December 2005

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

STOCK DEFINITION AND GEOGRAPHIC RANGE

The common dolphin may be one of the most widely distributed species of cetaceans, as it is found world-wide in temperate, tropical, and subtropical seas. In the North Atlantic, common dolphins appear to be present along the coast over the continental shelf along the 200-2000m isobaths or over prominent underwater topography from 50ºN to 40ºS 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). At least some of the reported sightings of common dolphins in the Gulf of Mexico may have been *Stenella clymene*, which has a color pattern similar to that of common dolphins (Evans 1994). 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 had documented a high variance in skull morphometric measurements, suggesting the existence of more than a single stock. Common dolphins are distributed along the continental slope (100 to 2,000 meters), and are associated with Gulf Stream features in waters off the northeastern U.S. coast (CETAP 1982; Selzer and Payne 1988; Waring *et al.* 1992). They are widespread from Cape Hatteras northeast to Georges Bank (35° to 42°N) in outer continental shelf waters from mid-January to May (Hain *et al.* 1981; CETAP 1982; Payne *et al.* 1984). Common dolphins move northward onto Georges Bank and the Scotian Shelf from mid-summer to autumn (Palka *et al.* Unpub. Ms.; 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, where temperature and salinity regimes are lower than on the continental slope of the Georges Bank/Mid-Atlantic region (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).

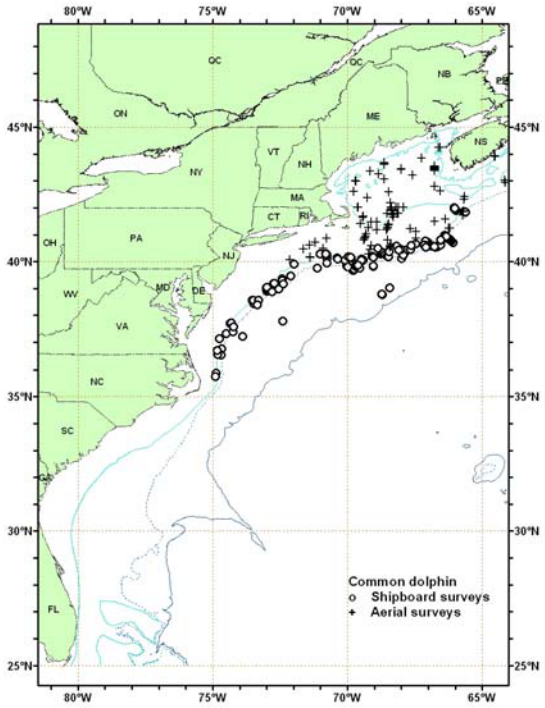

Figure 1. *Distribution of common dolphin sightings from NEFSC and SEFSC shipboard and aerial surveys during the summer 1998, 1999, and 2004. Isobaths are 100 m, 1,000 m and 4,000 m.*

POPULATION SIZE

Total numbers of common dolphins off the USA or Canadian Atlantic coast are unknown, although several estimates from selected regions of the habitat do exist for selected time periods. Sightings were 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, therefore should not be used for PBR determinations. Further, due to changes in survey methodology these data should not be used to make comparisons to more current estimates.

An abundance of 1,645 (CV=0.47) common dolphins was estimated 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 of 6,741 (CV=0.69) common dolphins was estimated 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; Palka *et al.* Unpub. Ms.). Total track line length was 32,600km. The ships covered waters between the 50 and 1,000 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 1,000 fathom isobath. Data collection and analysis methods used were described in Palka (1996).

An abundance of 30,768 (CV=0.32) common dolphins was estimated 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) (Figure 1; Palka *et al.* Unpub. Ms.). Shipboard data were analyzed using the modified direct duplicate method (Palka 1995) that accounts for school size bias and *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 SEFSC component of the joint surveys. That shipboard line transect sighting survey 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)).

Although the 1991, 1993, 1995, and 1998 surveys did not sample the same areas or encompass the entire common dolphin habitat (e.g., little effort in Scotian shelf edge waters), they did focus on segments of known or suspected high-use habitats off the northeastern USA coast. The 1993, 1995 and 1998 data suggest that, seasonally, at least several thousand common dolphins are occupying continental shelf edge waters, with perhaps highest abundance in the Georges Bank region.

An abundance of 90,547 (CV= 0.24) common dolphins was estimated 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) (Figure 1; Palka Unpub. Ms.). 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 (Figure 1; Palka Unpub. Ms.).

A ship survey of the U.S. Atlantic outer continental shelf and continental slope (water depths ▲50m) between Florida and Maryland (27.5 and 38ºN) was conducted during June-August, 2004. The survey employed two independent visual teams searching with 50x bigeye binocluars. 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 trackline, and there was a total of 473 cetacean sightings. Sightings were most frequent in waters north of Cape Hatteras, North Carolina along the shelf break. Data were analyzed to correct for visibility bias (*g(0)*) and group-size bias employing line-transect distance analysis and the direct duplicate estimator (Palka, 1995; Buckland *et al.*, 2001). The resulting abundance estimate for common dolphins between Florida and Maryland was 30,196 (CV =0.54*)*.

The best 2004 abundance estimate for common dolphins is the sum of the estimates from the two 2004 U.S. Atlantic surveys, 120,743 (CV = 0.23), where the estimate from the northern U.S. Atlantic is 90,547 (CV =0.24), and from the southern U.S. Atlantic is 30,196 (CV =0.54). This joint estimate is considered best because together these two surveys have the most complete coverage of the species' habitat.

Table 1. Summary of abundance estimates for western North Atlantic 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 (CV =0.23). The minimum population estimate for the western North Atlantic common dolphin is 99,975.

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 99,975. 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 0.48 because the CV of the average mortality estimate is between 0.3 and 0.6 (Wade and Angliss 1997), and because this stock is of unknown status. PBR for the western North Atlantic common dolphin is 960.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery information

Detailed fishery information is reported in Appendix III.

Total annual estimated average fishery-related mortality or serious injury to this stock during 1999-2003 was 119 common dolphins (CV =0.43; Table 2).

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 Fisheries Conservation and Management Act (MFCMA), an observer program was established which has recorded fishery data and information of 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).

Pelagic Drift Gillnet

Estimates of total annual bycatch 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 fisheries information. Variances were estimated using bootstrap re-sampling techniques. Eight hundred and sixty-one common dolphin mortalities were observed between 1989 and 1998 in this 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.

Pelagic Pair Trawl

Twelve mortalities were observed 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.

Pelagic Longline

Most of the estimated marine mammal bycatch 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).

Northeast Multispecies Sink Gillnet

In 1996, the first observed mortality of common dolphins in this fishery was recorded. The estimated annual fishery-related mortality and serious injury attributable to this 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 2000-2003; estimated annual mortality in 1999-2003 was 29 common dolphins (0.97) (Table 2).

Mid-Atlantic Coastal Gillnet

No common dolphins were taken in observed trips during 1993 and 1994. Two common dolphins were observed taken in 1995, 1996 and 1997, and no takes were observed from 1998-2002 (Table 2). Observed effort was concentrated off New Jersey and scattered between Delaware and North Carolina from 1 to 50 miles off the beach. All bycatches were documented during January to April. Using the observed takes, 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 1999-2003. Average annual estimated fishery-related mortality attributable to this fishery during 1999-2003 was zero common dolphins.

Southern New England/Mid-Atlantic Squid, Mackerel, Butterfish Trawl Fisheries

Illex Squid

No incidental takes of common dolphins have been observed in the *Illex* fishery.

Loligo Squid

All incidental takes attributed to this fishery were observed during the first quarter of the year (Jan-Mar), exclusively in the offshore fishery. The estimated fishery-related mortality of common dolphins attributable to the fall/winter offshore fishery was 0 between 1997-1998, 49 in 1999 (CV=0.97), 273 in 2000 (CV=0.57), 126 in 2001 (CV=1.09) and 0 in 2002-2003. The average annual mortality between 1999-2003 was 90 common dolphins (CV=0.47) (Table 2). However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage.

Atlantic Mackerel

The estimated fishery-related mortality attributed to this fishery was 161 (CV=0.49) animals in 1997 and 0 between 1999-2003. The average annual mortality between 1999-2003 was 0 (zero) (Table 2).

A U.S. joint venture (JV) fishery was conducted in the Mid-Atlantic region from February-May 1998. NMFS maintained 100% observer coverage on the foreign JV vessels where 152 transfers from the U.S. vessels were observed. Seventeen incidental takes of common dolphin were observed in the 1998 JV mackerel fishery. This fishery did not operate in 1999-2003.

Southern New England/Mid-Atlantic Bottom Trawl Fisheries

There was one observed take in this fishery reported in 1997. The estimated fishery-related mortality for common dolphins attributable to this fishery was 93 (CV=1.06) animals in 1997 and 0 between 1999-2003. The average annual mortality between 1999-2003 was 0 (zero) common dolphins (Table 2). However, these estimates should be viewed with caution due to the extremely low (<1%) observer coverage.

Table 2. Summary of the incidental mortality and serious injury 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	Years	Vessels[c]	Data Type [a]	Observer Coverage[b]	Observed Serious Injury	Observed Mortality	Estimated Serious Injury	Estimated Mortality	Estimated Combined Mortality	Estimated CVs	Mean Annual Mortality
Northeast Multispecies Sink Gillnet	99-03	349	Obs. Data Dealer, Logbooks	.06, .06, .04, .02, .03	0, 0, 0, 0, 0	2, 0, 0, 0, 0	0, 0, 0, 0, 0	146, 0, 0, 0, 0	146, 0, 0, 0, 0	.97, 0, 0, 0, 0	29 (.97)
Mid-Atlantic Coastal Gillnet	99-03	NA	Obs. Data Dealer	.05, .02, .02,.02, .01, .01	0, 0, 0, 0, 0	0, 0, 0, unk[e], 0	0, 0, 0, 0, 0	0, 0, 0, unk[e], 0	0, 0, 0, unk[e], 0	0, 0, 0, 0, unk[e], 0	0 (0)[5]
North Atlantic Bottom Trawl	99-03	TBD	Obs. Data Weighout	.001, .003, .004, .004, .021, tbd	0, 0, 0, 0, 0	0,0, 0, 1, 0	0, 0, 0, 0, 0	0,0, 0, tbd[f], tbd[f]	0,0, 0, tbd[f], tbd[f]	0,0, 0, tbd[f], tbd[f]	tbd[f]
SNE/Mid-Atlantic Loligo Squid Trawl (offshore)	99-03	384 [d]	Obs. Data Dealer	.009, .011, .012, .005, tbd	0, 0, 0, 0, 0	1, 6, 2, 0, 0	0, 0, 0, 0, 0	49, 273, 126, 0, 0	49, 273, 126, 0, 0	.78, .57, 1.09, 0, 0	90 (.47)
SNE/ Mid-Atlantic Bottom Trawl	99-03	NA	Obs. Data Dealer	.003, .003, .004,.005, tbd	0, 0,0, 0, 0	0, 0, 0, 0, 0	0, 0,0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0
SNE/Mid-Atlantic Mackerel Trawl-domestic	99-03	2,242 [d]	Obs. Data Dealer	.01, .04, .03, .006 , tbd	0, 0, 0, 0, 0	0, 0,0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0
SNE/Mid-Atlantic Mackerel Trawl-JV[g]	99-03	1999-2001=0 2002=2 2003=0	Obs. Data	NA,NA, NA, 1.00[h], NA	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0
TOTAL											119 (.43)

a 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. NEFSC collects dealer reported landings data. Total landings are used as a measure of total effort for the coastal gillnet, Northeast sink gillnet and the SNE/Mid-Atlantic and squid, mackerel, butterfish trawl fisheries.

b The observer coverage for the Northeast multispecies sink gillnet fishery are measured in trips. Observer coverage for the Mid-Atlantic coastal sink gillnet fishery is measured in tons of fish landed. Observer coverage of the SNE/Mid-Atlantic and squid, mackerel, butterfish trawl fisheries are measured in trips.

c These are numbers of potential fishing vessels based on permit holders in the 2002 fishery. Many of these vessels participate in the other fisheries and therefore the reported number of vessels are not additive across the squid, mackerel and butterfish fisheries. (67FR 65937).

d The incidental take was observed on a trip that landed scup as the primary species.

e Sixty-five percent of sampling by the NEFSC fisheries observer program was concentrated in one area and not distributed proportionally across the fishery. Therefore, observed mortality is considered unknown in 2002. The previous five year average (97-01) estimated mortality was applied.

f Mortality estimation attributed to the North Atlantic bottom trawl fishery is in progess.

g NA=No joint venture fishing effort for Atlantic mackerel.

h During joint venture fishing operations, nets that are transferred from the domestic vessel to the foreign vessels for processing are observed on board the foreign vessel. There may be nets fished by domestic vessels that do not get transferred to a foreign vessel for processing and therefore would not be observed. During TALFF fishing operations all nets fished by the foreign vessel are observed.

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 1999 to 2003, 202 common dolphins were reported stranded between Maine and Florida (Table 3). The total includes mass stranded common dolphins in Massachusetts during 1997 (10 animals) and 2002 (9 animals); 1998 (9

animals and 5 animals); and 1999 (3 animals), and in North Carolina in 2001 (7 animals). Three common dolphins which had stranded alive in Massachusetts in 2000 were released. In 1999, one stranding mortality in New Jersey was designated as a human interaction (fishing gear). In 2001, the cause of death of one stranding mortality in Virginia and another animal in North Carolina were designated as human interactions/fishing interactions. Similarly in 2002, the case of death for one stranding in New York and another animal in Virginia were designated as human interaction/fishery interaction.

Four common dolphin strandings (6 individuals) were reported on Sable Island, Nova Scotia from 1970 to 1998, with all having occurred since 1996 (Lucas and Hooker 1997; Lucas and Hooker 2000).

Table 3. Common dolphin (*Delphinus delphis*) reported strandings along the U.S. Atlantic coast, 1999-2003.

STATE	1999	2000	2001	2002[d]	2003	TOTAL
Maine	0	0	1	0	0	1
Massachusetts[a]	11	10	8	34	21	84
Rhode Island	5	5	0	1	2	13
Connecticut	0	1	0	0	0	1
New York	6	4	6	5	11	32
New Jersey	3[b]	5	5	1	6	20
Delaware	1	1	1	1	1	5
Maryland	0	3	2	0	0	5
Virginia	2	1	4[b]	3	4	14
North Carolina[c]	0	6	14[b]	0	62	26
Georgia	0	1	0	0	0	1
TOTAL	28	37	41	45	51	202

a Massachusetts mass strandings (1997 - 10 animals, 1998 - 9 and 5 animals, 1999 - 3 animals; 2002 - 9 animals)

b Fishery Interactions (FI)/Human Interactions (HI) - North Carolina reported 1 HI, fishing gear, April 2001; Virginia - 1 FI March 2001; New Jersey - 1 FI reported with net marks January 1999)

c North Carolina mass stranding (2001 - 7 animals)

d 2002 FI, one in NY, one in Va.

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 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 1999-2003 average annual fishery-related mortality and serious injury does not exceed PBR. However, the average annual mortality does not include the North Atlantic Bottom Trawl fishery, which is under analysis. In the last five editions of this stock assessment report, it has been designated as non-strategic.

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