Northeast Fisheries Science Center Reference Document 09-19

Proration of Estimated Bycatch of Loggerhead Sea Turtles in U.S. Mid-Atlantic Sink Gillnet Gear to Vessel Trip Report Landed Catch, 2002-2006

by Kimberly T. Murray

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PURPOSE

This document provides supplemental information to that provided in Murray (2009), which analyzed sea turtle bycatch in U.S. Mid-Atlantic sink gillnet gear during 1995 though 2006. Murray (2009) described characteristics of observed sea turtle bycatch, documented the temporal and spatial distribution of bycatch rates in the gillnet fishery, and estimated the magnitude of the average annual bycatch of loggerheads in the U.S. Mid-Atlantic sink gillnet fishery. Highest predicted bycatch rates occurred in warm waters of the southern Mid-Atlantic and in large-mesh gillnets. From 1995-2006, the average annual bycatch estimate of loggerheads was 350 turtles (C.V.= 0.20., 95% CI over the 12-year period: 234-504).

The Northeast Regional Office (NERO) has requested information on the number of loggerhead interactions occurring in sink gillnet gear during 2002-2006 in relation to all of the species landed in commercial fishing trips to support ESA Section 7 consultations for various Fishery Management Plans (FMPs). This document provides the information requested. The average annual bycatch estimate of loggerheads during 2002-2006 was 288 turtles (Murray, 2009).

Fisheries observer sampling and analysis of sea turtle bycatch are not normally done at the FMP level. Observer coverage is typically allocated in proportion to fishing effort, by month and port, with vessels selected randomly for coverage. Analyzing turtle bycatch rates and estimating the total magnitude of turtle bycatch is most often done by gear type, taking into account temporal and spatial patterns of fishing, environmental factors, and fishing gear characteristics/practices. Therefore, the sampling and analysis of bycatch data often do not align well with Section 7 information needs.

Reporting and assigning turtle bycatches by all individual species landed differs from previous bycatch approaches (Murray 2008), in which bycatch is related to the principal target species (or species group) sought or caught in a fishing trip. In Murray (2008), turtle bycatch was assigned to a single species group based on the largest amount (in pounds) of an individual species landed on a trip. That approach may under-represent species that are landed, but do not individually account for the largest share of the landed weight in a trip. The approach used in this report accounts for all species landed on a trip, regardless of their quantity.

METHODS

Murray (2009) used fisheries observer data from 1995-2006 to develop a Generalized Additive Model (GAM) describing loggerhead bycatch rates as a function of latitude, sea surface temperature, and mesh size. To estimate total bycatch on each individual VTR trip, this model was applied to adjusted Vessel Trip Report (VTR) landings (Murray 2009). The sum of estimated bycatch over all trips represented the total estimated loggerhead bycatch in the Mid-Atlantic sink gillnet fishery. Because each VTR trip has an estimated amount of bycatch, the total turtle bycatch can be assigned to individual species landed, as reported in VTR data. When multiple species are landed, the estimated bycatch per trip can be prorated across all of the species landed based on the proportion (by weight) of the species landings in the trip. For instance, if a vessel landed 800 pounds of monkfish, 150 pounds of skate, and 50 pounds of bluefish, the estimated number of loggerheads for that trip would be apportioned among these three species, with

monkfish receiving 80% of the total estimated loggerhead bycatch. Total bycatch estimates in this report are based on the adjusted VTR landings (Murray, 2009).

Estimated Bycatch by Species Landed

For each individual VTR trip (*i*) Murray (2009) estimated total loggerhead bycatch (B_i) per fishing trip. For this report, loggerhead bycatch for species *j* on trip *i* (B_{ji}) is multiplied by the proportion of reported (i.e. unadjusted) landings of species *j* caught on trip *i*:

$$B_{ji} = B_i * T_{ji}/T_i \quad (1)$$

where T_{ji} is the unadjusted amount of tons landed of species *j* on trip *i*, and T_i is the amount of unadjusted tons landed on trip i.

Total estimated loggerhead bycatch for species *j* over all sink gillnet trips (N) from 2002 to 2006 is then:

$$B_j = \sum_{i=1}^{N} B_{ji} \quad (2)$$

Bootstrap resampling was used to derive a coefficient of variation (CV) and 95% confidence intervals (CI) for the average annual bycatch during 2002-2006. Bootstrap replicates were generated by sampling hauls with replacement 1000 times from the original observer dataset, and the replicate datasets were used to re-parameterize the preferred model (Murray 2009). Each bycatch model was then applied to the adjusted VTR landings data to estimate total bycatch, which was then apportioned among all the species landed on the trip. A CV for each species was computed by dividing the standard deviation of the replicate bycatch estimates by the mean, while the 95% CI was the middle 95% of the distribution of the bycatch estimates.

From 2002 to 2006, there were approximately 60 species of fish and invertebrates reported as landed on Vessel Trip Reports, 42 of which constituted a very small amount (<0.5%) of the total reported landings and accounted for <0.5 estimated loggerhead bycatch. These 42 species were grouped into a single species group, called “other species” (Table 1).

In Murray (2009), adjustments were made to the VTR landings because these landings do not represent a complete census of all the fishery landings in the Mid-Atlantic. Total reported landings on each VTR trip were therefore adjusted upwards to match the amounts reported in the Northeast Region dealer database (Note: the amount of each individual species landed on a trip was not adjusted upwards). Therefore, the data presented here reflect the catch composition as reported in the VTR logbooks. Because the largest amount of uncertainty in commercial VTR landings is from NC state waters (Murray 2009), loggerhead bycatch for species landed in NC may be under or over-estimated in this report, depending on the amount of unreported VTR landings from NC. To assess the magnitude and direction of potential bias in the NC data, the percentage of VTR reported landings from 2002-2006 in North Carolina was compared to the information in the North Carolina Division of Marine Fisheries (NCDMF) database.

RESULTS

The largest proportion of the average annual estimated loggerhead bycatch (41%) occurred on VTR trips landing monkfish, followed by bluefish (17%) (Table 2). The total average annual turtle bycatch (285 loggerheads) allocated across all species landed was three (3) animals less than the average reported in Murray (2009). These 3 loggerheads not assigned represent the cumulative amount from the 'other species' reported in the VTR data which constituted ~4% of the reported landings (Table 1).

The VTR and NCDMF data showed similar patterns for most species. For all target species, the percent of landed species in the VTR and NCDMF databases differed by <10%, with the exception of bluefish and croaker (Figure 1). Bluefish accounted for ~47% of VTR landings from NC, compared to 17% in the NCDMF landings. Croaker accounted for ~38% of VTR landings, compared to 24% in the NCDMF landings.

DISCUSSION

Loggerhead bycatch rates in Mid-Atlantic sink gillnet gear are correlated with the mesh size, water temperature, and area fished (Murray, 2009). Because mesh size in gillnet gear is dictated by season, water depth, location, and target species (Steve et al. 2001), identifying the variability in turtle bycatch rates relative to mesh size, water temperature, and area is very important. From 1995-2006, highest estimated loggerhead bycatch rates occurred in the southern Mid-Atlantic in warm surface temperatures and in large mesh (>17.8 cm) gear (Murray, 2009). Fisheries operating in times and areas having some likelihood of bycatch may have no documented bycatch due to little or no observer coverage (Murray 2008), or the effect of random sampling of rare bycatch events. However, the approach taken in this paper (i.e., apportioning the total estimated annual loggerhead bycatch amongst individual species) explicitly recognizes that gear and environmental factors affect bycatch rates on individual fishing trips. This approach also accounts for species landed on a trip, rather than merely the target (or principal) species landed.

Confidence intervals for each species landed encompass the mean annual bycatch estimates from 2002-2006. About 95% of the random samples of the 5-year average annual loggerhead bycatch are contained within the CIs. Since the variability in the estimated turtle bycatch in any given year for an individual species is likely to be higher than that associated with the 5-year average, there is a higher than 5% chance that a yearly bycatch estimate will fall outside the confidence interval. For instance, the average annual estimate of loggerheads in gillnet gear catching black-tipped shark is 7 turtles (95% CI: 2-15), although in 3 out of the 5 years, the annual estimates fell outside the confidence intervals. To directly compare future levels of loggerhead bycatch to the average annual estimates and CIs reported in this paper, these future estimates would also need to be 5-year averages.

Trips landing monkfish had the largest amount of estimated loggerhead bycatch primarily because trips landing monkfish had (a) high predicted bycatch rates (monkfish are mainly caught with ~30 cm mesh gear), and (b) large landings volumes. On a small number of trips (<0.5%) landing monkfish, the estimated loggerhead bycatch was very high (i.e., > 3 turtles). Estimated bycatch was also high for trips landing sandbar shark. These shark trips also used large mesh gear, and occurred in southern latitudes in warm ocean surface temperatures. Because estimated bycatch on a trip was prorated based on

the landed weight of species, trips landing shark may have actually caught only a few individual sharks.

The amount of loggerhead bycatch on trips catching bluefish or croaker may be overestimated—and estimates for other species slightly underestimated—due to the possibility of disproportionately high bluefish and croaker VTR landings in North Carolina. In particular, some flounder species may be underestimated. For example, estimates are not provided for southern flounder because they constituted <0.1% of VTR landings, although observers have documented loggerhead bycatch in nets targeting southern flounder prior to 2002 and after 2006. Flounder trips constituted about 10% of NCDMF landings from 2002-2006 but, because all flounders are grouped together in the NCDMF data, it was not possible to ascertain what percent of the flounder landings were southern flounder.

Non-target species caught on trips with high estimated loggerhead bycatch will, by the approach used in this paper in assigning bycatches to all species, also have a relatively high estimated loggerhead bycatch. For instance, bluefish is often caught as a secondary or tertiary species on monkfish trips, which have high estimated bycatch due to the large mesh sizes used and the times/areas during which the fishery is prosecuted. An annual average loggerhead bycatch of 48 animals (95% CI: 23–79) was associated with landings of bluefish, although observers from 1995-2006 did not document any loggerheads taken in Mid-Atlantic sink gillnet gear targeting bluefish. The bluefish estimate is due to the high proportion of reported VTR bluefish landings in North Carolina (an area with high bycatch rates, Murray 2009), and the high estimated loggerhead bycatch rates on some trips landing bluefish as a non-target species. From 2002-2006, 9% of observed trips targeted bluefish, although 37% of the observed trips landed bluefish. Between 1995 and 2006, 13 loggerheads were caught on trips catching bluefish, although the targeted species on these trips were monkfish, striped bass, southern flounder, Spanish mackerel, and fluke.

REFERENCES

Murray KT. 2009. Characteristics and magnitude of sea turtle bycatch in U.S. Mid-Atlantic gillnet gear. Endang Species Res. 8:211-224.

Murray KT. 2008. Estimated average annual bycatch of loggerhead sea turtles (*Caretta caretta*) in U.S. Mid-Atlantic bottom otter trawl gear, 1996-2004 (Second Edition). US Dept Commer, Northeast Fish Sci Cent Ref Doc. 08-20; 32p. Available at: http://www.nefsc.noaa/gov/nefsc/publications/

Steve C, Gearhart J, Gorggaard D, Sabo L, Hohn AA. 2001. Characterization of North Carolina commercial fisheries with occasional interactions with marine mammals. US Dep Commer, NOAA Tech Memo NMFS-SEFSC-458; 57 p.

Table 1. Species caught in Mid-Atlantic sink gillnet gear 2002-2006 and grouped into "other species" category.

Other Species Category	
American plaice	Ocean pout
Atlantic halibut	Pelagics, misc.
Atlantic mackerel	Perch
Atlantic needlefish	Pollock
Black sea bass	Pompano
Blue crab	Red snapper
Bonito	Red, white, mixed hake
Butterfish	Redfish
Cod	Sand dab flounder
Groundfish, mixed	Scup
Haddock	Sea robin
Har fish	Sea scallop
Horseshoe crab	Shad
Invertebrates, misc.	Sharpnose shark
John dory	Silver hake
Kingfish	Southern flounder
Little tuna	Tautog
Lobster	Unidentified shark
Loligo squid	Winter flounder
Menhaden	Witch flounder
Mullet	Yellowtail flounder

Table 2. Annual and average estimates of loggerhead turtles by species group in Mid-Atlantic sink gillnet gear, 2002-2006. Adjusted tons landed were used in computing the total bycatch estimates. ATOL = Average Tons Observed Landed, ARVTL = Average Reported VTR Tons Landed, AAVTL = Average Adjusted VTR Tons Landed.

Individual Species Group	**ATOL**	**ARVTL**	**AAVTL**	**Estimated Loggerhead Bycatch**						**CV**	**95% CI**
				2002	2003	2004	2005	2006	Mean		
Monkfish	191	4520	8027	106	108	116	156	104	118	0.22	68-171
Bluefish	50	1225	5786	70	68	48	39	17	48	0.30	23-79
Sandbar shark	0	20	112	22	8	106	23	4	33	0.47	10-69
Smooth dogfish	14	284	1589	31	53	41	24	10	32	0.32	15-56
Croaker	104	1084	6150	17	9	14	12	5	11	0.37	3-20
Skates	72	1389	2000	12	6	11	11	7	9	0.27	5-15
Black-tipped shark	0	6	34	18	7	7	1	0	7	0.48	2-15
Summer flounder	2	48	92	0	15	8	6	0	6	0.38	2-11
Striped bass	7	117	476	2	11	8	1	0	4	0.44	2-9
Spanish mackerel	3	25	139	7	2	1	3	1	3	0.42	1-6
Dusky shark	0	4	26	7	6	0	0	0	3	0.42	1-5
Black drum	0	5	23	0	1	3	6	2	2	0.30	1-4
Thresher shark	0	5	21	2	2	2	1	1	2	0.34	0-2
King mackerel	1	5	32	5	1	2	2	0	2	0.45	1-4
Spot	10	105	636	3	2	3	1	0	2	0.56	0-4
Albacore tuna	0	14	51	2	1	0	0	0	1	0.32	0-1
Spiny dogfish	7	67	284	0	0	2	0	1	1	0.29	0-1
Weakfish	6	141	580	2	1	0	0	0	1	0.29	0-1
Other species		370	886						3		
Total	**467**	**9,434**	**26,944**						**288**		

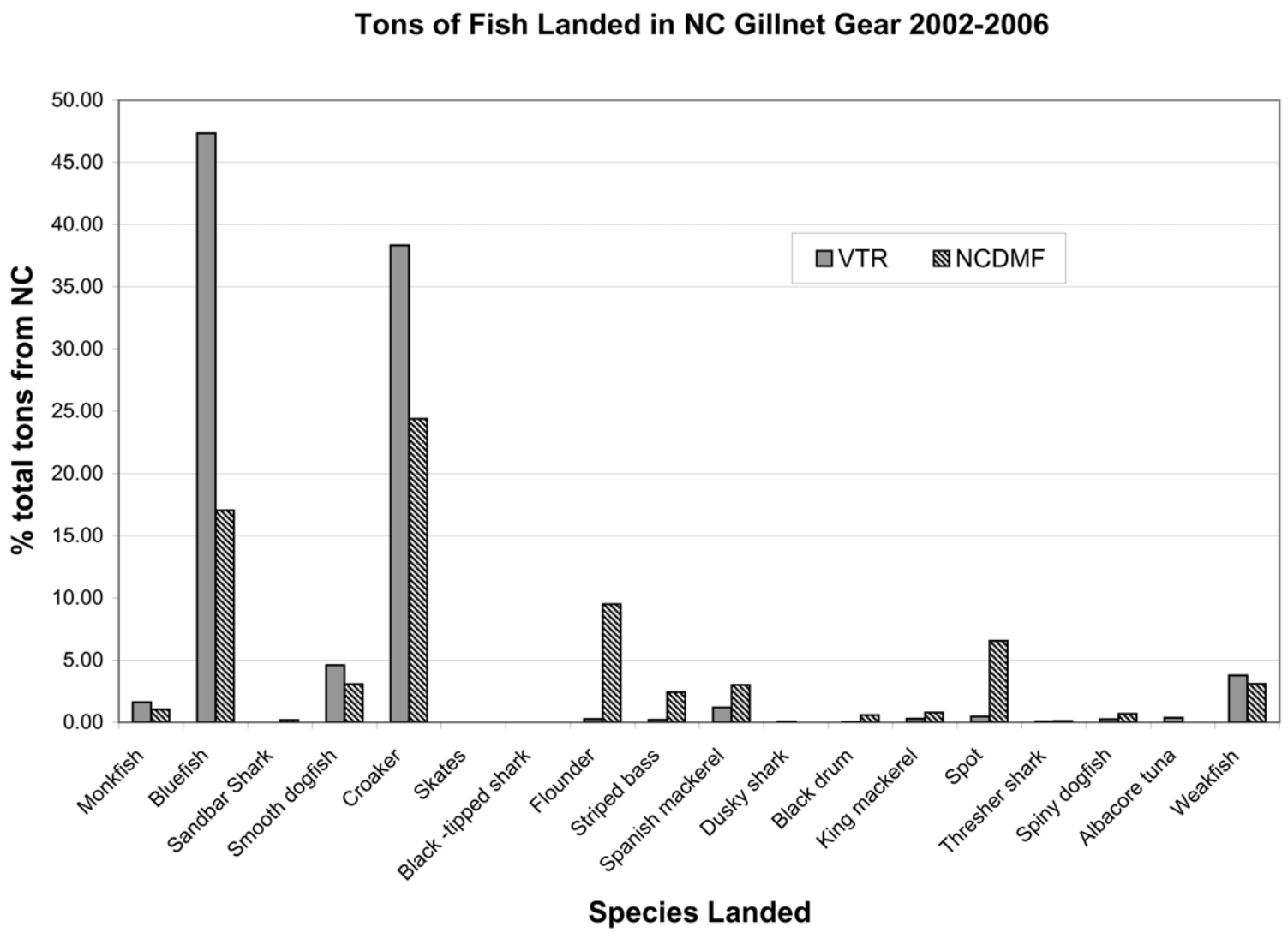

Figure 1. Comparison of VTR and NCDMF reported landings in sink gillnet gear, 2002-2006.

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