





INCIDENTAL CAPTURE OF SEA TURTLES
BY
COMMERCIAL FISHERIES

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INTRODUCTION

It is generally agreed (Pritchard, 1980; Mackey, 1980) that overhunting, coupled with a dramatic increase in commercial trade, has decimated sea turtle populations worldwide over the past 2-3 centuries. Now, size alone may render these severely depleted stocks highly vulnerable to a variety of other factors such as water pollution and beach alterations.

One of these additional pressures is the incidental capture (and drowning) of sea turtles by various fishing industries. The fishery that has received the most attention with respect to incidental catch is the shrimping industry (Hillstead *et al.*, 1977; Anonymous, 1976; *etc.*). As a result, the U.S. National Marine Fisheries Service (NMFS) has developed a "trawler efficiency device" (TED) that can be adapted to existing trawl nets (Watson and Seidel, 1980). This device prevents turtles and other large objects from entering the cod end of the trawl.

Much less is known about the incidental catch problem in other fisheries. This report is intended to assess the current state of knowledge and research into the incidental capture of sea turtles by fisheries other than the shrimping industry.

METHODS

The material in this report was obtained primarily by interviewing primary researchers and other individuals likely to be acquainted with the problem. Frequently these people suggested others to contact. Some discussions led to return contacts with the original interviewees. Contacts were made by letter, telephone, and personal interview.

RESULTS

It was universally agreed that there is very little in the way of good documentation of these problems especially in such a form that would allow for the comparison of relative impacts for different fisheries. Still there are several cases where documentation is available. For organizational purposes, these will be dealt with by gear type.

Gill Nets--Large-mesh gill nets, both stationary and drifting, have been implicated in several situations.

1) A clearly documented conflict exists with the large-meshed gill nets set for sturgeon. In Winyah Bay, South Carolina, where these nets are fished throughout the winter, turtle mortalities increased rapidly each year in April (Ulrich, 1978; Marchette, 1981; Hopkins, *pers. comm.*), presumably as the turtles began to move in towards the feeding and nesting areas. In 1980, the S.C. Wildlife and Marine Resources Department issued regulations closing Winyah Bay to nets with a stretched-mesh larger than 5 inches in mid-April, specifically to reduce sea turtle and bottlenose dolphin mortalities. These mortalities have been significantly reduced,

from ~50/month to 21 and 13 (1980 and 1981 respectively) on North Island (Hopkins, pers. comm.).

Ironically, in April, 1981, some of these displaced South Carolina fishermen obtained a North Carolina out-of-state commercial license and set 1500 yards of stationary 10 inch stretched-mesh gill nets on the Frying Pan Shoals off Smith Island in North Carolina. (Sturgeon fishing has not occurred here for more than 15 years). Within 10 days, between 30 and 47 loggerheads washed up in the immediate vicinity. This constituted ~20% of the total strandings reported in North Carolina in 1981. N.C. Wildlife Enforcement Officer Joseph Newman inspected the nets one day and observed 4 turtles tangled in the nets (Newman, pers. comm.). The obvious relationship between the South Carolina and North Carolina cases was noted by the author while working on this project and the South Carolina information was provided to Officer Newman, who gave a statement at the local public hearings on marine fishing regulations (Newman, 24 February, 1982). The N.C. Division of Marine Fisheries is currently reviewing proposed modifications to its regulations hoping to reduce this conflict. It should be noted that a sturgeon fisherman who sets drift gill nets off the Bogue Banks in North Carolina tends these nets every 1-2 hours, releasing turtles and other incidentally caught species, with little or no mortality (Street, pers. comm.).

2) Balazs (1980) has documented mortality to leatherback turtles due to monofilament drift-nets set for squid in international waters northwest of the Hawaiian Islands. This is a new (1979) fishery, involving nets up to 16km in length and 6m in depth, with a 12cm (bar?) mesh, set overnight by Japanese fishing vessels. Because of the distance from any shore, quantification of mortality here is difficult but a single tuna boat reported "at least 5 dead leatherbacks floating at the surface wrapped in sections of net." Indeed, several tuna boats have become snarled in these nets!

Pound Nets--A number of people mentioned the incidental capture of turtles in a variety of traps. Some of the best documentation of incidental catch outside the shrimping industry has been done on the pound net fishery in Virginia by Molly Lutcavage and Jack Musick at the Virginia Institute of Marine Sciences (Lutcavage, 1981; Musick, 1981). They collected stranding reports on a total of 361 turtles throughout Virginia in 1979 and 1980. Loggerheads were the primary species with a few ridleys and leatherbacks included. Additionally, Lutcavage and Musick contacted many fishermen. They concluded that pound nets were the principle source of turtle mortalities in Virginia during these two years. Interestingly, although turtles do become trapped in the pounds, they are able to breathe here and are usually released, unharmed, by the fisherman. The mortality is caused by entanglement in the large-meshed leaders ("hedges"), frequently well below the surface, where they go unnoticed, and therefore unreleased. These leaders act like infrequently tended large-meshed gill nets.

Although turtles were caught less frequently in smaller-meshed leaders, these tend to foul more readily and are therefore less desirable

to the fishermen. Lutcavage did note (pers. comm.) that leaders that were taut when staked appeared to catch fewer turtles than those that were loosely staked and billowy. She also noticed that catch frequency varied considerably with both location and date, suggesting that the turtles may move in loose aggregations. She suggested that keeping track of these turtle movements and temporarily limiting fishing near concentrations might be a more viable protection alternative than requiring smaller mesh or attempting to release turtles from the extensive, deep leaders.

Shoop (pers. comm.) also reported turtles becoming trapped in pound nets in New York and Rhode Island. Although he has been told some fishermen kill turtles before dumping them, he has no direct evidence of such mortality. In fact, many fishermen cooperated with him and the turtles are tagged before release. He made no mention of entanglement in leaders.

Other Traps--There were also several references to entanglement with lobster traps and crab pots. Two types of mortality are possible here: entanglement in buoy lines below the surface may lead to drowning, and entangled animals may be killed by fishermen as nuisances. Again there is no documentation of mortality rates.

Higman and Davis (1978) reported on the damage done by turtles to spiny lobster gear in the Florida Keys. They presented strong circumstantial evidence that loggerhead turtles cause considerable damage to lobster traps in highly localized areas. This damage appeared to be a result of direct action by the turtles, presumably trying to feed on barnacles growing on the gear and/or the lobsters caught in the traps. Although actual turtle mortality was not investigated, it was noted that damage rates were substantially reduced in areas where the turtles were "removed".

Trawls--Shrimp trawls are a common cause of mortality. This has been studied and reported elsewhere (Hillestad et al., 1977; etc.).

Bullis and Drummond (1978) analyzed 26 years worth of exploratory trawling activities conducted by NMFS research vessels. A total of 53 turtles were taken during 7,625 hours of trawling effort: 41 loggerheads, 7 greens, 4 hawksbills, and 1 leatherback. Although the turtle capture per hour rate was higher for bottomfish trawls than shrimp trawls, it was noted that none of these data came from inside waters, which might have a higher turtle density.

In November, 1980, and December, 1981, there were sharp localized pulses of stranding reports off Pea Island National Wildlife Refuge and Cape Hatteras National Seashore in North Carolina. Schwartz and others attributed this to the winter trawl fishery, primarily for flounder, which has followed the fish south from Virginia at this time of year. Others have suggested that this may be due to a recent major conversion in the king mackerel fishery in this region, from hook-and-line to 6in stretched-mesh gill nets. This situation needs investigation.

An interesting question here is why there are so many turtles in this area at these late dates. Could they be entangled in gill nets while leaving the sounds through Oregon Inlet as the shallower waters cool off? Or are the bottom trawls dragging them from hibernation in soft mud bottoms just offshore? Unconfirmed reports of turtles hibernating in the Cape Lookout Bight have been around for years (Richardson, pers. comm.). Discussion with two geologists indicate the bottom in this area has not been mapped yet.

Lines--A relatively new Japanese longline fishery, set for tuna and swordfish, was mentioned by a number of researchers throughout the southeastern states. Roithmayr (1981) states that NMFS observers estimated 96 turtles were caught by 24 vessels during a three month period (February, March, April) in 1979. Barbara Anderson, of the South Atlantic Fisheries Management Council, indicated to Bricklemeyer (pers. comm.) that they are completing a biological assessment on this situation for the swordfish fishery and will soon initiate formal consultation under Section 7 of the Endangered Species Act.

Shoop noted (pers. comm.) hearsay reports of turtles caught by longlines set for sharks. And George Balazs has recently finished an annotated bibliography of longline/sea turtle interactions.

Hildebrand (1980) reports that green turtles were frequently "caught" (usually foul hooked in the flipper) on trotlines set in eel grass flats in the Laguna Madre, Texas. Reports decreased after 1976, correlating to a drop in the number of trotlines and a change in the area fished.

Bricklemeyer (pers. comm.) reported that Barbara Anderson has also received hearsay reports of turtles taken in the hook-and-line fishery for snapper and grouper.

Seines--Schwartz (pers. comm.) states turtles are often caught in menhaden purse seines, as did Carr (pers. comm.) and Shoop (pers. comm.). Schwartz likewise mentioned tuna purse seines. Documentation is not available for these reports. Shoop also received a report of a leatherback caught twice in the same day in salmon purse seines off the west coast of Canada, August, 1981. There was a large concentration of jellyfish in the area. The turtle was tagged and released unharmed.

A single loggerhead and two diamondback terrapins were reported from 61 longhaul seine catches in the sounds and estuaries in North Carolina (DeVries, 1980). But Johnson (pers. comm.) reported "many" caught. He was unsure about mortality. Clearly the situation with seines is muddy.

Dredges--Even though dredges are used for fishing for scallops, oysters, and clams, the clearly documented conflict with turtles is with channel maintenance dredges in the Port Canaveral Shipping Channel (Pritchard, 1981). This unfortunate situation seems to result from the

recently discovered hibernation of turtles in the soft mud sides of the channel (Carr et al., 1980). It has been mentioned that hibernation has been rumored but not documented elsewhere. It is unknown whether shellfish dredges have the potential to disturb or kill such turtles if they exist.

SUMMARY, DISCUSSION AND CONCLUSIONS

In summary, there is at least hearsay indication of conflict between turtles and all the major classes of fishing gear. Yet, aside from the shrimping industry, these conflicts have been clearly documented in only a few situations. There is even less evidence available on mortality rates. Nevertheless some conclusions can be made.

There is a clear conflict between turtles and large-meshed gill nets. This has been documented with sturgeon nets in North and South Carolina, squid drift nets in the Pacific Ocean, and the leaders to certain pound nets in Virginia.

The relatively new offshore longline fishery for tuna and billfish (swordfish, etc.) may pose a significant threat. As noted, George Balazs is preparing an annotated bibliography on longline/turtle conflicts and the South Atlantic Fishery Management Council is preparing a biological assessment of this situation in the swordfish industry.

There are several other situations that need investigation. Is the November/December mortality off Cape Hatteras, North Carolina due to the winter trawl fishery for bottom fish, the recent switch to gill nets in the king mackerel fishery, or is this unrelated to fishing? Could this be a natural biological phenomenon such as cold stunning? Why are turtles present here at this time of year? Menhaden purse seines were implicated by many, but no documentation was found. Is this an oversight?

Several other conclusions can be made from this study. Fishery trends are dynamic. As the world demand for fish and energy costs increase, new equipment and even new fisheries are being introduced. This is illustrated clearly in a North Carolina Division of Marine Fisheries report entitled Trends in North Carolina's Commercial Fisheries, 1965-1980 (Street, 1981). Balazs (1982) notes the squid driftnet fishery only started in 1979. The Japanese longline fishery off Texas is also very recent. The North Carolina gill net take for king mackerel increased from 0 pounds in 1978 to 124,800 pounds in 1981 and there is a growing pound net fishery in the Pamlico Sound in North Carolina (Street, pers. comm.). George Henderson (pers. comm.) mentioned a new deep-water roller-trawl fishery off Georgia. If turtles are overwintering in the offshore reefs there (Richardson, pers. comm.), they may be affected by this gear.

In addition to being innovative, approaches to sea turtle/fisheries conflicts will have to be flexible. As Lutcavage suggested, monitoring

turtle movements and closing local areas for short periods may be more fruitful in some situations than redesigning gear. Likewise, as Shoop noted, a widespread, intensive, information program for fishermen is very important, especially in the live entanglement situations.

The number and type of conflicts vary geographically. North Carolina's waters are biogeographically complex. There are both northern and southern fisheries as well as the tremendous sound systems. The South Carolina and Georgia fisheries are much less diverse, with shrimping being a primary fishery and a primary cause of turtle mortality. Florida, with temperate and subtropical waters, and both the Atlantic and the Gulf of Mexico, might also be expected to have a diversity of fisheries and turtle conflicts.

What information there is on sea turtle/fishery conflicts (outside the well documented shrimping industry) is widely scattered. Even within a single agency, such as NMFS, repeated contacts with a variety of persons yielded more information. The author's location in North Carolina lent itself to a more thorough investigation of the North Carolina information. This should be done in the other states as well.

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