

A Review of Coastal Bottlenose Dolphin Bycatch Mortality Estimates in Relation to the Potential Effectiveness of the Proposed CBDTRP

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Abstract

During 2001 and 2002, total estimated bycatch mortality of coastal bottlenose dolphins (*Tursiops truncatus*) attributed to mid-Atlantic gillnet fisheries was 86 (CV=22.12%) and 69 (CV=21.79%) animals, respectively. Most of these takes were from the VA and NC winter mixed stock management unit, in state waters and from large mesh fisheries. The 19% reduction in total mortality from 2001 to 2002 is attributed to a reduction in metric tons of fish landed. The average mortality (78 animals) from the present time period (2001-2002) is 66% lower than the previous 5 year (1996-2000) average (233 animals). This reduction in mortality is primarily due to reduced landings and lower bycatch rates across most of the strata. This is explained by: 1) a reduction in the landings and bycatch rate from the medium mesh spiny dogfish fishery within the state coastal habitat of the winter NC mix stock management unit due to the implementation of the spiny dogfish fishery management plan; and 2) lower estimated bycatch rates among all strata during the recent time period. The estimation of bycatch rates during the recent time period is confounded by the low probability of detecting a take with low observer coverage. Nonetheless, the reduced number of dolphins observed stranded with signs of human interaction, specifically within the winter NC mix management unit, supports the prediction of reduced bycatch in the fishery. A preliminary analysis of 2004 observed gillnet trips showed fishing practices already following the regulatory requirements for the medium mesh component of the proposed TRP for the winter NC mixed management unit. Regulatory measures in the proposed take reduction plan will insure that fishing practices known to be associated with higher bycatch rates (i.e. long soak durations in medium and large mesh fisheries) can not be prosecuted as before, if and/or when a fishery management plan is modified to allow increases in fishing effort.

Estimated Bycatch Mortality during 2001 and 2002

During 2001 and 2002, total estimated bycatch mortality of coastal bottlenose dolphins attributed to mid-Atlantic gillnet fisheries was 86 (CV=22.12%) and 69 (CV=21.79%) animals, respectively (Rossman, *in review*). Most of these takes were from the winter mixed stock management unit, in state waters and from large mesh fisheries.

During 2001 and 2002, 48 (56%) and 32 (46%) animals came from the winter VA mixed, 19 (22%) and 18 (26%) from the winter NC mixed, 11 (13%) and 11 (16%) from the summer Northern migratory, and 8 (9%) and 8 (12%) from the summer Northern NC management units, respectively (Table 1). The majority of the mortality came from the state coastal habitat (SCH) in 2001(95%) and 2002 (96%). In 2001, 53 (65%), 8 (9%) and 21 (26%) animals from the SCH came from the large, medium, and small mesh fisheries, respectively. In 2002, 39 (59%), 10 (15%) and 17 (26%) animals from the SCH came from the large, medium, and small mesh fisheries, respectively.

Because the majority of change in mortality has occurred within the winter mixed management unit the remainder of this document will focus primarily on the VA and NC sub-components of this management unit. The 19% reduction in total mortality from 2001 to 2002 is due to a reduction in landings (Fig. 1). Although landings from the large mesh category comprise a small percentage of the annual landings in the NC SCH, the high bycatch rate for this mesh category (Fig. 2) results in this mesh category being a

major contributor to total mortality for the winter mixed stock management unit (Fig. 3). During 2001 and 2002, 51% of the average mortality was derived from the winter VA management unit (Table 1). This is also due to the relatively high bycatch rate and landings from the large mesh category (Fig. 2). The small mesh fisheries in the state coastal habitat comprise the majority of combined total landings during 2001-2002 for both Virginia and North Carolina. However, the small mesh fisheries are a smaller contributor to total mortality, due to the low bycatch rates for this category (Fig. 2). Finally, although the summer Northern NC management unit has the highest bycatch rates, the landings from this management unit are relatively low. As a result, this management unit includes only 10% of the total bycatch mortality (Table 1).

Comparison of Recent Estimates to Historical Estimates

The average mortality (78 animals) from 2001-2002 is 66% lower than the previous 5 year (1996-2000) average (233 animals) (Palka and Rossman, 2001; Table 1, Fig. 4). This reduction in mortality is a result of reduced landings and lower bycatch rates across most of the strata. This is explained by:

- 1) A reduction in the landings and bycatch rate from the medium mesh spiny dogfish fishery within the state coastal habitat of the winter NC mixed stock management unit, due to the implementation of the spiny dogfish fishery management plan (NMFS, 2000); and
- 2) Lower estimated bycatch rates among all strata during the recent time period (Fig. 2). The lower estimated bycatch rates during the recent time period are confounded by the low probability of detecting a take because of low observer coverage.

Due to the reduction in medium mesh spiny dogfish landings within the SCH of the winter NC management unit, this mesh category contributed only 24% to the average coastal bottlenose dolphin mortality during the recent time period as compared to 63% during the old time period (Palka and Rossman, 2001). During the old time period, the spiny dogfish fishery from the medium mesh category was the primary contributor to total mortality in the winter NC mixed management unit, in contrast to the recent time period, where the small and large mesh categories were the primary contributor (Fig. 3)

The 2001-2002 mortality estimates from the recent time period, from the winter NC mixed management unit, may be biased low due to insufficient sampling. Within the SCH of the winter NC mixed management unit, the average observer coverage in the recent and old time periods were 0.5% and 0.8%, respectively. Due to the rarity of coastal bottlenose dolphin takes, the observer program would have to increase sampling up to 3-4x current levels in the SCH to achieve reasonable statistical confidence in the estimated bycatch rates. However, even though we may be able to detect a reduction in mortality with increased sampling, this does not imply that we have the statistical power to detect if the mortality estimate is a little above or below PBR. This is because power (the probability of rejecting a null hypothesis when it is in fact false and should be rejected) is dependent on, among other things, the minimum difference you want to detect. For example, the minimum detectable difference between a mortality estimate of 79 and 68 (PBR) is too small to be detected statistically even with moderate variances.

Despite the sampling concerns during the winter off NC, the recent decreases in dolphin strandings lend support to the reduced bycatch rates estimated from the fisheries observer data. In 2003, a review of stranding data from the state of NC revealed a decline in fishery related mortalities of coastal bottlenose dolphins adjacent to the NC winter mixed management unit during the recent time period when compared to the old time period (Byrd et al., 2003). Stranding data from the remaining coastal habitat north of NC still need to be reviewed for trends in mortality during the recent time period.

Comparison of Recent Gillnet Fishing Practices to Historical Practices

Soak duration from medium and large mesh nets was correlated with the mortality rate during 1996 to 2000 (NEFSC, 2002). Soak durations in the recent time period significantly changed from the old time period for all mesh categories, except the small mesh category in the SCH (Rossman, *in review*):

- 1) The mean soak duration during the recent time period increased significantly for all mesh categories in the federal coastal habitat. Note, the federal habitat has the lowest probability of interacting with coastal bottlenose dolphins and the state coastal habitat has the highest probability.
- 2) The mean soak duration during the recent time period decreased significantly for the medium mesh categories in the state coastal habitat from 12.06 hours during the old time period to 7.68 hours during the recent time period (Rossman, *in review*).
- 3) The mean soak duration during the recent time period increased significantly for the large mesh category from 13.30 hours during the old time period to 21.73 hours during the recent time period (Rossman, *in review*).
- 4) There was no significant change for the small mesh category.

Given the removal of the directed spiny dogfish fishery (medium mesh category), it was not surprising to find a significant bycatch reduction in the medium mesh category. The increase in soak duration of the large mesh category within the state coastal habitat, may indicate an increased chance of interacting with coastal bottlenose dolphins. Other factors associated with fishing practices have not yet been investigated for significant changes between the historical and recent time periods.

Proposed Coastal Bottlenose Dolphin Take Reduction Plan

The majority of the bycatch in the old time period was in the medium and large mesh size categories. Both of these mesh categories are addressed in the proposed TRP. Some of the regulatory measures in the proposed TRP will insure that the fishing practice of longer soak durations, known to be associated with higher bycatch rates, can not be prosecuted as before if and/or when a fishery management plan is modified to allow increased fishing effort. For example, if a directed spiny dogfish fishery (medium mesh fishery) were to return to mid-Atlantic state and federal waters, it is expected that the restriction on soak duration of medium mesh nets to less than 12 hours via the no night time fishing in the winter NC management units will maintain the recently observed reduced mortality within this fishery (NMFS, 2004). In addition, the extension of the large mesh gillnet time/area closure in state waters via sea turtle conservation measures will reduce the frequency of bottlenose dolphins interacting with large mesh gear (NMFS, 2004). And finally, it is expected that the restriction on large mesh soak durations within state waters of the winter VA mixed management unit will, at least during the months of November and December, reduce the frequency of animals interacting with the large mesh winter striped bass fishery.

Consistent with changes in soak durations observed during the recent time period, a preliminary analysis of gillnet trips observed during 2004 (January-June) showed some gillnet fishing practices already following the regulatory requirements of the currently proposed TRP. For example, in the SCH of the winter NC mixed management unit, seven different vessel were observed targeting spiny dogfish allowed by the state of NC under Proclamation FF-6-2004. All 49 hauls observed had an average mesh size less than seven inches (ranged from 5.5" to 6.3"). Ninety-six percent (47) of the hauls observed soaked for less than 3 hours. The remaining 4% (2) of the hauls soaked for 14-15 hours.

The significant recent changes in mid-Atlantic gillnet soak durations for most mesh categories raises additional questions as to how fishermen may respond to future fishery management actions, and how this will affect the future bottlenose dolphin mortality estimates. Consequently, future monitoring of these fisheries is critical. Moreover, without the insurance provided by the proposed Take Reduction Plan (TRP; NMFS, 2004) coastal bottlenose dolphins will be at risk of more frequent interactions, particularly with fishing practices (i.e. longer soak durations) once commonly associated with medium mesh and the more recent large mesh fisheries.

References

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