fundy (COMBINED)	120,743	0.23

Minimum Population Estimate

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed best abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). The best estimate of abundance for common dolphins is 120,743 animals (CV =0.23)derived from the 2004 surveys. The minimum population estimate for the western North Atlantic common dolphin is 99,975.

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 (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is 99,975 animals. The maximum productivity rate is 0.04, the default value for cetaceans. The "recovery" factor, which accounts for endangered, depleted, threatened, 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 stock of common dolphin is 1,000.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery information

Detailed fishery information is reported in Appendix III.

Earlier Interactions

Prior to 1977, there was no documentation of marine mammal bycatch in distant-water fleet (DWF) activities off the northeast coast of the U.S. With implementation of the Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA), an observer program was established which recorded fishery data and information on incidental bycatch of marine mammals. During the period 1977-1986, observers recorded 123 mortalities in foreign *Loligo* squid-fishing activities (Waring *et al.* 1990). In 1985 and 1986, Italian vessels took 56 and 54 animals, respectively, which accounts for 89% (n=110) of the total takes in foreign *Loligo* squid-fishing operations. No mortalities were reported in foreign *Illex* squid fishing operations. Because of spatial/temporal fishing restrictions, most of the bycatch occurred along the continental shelf edge (100m) isobath during winter (December to February).

From 1977 to 1991, observers recorded 110 mortalities in foreign mackerel-fishing operations (Waring *et al.* 1990; NMFS unpublished data). This total includes one documented take by a U.S. vessel involved in joint-venture fishing operations in which U.S. captains transfer their catches to foreign processing vessels. The bycatch occurred during winter/spring (December to May).

Most of the estimated marine mammal bycatch in the pelagic longline fishery was from U.S. Atlantic EEZ waters between South Carolina and Cape Cod (Johnson *et al.* 1999). Between 1990 and 2000, sixteen common dolphins were hooked and released alive (Yeung *et al.* 2000; Yeung 2001).

Eight hundred and sixty-one common dolphin mortalities were observed between 1989 and 1998 in the pelagic drift gillnet fishery. Mortalities were observed in all seasons and areas. Seven animals were released alive, but 6 were injured. Estimated annual mortality and serious injury attributable to this fishery (CV in parentheses) was 540 in 1989 (0.19), 893 in 1990 (0.18), 223 in 1991 (0.12), 227 in 1992 (0.09), 238 in 1993 (0.08), 163 in 1994 (0.02), 83 in 1995 (0), 106 in 1996 (0.07) and 255 in 1998 (0). Since this fishery no longer exists, it has been excluded from Table 2.

Twelve mortalities were observed in the pelagic pair trawl between 1991 and 1995. The estimated annual fishery-related mortality and serious injury attributable to this fishery (CV in parentheses) was 5.6 in 1991 (0.53), 32 in 1992 (0.48), 35 in 1993 (0.43), 0 in 1994 and 5.6 in 1995 (0.35). Since this fishery is no longer in operation it has been deleted from Table 2.

The estimated fishery-related mortality of common dolphins attributable to the *Loligo* squid portion of the Southern New England/Mid-Atlantic Squid, Mackerel, Butterfish Trawl fisheries was 0 between 1997-1998 and 49 in 1999 (CV=0.97). However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage. After 1999 this fishery is included as a component of the mid-Atlantic bottom trawl fishery.

In the Atlantic mackerel portion of the Southern New England/Mid-Atlantic Squid, Mackerel, Butterfish Trawl fisheries, **t**he estimated fishery-related mortality was 161 (CV=0.49) animals in 1997 and 0 in 1998 and 1999. However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage. After 1999 this fishery is included as a component of the mid-Atlantic bottom trawl and mid-Atlantic mid-water trawl fisheries.

A U.S. joint venture (JV) mackerel fishery was conducted in the mid-Atlantic region from February-May 1998. Seventeen incidental takes of common dolphin were observed in the 1998 JV mackerel fishery.

There was one observed take in the Southern New England/mid-Atlantic Bottom Trawl fishery reported in 1997. The estimated fishery-related mortality for common dolphins attributable to this fishery was 93 (CV= 1.06) in 1997 and 0 in 1998 and 1999. After 1999 this fishery is included as a component of the mid-Atlantic bottom trawl fishery.

The estimated annual fishery-related mortality and serious injury attributable to the northeast sink gillnet fishery (CV in parentheses) was 0 in 1995, 63 in 1996 (1.39), 0 in 1997, 0 in 1998, 146 in 1999 (0.97) and 0 in 2000-2004.

No common dolphins were taken in observed Mid-Atlantic gillnet fishery trips during 1993 and 1994. Two common dolphins were observed taken in 1995, 1996 and 1997, and no takes were observed from 1998 to 2004. The estimated annual mortality (CV in parentheses) attributed to this fishery was 7.4 in 1995 (0.69), 43 in 1996 (0.79), 16 in 1997 (0.53), and 0 in 1998-2004.

Northeast Bottom Trawl

This fishery is active in New England waters in all seasons. One common dolphin was observed taken in 2002 and three in 2004 (Table 2).

Mid-Atlantic Bottom Trawl

Three common dolphins were observed taken in the mid-Atlantic bottom trawl fishery in 2000, two in 2001 and nine in 2004 (Table 2).

Table 2. Summary of the incidental mortality of common dolphins (*Delphinus delphis*) 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 [a]	Years	Vessels	Data Type [b]	Observer Coverage [c]	Observed Serious Injury	Observed Mortality	Estimated Serious Injury	Estimated Mortality [d]	Estimated Combined Mortality	Estimated CVs	Mean Annual Mortality
Northeast Bottom Trawl	00-04	unk	Obs. Data, Dealer, VTR Data	.01, .01, .03, .04, .05	0, 0, 0, 0, 0	0, 0, 1, 0, 3	0, 0, 0, 0, 0	unk	unk	unk	unk
Mid-Atlantic Bottom Trawl	00-04	unk	Obs. Data, Dealer	.01, .01, .01, .01, .03	0, 0, 0, 0, 0	3, 2, 0, 0, 9	0, 0, 0, 0, 0	unk	unk	unk	unk
TOTAL											unk

a. The fisheries listed in Table 2. reflect new definitions defined by the proposed List of Fisheries for 2005 (FR Vol. 69, No. 231, 2004). The 'North Atlantic bottom trawl' fishery is now referred to as the 'Northeast bottom trawl. The Illex, Loligo and Mackerel fisheries are now part of the 'mid-Atlantic bottom trawl' and 'mid-Atlantic midwater trawl' fisheries.

b. Observer data (Obs. Data), used to measure bycatch rates, are collected within the Northeast Fisheries Observer Program. NEFSC collects landings data (Dealer reported data) which are used as a measure of total landings and mandatory Vessel Trip Reports (VTR) (Trip Logbook) that are used to determine the spatial distribution of landings and fishing effort.

c. Observer coverage for trawl fisheries is measured in trips.
d. The data used to predict bycatch rates to estimate annual mortality were pooled over the years 2000-2004. The data are treated as one data set and assumed to represent average fishing practices during the time period. Regression techniques within a model framework were applied to the pooled data set. Therefore, if there was no observed bycatch reported for any one given year, this does not imply that there was no bycatch during that year. The exception would be if year was selected by the model as an important factor associated with observing bycatch.

CANADA

Between January 1993 and December 1994, 36 Spanish deep water trawlers, covering 74 fishing trips (4,726 fishing days and 14,211 sets), were observed in NAFO Fishing Area 3 (off the Grand Banks) (Lens 1997). A total of 47 incidental catches were recorded, which included 1 common dolphin. The incidental mortality rate for common dolphins was 0.007/set.

Other Mortality

From 2000 to 2004, 466 common dolphins were reported stranded between Maine and Florida (Table 3). The total includes mass stranded common dolphins in Massachusetts during 2002 (9 animals); and in North Carolina in 2001 (7 animals). Three common dolphins stranded alive in Massachusetts in 2000 were released. In 2001, the causes of death of one stranding mortality in Virginia and another animal in North Carolina were designated as human interactions/fishing interactions. Similarly in 2002, one stranding in New York and another animal in Virginia were designated as human interactions/fishery interactions.

Common dolphins were involved in two Unusual Mortality Events (UMEs) in 2004. The first occurred along the coast of Virginia from May to July 2004, when 66 small cetaceans, including four common dolphins, stranded mostly along the outer (eastern) coast of Virginia's barrier islands. Human interaction was implicated in one of the common dolphins. The second UME was declared when 36 small cetaceans, including 3 common dolphins, stranded from Maryland to Georgia between 3 July and 2 December 2004.

Four common dolphin strandings (6 individuals) were reported on Sable Island, Nova Scotia from 1996 to 1998 (Lucas and Hooker 1997; Lucas and Hooker 2000).

Table 3. Common dolphin (*Delphinus delphis*) reported strandings along the U.S. Atlantic coast, 2000-2004.

STATE	2000	2001	2002	2003	2004	TOTAL
Maine	0	1	0	0	0	1
Massachusetts[a]	10	8	34	21	26	99
Rhode Island	5	0	1	2	1	9
Connecticut	1	0	0	0	0	1
New York	4	6	5	11	3	29
New Jersey	5	5	1	6	8	35
Delaware	1	1	1	1	2	6
Maryland	3	2	0	0	4	9
Virginia[b]	1	4[c]	3	4	8	20
North Carolina[d]	6	14[c]	0	62	4	86
Georgia	1	0	0	0	0	1
Florida	0	0	1	0	0	1
EZ	0	0	0	0	1	1
TOTAL	37	41	46	51	67	466

a. Massachusetts mass strandings (2002 - 9 animals; 2004 - 6 and 3).

b. Virginia reports 1 common dolphin found in a pound net in 2004.
c. Fishery Interactions (FI)/Human Interactions (HI) - North Carolina reported 1 HI, fishing gear, April 2001; Virginia - 1 FI March 2001).
d. North Carolina mass stranding (2001 - 7 animals).
e. 2002 FI, one in NY, one in Va.

Stranding data probably underestimate the extent of fishery-related mortality and serious injury because all of the marine mammals that die or are seriously injured may not 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

The status of common 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. The total U.S. fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate. The status of the stock is unknown.

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