The Incidental Capture of Sea Turtles in Commercial Non-Shrimping Fisheries in Southeastern U.S. Waters

by

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INTRODUCTION

The incidental capture of threatened and/or endangered species of sea turtle by commercial fishing activities needs to be adequately addressed. Although several important studies have addressed the incidental capture of turtles in shrimp trawls (Henwood and Stuntz 1987; Bricklemyer et al. 1989; National Academy of Science 1990), published documentation of turtle by-catch in other fisheries is limited, and much of the remaining information is anecdotal. The identification, and subsequent quantification, of incidental sea turtle captures in all fisheries is necessary when formulating sound recovery and management strategies as mandated by the Endangered Species Act of 1973 and the Magnuson Fishery Conservation and Management Act of 1976. To fulfill these conservation objectives, this report attempts to identify non-shrimping commercial fisheries in which turtles are incidentally captured, summarize available data sources, and recommend appropriate research strategies.

METHODS

The information documented here were summarized from three sources: literature, interviews, and commercial fish landings. A search for published incidental catch (by-catch) literature was conducted using standard bibliographic methods. Because the

pertinent published literature was sparse, an additional search was conducted through data files for unpublished reports and manuscripts, many of which were conducted through contracts from the National Marine Fisheries Service (NMFS). These unpublished reports are often difficult to locate but the information they contain is too valuable to omit. The bibliography resulting from this search is listed in Appendix 1.

Interviews were conducted by telephone with NMFS statistical port agents along the entire southeastern Atlantic and Gulf of Mexico coasts and with selected NMFS and state sea turtle biologists. A questionnaire form was developed to standardize the information gathered (Appendix 2).

The commercial landings, by gear, by state, were also examined for 1989-90. This was done to determine major commercial target species, and the locations of potentially damaging fishing gears (Table 1).

There are two basic types of fishing gears involved, active and passive. Active fishing gear includes bottom trawls, gillnets, hook & lines, and passive fishing gear are traps, gill nets, pound nets, and longlines. There are many permutations of these gear, each method differing according to the target species. An additional category, "lost gear and fishing debris", is a potentially serious threat to sea turtles, but is considered a by-product of the fishing industry as a whole and is not considered here separately.

After examining the available information sources, the method of approach selected was to summarize the available information by gear type (Table 2).

RESULTS

Pelagic Longline:

The pelagic longline fishery for swordfish, tuna, and sharks has increased in effort and expanded geographically throughout the western North Atlantic Ocean. The swordfish fishery operates predominantly at night, whereas the tuna fishery occurs primarily during the day. Sharks are almost always a by-catch of both fisheries. Most sharks are discarded, but the premium species (i.e. mako) are kept. Also, some directed shark longliners have operated in inshore (state) waters in the Gulf of Mexico.

Catch rates of sea turtles in the different longline fisheries varies seasonally and spatially between day and night longline fisheries. Additionally, because of identification problems, the sea turtles that have been observed caught are identified as either leatherbacks or unidentified (probably loggerheads). Leatherbacks usually become entangled in the branchlines and the other species usually get either entangled or hooked while devouring the baited hooks.

NMFS has documented sea turtles captured occasionally by U.S. flagged swordfish vessels, but synoptic by-catch data are presently non-existent. However, beginning in 1992, permitted swordfish vessels are required to record these data on daily fishing logs and submit them to NMFS (SEFC).

There is an active pelagic longline fishery for tuna and sharks in the Gulf of mexico. NMFS observers were placed aboard some of these vessels from 1985 to 1987 and observers from Louisiana State University (LSU) have been placed under MARFIN contract from 1987 to the present. Data from observer logs indicates that sea turtles are occasionally captured in this fishery but total estimates are difficult due to the lack of synoptic coverage.

There is a Japanese longline fishery for tuna in the western North Atlantic Ocean. The fishery operated with partial NMFS observer coverage in U.S. Gulf of Mexico and Atlantic waters from 1978-1982. Beginning in 1982, the fishery operated under 100% mandatory observer coverage, and moved out of the Gulf and in to the Atlantic until 1988. The fishery continues to operate outside U.S. controlled Atlantic waters.

Gill Net:

Gill nets are a large class of fishing nets with many variations depending on the target species. Set nets (anchored and drift) fish passively and are left in the water for fish to

entangle themselves. The fisheries for pompano, sturgeon, and shad are examples. These nets have usually fished inshore, unattended, and may have considerable incidental sea turtle by-catches. However, due to this by-catch, and/or a depletion in target species, some of these fisheries have either stopped (sturgeon) or states have passed regulations limiting the number and lengths of the nets used, mesh size, and have added the stipulation that all nets be attended (pompano, shad). The by-catch of sea turtles in the various, and ubiquitous, gill net fisheries is under reported, but it is very difficult to document because of the ephemeral nature of the fisheries and the extreme temporal and spatial variability.

The spring (March-May) gill net fishery for sturgeon in the Carolinas has ceased operation. However, because it operated near estuarine environments, there was a considerable by-catch of juvenile and sub-adult green and loggerhead turtles. There are two years of by-catch data from this fisheries.

There is a winter gill net fishery for pompano off the southeast coast of Florida. Recent sea turtle mortalities found as either stranded or found in abandoned/lost nets prompted the Florida Legislature to limit net numbers, lengths, mesh sizes, and requires that the nets be attended.

There is a gill net fishery for reef fish in Puerto Rico. This is a shallow water fishery, usually a night, that has some documented sea turtles captures. However, due to the nature of the island philosophy, many of these turtles have been unofficially

reported as consumed.

There is a drift gill net fishery for sharks that occurs intermittently from Charleston, SC to mid-Florida. This fishery operates in state and federal waters and is considered a potential source of sea turtle mortality. Mandatory reporting of commercial catches will include information on turtle by-catch.

Trammel nets, a multi-layered gill net, are used throughout the southeast for flounders and ground fish (croakers). However, none of these fisheries has been identified as a source of sea turtle by-catch. A limited amount of data is available from North Carolina.

Gill nets (runaround) are also used in other fisheries (particularly mullet and mackerel) throughout the southeast, these are usually actively fished by surrounding a school and immediately hauled. Although these may capture turtles, it is assumed that mortality would be low because they are hauled out quickly after setting.

Bottom Trawl:

Bottom trawls are used in the southeast primarily for shrimp, and they are also used for flounder and unclassified finfish (pet food). However, because of the target species involved, fish trawls are not commonly found south of the Carolinas. In spite of their limited usage, extensive turtle by-catches have been documented from these trawls, seasonally, in certain locations.

The most important trawl fishery impacting turtles appears to be the winter (November-December) fishery for flounder in state and federal waters off Cape Hatteras, NC. The interaction occurs when turtles (ridleys and loggerheads) move inshore onto the fishing grounds in warm water eddies. The subsequent incidental catch and mortality is extensive. An observer program was initiated in 1991 to monitor the fishery, utilizing personnel from the SEFC, NEFC, and NCDNR.

Pound Net:

The pound net fisheries in the southeast occurs in the large sounds and bays of North Carolina. The are basically two separate fisheries: 1) a Spanish mackerel and flounder fishery from September through December, and 2) a bottomfish fishery for spot, sheepshead, harvestfish, etc. in May through September. Many turtles have been reported captured in these pound nets but, unlike the Chesapeake and New York pound net fisheries, no fatalities have been documented. This lack of mortalities is probably because the leaders are reportedly of smaller mesh size (8") and are staked out straight so they are less likely to entrap turtles. The species captured are loggerheads and ridleys. Limited data are available. Data Contact: Sheryan Epperly (SEFC).

Crab Pots:

Leatherback turtles have been reported entangled in crab pot lines in the bays and sounds of North Carolina from spring through

fall. However, although leatherbacks undoubtedly become entangled, there are no data on the frequency or possible mortality.

Hook & Line:

Sea turtles, particularly loggerheads and ridleys, have been reportedly captured on the inshore commercial and recreational hook and line fisheries in North Carolina, Florida, and Texas. The rate of capture is unknown but it is apparently not uncommon in certain areas.

FISHERIES WITH TURTLE BY-CATCH POTENTIAL

There are many fisheries that might impact turtles as a by-catch. Table 2 lists important fisheries and target species landed in the southeastern United States for 1990. However, it is extremely difficult to pinpoint any particular fishery (or gear type) because of their highly dynamic nature. Fisheries can vary temporally and spatially between seasons and locations as stocks move within the ecosystem due to environmental parameters, or as legislation regulate stocks. These same environmental parameters undoubtedly determine sea turtle distributions and when these conditions are optimal, Sea turtle:fishing gear interactions occur. Consequently, it is extremely difficult to select one fishery (gear type) as a source of turtle by-catch.

As stated earlier, trawl fisheries have proven to be very effective methods for capturing sea turtles. The various shrimp fisheries throughout the southeast and the North Carolina flounder fishery are examples. However, bottom trawls are responsible for harvesting other inshore target species (spot, drum, sheepshead, finfish, etc) in North and South Carolina and Mississippi.

Probably the most potentially dangerous gear type, after the bottom trawl, is the ubiquitous gill net. Although, every state has large year round fisheries utilizing these nets (Table 2), legislation regarding net numbers, lengths, mesh sizes, seasons, areas, and mandatory attendance (thereby reducing sea turtle captures and mortalities) is being enacted in several states.

The purse seine fishery for menhaden in North Carolina, Florida, and Mississippi (also blue runner and drum) is a potential source of turtle mortality. Although undocumented, turtles captured by this method could possibly drown before being brailled out of the net. Bottlenose dolphin are reportedly captured in this fishery.

SEA TURTLE STRANDING AND SALVAGE NETWORK

Sea turtle strandings along the entire U.S. Atlantic and Gulf of Mexico coastline are reported to the Sea Turtle Stranding and Salvage Network (STSSN) at the Southeast Fisheries Center (SEFC). However, unless obvious, determining the causes of mortality on

these carcasses is difficult. For example, recent evidence from autopsied turtles stranded on Florida beaches indicates that 50% had ingested debris, and might be a possible source of mortality or a factor facilitating mortality.

Additionally, the STSSN includes opportunistic reports of turtles that are reported captured and released alive. These data were summarized (Table 3) by Thompson (1991). The data suggests that sea turtles do in fact become entangled and/or entrapped in a wide variety of fishing gear and are able to survive until release. It is unknown whether these strandings had resulted from becoming entangled in operational or derelict gear, or what physical condition they were in when they encountered the gear.

CONCLUSIONS/RECOMMENDATIONS

The marine fishing industry incidentally captures and/or kills an unknown number sea turtles each year. However, it is difficult at this time to determine the magnitude of this incidental catch due to the diversity of the commercial fishery industry. The deployment of any particular gear type varies temporally and spatially, depending on the target species sought. Although several specific fisheries are known to incidentally take turtles, there is a general lack of documented by-catch throughout the industry and some fisheries are only "suspected" at this time. Consequently, it is difficult to prioritize specific fisheries at this time.

However, it is probable that the various inshore trawling and gill net fisheries are the most important. Also, while the incidental take of any individual fishery may be small, the cumulative impact over many fisheries may be great.

The problems of incidental catch and mortality of these fisheries were addressed in a recent study by the National Research Council (1990) and were considered important factors in the overall decline of western Atlantic sea turtle populations. The report stated that an estimated 500-5,000 loggerheads and 50-500 Kemp's ridleys were possibly killed annually as a result of these non-shrimping commercial fisheries.

The total impact of these fisheries on the decline of sea turtle populations is important to quantify. It is recommended that a two-stage project be initiated immediately to address this problem: 1) collating existing by-catch data, and 2) research on selected fisheries. The first part would consist of identifying, collecting, and analyzing available data sources. This would be accomplished through a series of detailed interviews and questionnaires. The results of these efforts would identify problem fisheries and researchers would then be able to prioritize each fishery according to its suspected impact on turtle populations.

The second phase would be to design and initiate a research sampling program involving the important fisheries prioritized as having high sea turtle by-catches. The methods utilized would probably vary depending on the fishery, but it is likely that dock-side interviews and/or observers would be the best approach. The

catch and effort data gathered would be standardized by gear, and mortality estimates generated.

TABLE 1.

MAJOR FISH LANDINGS IN SE BY GEAR, BY STATE

GILL NETS:

Alabama: drum, spot, flounders, mullet, spanish mackerel, sheepshead, shark, finfish (unclassified)

Florida (EC): blue runner, bluefish, bonito, croaker, drum, flounder, whiting, mullet, permit, pompano, sea trout, sheepshead, spanish mackerel, spot, ladyfish blackfin tuna, sharks, finfish (unclassified)

Florida (WC): alewives, bluefish, blue runner, crevalle, cigarfish, croaker, drum, flounder, mackerel (spanish & king), ladyfish, mojarra, permit, pompano, sea trout, shad, whiting

Georgia: shad, sturgeon

Louisiana: croaker, drum, flounder, mullet, pompano, sea catfish, sea trout, shad, sheepshead, spanish mackerel, shark, whiting

Mississippi: bluefish, drum, flounder, mullet, pompano, sea trout, sheepshead, shark, spanish mackerel, whiting

N. Carolina: bluefish, croaker, drum, flounder, harvestfish, mackerel (cero, spanish, & king), mullet, scup, shad, sheepshead, spot, shark

S. Carolina: shad, spot, shark

Texas: flounder, shark

LONGLINES:

Alabama: tuna (yellowfin)

Florida (EC): tuna (bigeye, yellowfin, unclassified)

Florida (WC: tuna (bigeye, blackfin, yellowfin, unclassified)

Louisiana: swordfish, tuna (blackfin, bluefin, yellowfin)

N. Carolina: shark, swordfish, tuna (yellowfin)

S. Carolina: shark, swordfish, tuna (yellowfin, unclassified)

Texas: swordfish, tuna (bluefin, yellowfin, unclassified)

PURSE SEINES:

Florida (WC): menhaden

Mississippi: blue runner, drum, menhaden

N. Carolina: menhaden

FISH TRAWLS:

Mississippi: spot, finfish (unclassified)

N. Carolina: anglerfish, butterfish, croaker, drum, flounder, harvestfish, menhaden, scup, sea bass, sea trout, spot, shark, squid, sturgeon, finfish (unclassified)

S. Carolina: Sheepshead, spot, flounder

POUND NETS:

N. Carolina: flounder, harvestfish, shad, sheepshead, spot, finfish (unclassified)

TABLE 2.
IMPLIED OR DOCUMENTED SOURCES OF COMMERCIAL FISHERY (NON-SHRIMPING) SEA TURTLE INCIDENTAL CATCHES FROM THE LITERATURE

FISHING GEAR	PRINCIPAL FISHERY	GENERAL LOCATION	JURISDICTION STATE/FEDERAL
Longline	Swordfish	N. Atlantic	FEDERAL
		S. Atlantic	FEDERAL
		Gulf of Mexico	FEDERAL
		Caribbean	FEDERAL
Longline	Tuna	N. Atlantic	FEDERAL
		Gulf of Mexico	FEDERAL
Longline	Sharks	N. Atlantic	FEDERAL
		S. Atlantic	FEDERAL
		Gulf of Mexico	FEDERAL
		(TX to Fl)	STATE
Gill Net	Swordfish	N. Atlantic (Georges Bank)	FEDERAL
Gill Net	Mackerel	Gulf of Mexico (FL)	FEDERAL STATE
		S. Atlantic (NC to FL)	FEDERAL STATE
Gill Net	Pompano	S. Atlantic (Fl)	STATE
Gill Net	Sturgeon/shad	S. Atlantic (SC)	STATE
Gill Net	Sturgeon/shad	N. Atlantic (DE)	STATE
Gill Net	Shark	Gulf of Mexico (TX to FL)	STATE
		S. Atlantic (TX to FL)	STATE
Gill Net	Reef fish	Caribbean (PR & VI)	STATE
Trawl	Flounder	N. Atlantic (MA to NC)	STATE

Trawl	Ground fish	N. Atlantic (ME to MA)	STATE
Pound Net	Misc...	N. Atlantic (RI to NC)	STATE
		S. Atlantic	STATE
Traps	Lobster	N. Atlantic (ME to NC)	STATE

TABLE 3

SEA TURTLES REPORTED TO THE SEA TURTLE STRANDING AND SALVAGE NETWORK, AND REPORTED AS RELEASED ALIVE, FROM 1980-1989

(modified from Thompson, 1991)

FISHERY METHOD	NUMBER OF TURTLES
Pound Net	90
"Fishing Gear" (Unspecified)	77
Hook & Line	63
Crab/Lobster Trap Lines	62
Fishing Net (Unspecified)	24
Gill Net	24
Fish Trap	18
Bottom Trawl (Non-Shrimp)	10
Set Net	3
Seine Net	2
Cast Net	2
Commercial Drift Net	1
Drift Net	1
Trot Line	1
TOTAL	378

APPENDIX 1
SEA TURTLE BY-CATCH BIBLIOGRAPHY

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APPENDIX 2

TURTLE BY-CATCH INTERVIEW FORM

1. NMFS port agent:
   Turtle scientist:
   A. Phone number:
   B. Location (coverage):

2. What fishery does/might impact sea turtles?
   A. Gear type:
   B. Target species:
   C. Magnitude of fishery:
   D. Location of fishery (State/Federal):
   E. Season of fishery:

3. Data contact:
   A. Affiliation;
   B. Address:
   C. Phone number:

4. Comments: