NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Agency: National Marine Fisheries Service

Activity: Sea Turtle Conservation Measures for the Pound Net Fishery in Virginia Waters of the Chesapeake Bay (F/NER/2003/01596)
GARFO-2003-00003

Conducted by: National Marine Fisheries Service
Northeast Regional Office

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Approved by: [signature]

This constitutes the National Marine Fisheries Service's (NOAA Fisheries) biological opinion on the effects of NOAA Fisheries' implementation of sea turtle conservation measures for the pound net fishery in the Virginia Chesapeake Bay on threatened and endangered species in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). This biological opinion is based on information provided in the proposed rule (69 FR 5810, February 6, 2004), public comments received on the proposed rule, the Environmental Assessment/Regulatory Impact Review (EA/RIR), correspondence with the Virginia Marine Resources Commission (VMRC; the state agency responsible for marine fisheries management in Virginia) and the Virginia pound net fishing industry, and available scientific information. A complete administrative record of this consultation is on file at the NOAA Fisheries Northeast Regional Office (F/NER/2003/01596).

CONSULTATION HISTORY

The Virginia pound net fishery operates exclusively in state waters. As such, there has not been a previous Federal fishery management action that would have resulted in the initiation of section 7 consultation under the ESA. However, a section 7 consultation was previously conducted, which considered the impacts of the Virginia pound net fishery on listed species. In 2002, NOAA Fisheries issued an interim final rule that prohibited the use of all pound net leaders measuring 12 inches and greater stretched mesh and all pound net leaders with stringers in the Virginia waters of the mainstem Chesapeake Bay and portions of the Virginia tributaries from May 8 to June 30 each year (67 FR 41196, June 17, 2002). Included in this interim final rule was a year-round requirement for fishermen to report all interactions with sea turtles in their pound net gear to NOAA Fisheries within 24 hours of returning from the trip, which was enforceable after OMB approval pursuant to the Paperwork Reduction Act (PRA) was obtained on February 6, 2003 (OMB No. 0648-0470), and a year-round requirement for pound net fishing operations to be observed by a NOAA Fisheries-approved observer if requested by the Northeast Regional Administrator. The interim final rule also established a framework mechanism by which NOAA Fisheries may make changes to the restrictions and/or their effective dates on an expedited basis in order to respond to new information and protect sea turtles. Under this framework mechanism, if NOAA Fisheries believes that sea turtles may still be vulnerable to entanglement in pound net leaders after June 30 of any given year, the Assistant Administrator, NOAA, (AA) may extend the effective dates of the restrictions established by the regulations. Additionally, if monitoring of pound net leaders during the time frame of the gear restriction, May 8 through June 30 of each year, reveals that one sea turtle is entangled alive in a pound net leader less than 12 inches stretched mesh or that one sea turtle is entangled dead and NOAA Fisheries determines that the entanglement contributed to its death, then NOAA Fisheries may determine that additional restrictions are necessary to conserve sea turtles and prevent entanglements.

This interim final rule establishing sea turtle conservation measures for the Virginia pound net fishery represented a Federal action for which a section 7 consultation was necessary. The Biological Opinion (BO) was issued on May 14, 2002, and concluded that NOAA Fisheries' implementation of sea turtle conservation regulations for the Virginia pound net fishery (including the issuance of an interim final rule that restricts the use of pound net leaders in the Virginia Chesapeake Bay from May 8 to June 30, and requires year round monitoring of pound net gear and reporting of any incidental take of sea turtles in pound net gear) may adversely affect but is not likely to jeopardize the continued existence of the loggerhead, leatherback, Kemp's ridley, green, or hawksbill sea turtle, or shortnose sturgeon. The Incidental Take Statement (ITS) issued with the Biological Opinion exempted the annual incidental take of no more than 360 loggerhead, 72 Kemp's ridley, and 1 green sea turtle, in all pounds set throughout the action area. These takes were anticipated to be live, uninjured animals; no incidental takes of injured or dead sea turtles in the pounds were anticipated. NOAA Fisheries further anticipated that no more than 1 loggerhead, 1 Kemp's ridley, 1 green, and 1 leatherback sea turtles would be entangled in leaders with greater than or equal to 12 inches stretched mesh and leaders with stringers from July 1 to May 7 each year. Those entanglements were considered to result in sea turtle mortality. No incidental take of hawksbill sea turtles or shortnose sturgeon were anticipated for the proposed action. The BO noted that anecdotal information from other states suggested that sea turtle entanglement may occur in leaders with less than 12 inches stretched mesh, but at the time of the consultation, NOAA Fisheries had no reliable data for Virginia indicating as such. Therefore, there was no incidental take anticipated in pound net leaders with less than 12 inches stretched mesh at any time of the year.

During pound net leader monitoring efforts in the spring of 2003, which are described in detail in the Effects of the Action section, sea turtle takes were documented in pound net leaders in compliance with the current pound net leader restrictions (i.e., takes were found leaders with 11.5 and 8 inch stretched mesh). These monitoring results represented new information on the effects of the action that were not previously considered in NOAA Fisheries' 2002 Biological Opinion. Additionally, as the ITS did not anticipate any take in pound net leaders with less than 12 inches stretched mesh, and takes were documented in this mesh size during the spring of 2003, the ITS was exceeded. NOAA Fisheries reinitiated consultation on July 29, 2003, to evaluate the new information and consider the effects of those incidental takes on listed sea turtles.

In addition, NOAA Fisheries published a proposed rule (69 FR 5810, February 6, 2004) that would revise the current management measures for pound net leaders in Virginia in order to protect sea turtles. The measures in the proposed rule included a prohibition of the use of all pound net leaders south of 37° 19.0' N. lat. and west of 76° 13.0' W. long., and all waters south of 37° 13.0' N. lat. to the Chesapeake Bay Bridge Tunnel at the mouth of the Chesapeake Bay, and the James and York Rivers downstream of the first bridge in each tributary, and all leaders with stretched mesh greater than or equal to 8 inches and leaders with stringers outside the aforementioned area, extending to the Maryland-Virginia State line and the Rappahannock River downstream of the first bridge, and from the Chesapeake Bay Bridge Tunnel to the COLREGS line at the mouth of the Chesapeake Bay, from May 6 to July 15 each year. Public comments were accepted until March 8, 2004. Nineteen comment letters (4 in support, 14 in opposition, 1 neutral) were received during the public comment period for the proposed rule. A petition signed by 1,077 individuals was also received requesting that the proposal be withdrawn and terminated. A public hearing was also conducted in Virginia Beach, Virginia, on February 19, 2004, which also enabled NOAA Fisheries to gather public comments. Eleven individuals, three of which also provided written comments, provided spoken comments in opposition to the proposed measures. NOAA Fisheries considered the comments on the proposed rule as part of its decision making process in developing the final rule. Based upon public comments received on the proposed rule, NOAA Fisheries determined that modifications to the proposed measures were necessary and that the closure area should be redefined, mesh size should not be further restricted at this time, and the framework mechanism should be retained (see Description of the Proposed Action section for details). A final rule has been prepared that includes the proposed restrictions with these modifications. This action, the issuance of a rule with sea turtle conservation measures, is a federal action, which also triggers formal consultation.

Note that NOAA Fisheries also discussed interactions between sea turtles and pound net gear with the Commonwealth of Virginia since the last section 7 consultation. On September 3, 2003, VMRC convened a meeting with NOAA Fisheries, representatives from the pound net industry, the Virginia Institute of Marine Science (VIMS), the Virginia Marine Science Museum (VMSM) and the Virginia Department of Game and Inland Fisheries to discuss the 2002 and 2003 pound net leader monitoring results, high spring sea turtle strandings, and potential measures to reduce sea turtle interactions in pound net gear.

Formal consultation on the issuance of additional pound net leader management measures was initiated on December 5, 2003, by the NOAA Fisheries Northeast Regional Office Protected Resources Division (NOAA Fisheries NER PRD).

DESCRIPTION OF THE PROPOSED ACTION

Description of proposed regulatory action

The proposed action is NOAA Fisheries' implementation of sea turtle conservation measures for the Virginia pound net fishery. Because the action is NOAA Fisheries' regulation of the fishery, and because the regulation provides an exception to the prohibition on incidental take of threatened sea turtles, NOAA Fisheries will consider the impacts to listed species from the continued operation of the pound net fishery as a whole. Based upon new information on sea turtle interactions with pound net leaders, additional restrictions on the use of Virginia pound net leaders are deemed warranted to protect sea turtles. Specifically, the proposed action would involve issuing a final rule that prohibits the use of all offshore pound net leaders in the Virginia waters of the mainstem Chesapeake Bay south of 37° 19.0' and west of 76° 13.0', and all waters south of 37° 13.0' to the Chesapeake Bay Bridge Tunnel at the mouth of the Chesapeake Bay, and the James and York Rivers downstream of the first bridge in each tributary (Figure 1). This area is referred to as the "closed area" elsewhere in this document. Offshore pound net leaders are defined here as nets set with the inland end of the leader greater than 10 horizontal feet from the mean low water line. Additionally, the final rule retains the leader mesh size restriction included in the previous interim final rule on the pound net fishery (67 FR 41196, June 17, 2002), which is the prohibition of the use of all leaders with stretched mesh greater than or equal to 12 inches and leaders with stringers from May 6 to July 15 each year in the Virginia waters of the Chesapeake Bay outside the aforementioned closed area, extending from the Maryland-Virginia State line, the Great Wicomico River downstream of the Jessie Dupont Memorial Highway Bridge (Route 200), the Rappahannock River downstream of the Robert Opie Norris Jr. Bridge (Route 3), and the Piankatank River downstream of the Route 3 Bridge, to the COLREGS line at the mouth of the Chesapeake Bay. South of 37° 19.0' N. lat. and west of 76° 13.0' W. long., and all waters south of 37° 13.0' N. lat. to the Chesapeake Bay Bridge Tunnel, the leader restriction applies to those nets set with the inland end of the leader 10 horizontal feet or less from the mean low water line. This area is referred to as the "leader restricted area" elsewhere in this document. These measures would be in effect from May 6 to July 15 each year.

The final rule (this proposed action) also retains the framework mechanism included in the 2002 interim final rule, by which NOAA Fisheries may make changes to the restrictions and/or their effective dates on an expedited basis in order to respond to new information and protect sea turtles. Under this framework mechanism, if NOAA Fisheries believes based on, for example, water temperature and the timing of sea turtles' migration, that sea turtles may still be vulnerable to entanglement in pound net leaders after July 15, NOAA Fisheries may extend the effective dates of this regulation to July 30. Additionally, under this framework mechanism, if monitoring of pound net leaders reveals that one sea turtle is entangled alive in a pound net leader less than 12 inches stretched mesh or that one sea turtle is entangled dead and NOAA Fisheries determines that the entanglement contributed to its death, then NOAA Fisheries may determine that additional restrictions are necessary to conserve sea turtles and prevent entanglements. Such additional restrictions may include reducing the allowable mesh size for pound net leaders or prohibiting all pound net leaders regardless of mesh size in Virginia waters.

The year round reporting and monitoring requirements established via the 2002 interim final rule would remain in effect.

NOAA Fisheries determined that the closed area should be redefined based in part on public comments noting that there is a difference between the nearshore and offshore nets along the Eastern shore, and that this difference may impact sea turtle interaction rates, in particular the occurrence of impingements. NOAA Fisheries had originally considered the environmental conditions in the locations where the offshore and nearshore nets are set to be similar, based upon reports from NOAA Fisheries observers and general understanding of the currents in the Chesapeake Bay (e.g., strong along the Eastern shore near the mouth of the Chesapeake Bay). NOAA Fisheries considered those potential differences when reanalyzing the take information, and found that the data support the difference between observed turtle takes in offshore and nearshore nets. In 2002 and 2003, offshore nets accounted for all of the observed impingements (n=14) and 8 of the 9 observed entanglements. One dead sea turtle was observed entangled in a nearshore 8 inch stretched mesh leader along the Eastern shore. The difference in takes between the offshore and nearshore nets is statistically significantly different with a chi-square value of 3.841 and $p<0.01$. In 2002 and 2003, there were 345 surveys of nearshore nets and 480 surveys of offshore nets, and 13 surveys did not specify the location. The best available information suggests that the boundary of the closed area should be modified to account for the fact that all but one turtle take were in offshore nets.

NOAA Fisheries also determined that the final rule should not change in the restricted leader mesh size outside the closed area from 12 inches to 8 inches stretched mesh. Based upon additional analysis on impingements and entanglement ratios by NOAA Fisheries, it appears that restricting mesh size to less than 8 inches stretched mesh would not necessarily provide the anticipated conservation benefit to sea turtles. In additional to mesh size, the frequency of sea turtle takes appears to be a function of where the pound nets are set, with pound nets set in certain areas having a higher potential likelihood of takes for a variety of possible reasons, such as depth of water, current velocity, and proximity to certain environmental characteristics or optimal foraging grounds, and may be independent of mesh size. Additional analyses, and perhaps data collection, will be completed that will provide insights into the relationship between mesh size and sea turtle interactions, because at this time, the mesh size threshold that would prevent sea turtle entanglements cannot be determined. As such, NOAA Fisheries is not making an additional modification to leader mesh size and is retaining the mesh size restriction included in the 2002 interim final rule.

The third change from the proposed rule involved retaining the framework mechanism included in the 2002 interim final rule. This final rule does not reduce the allowable leader stretched mesh size to less than 8 inches as proposed, for reasons identified above. Takes have been documented in 8 inches and 11.5 inches stretched mesh, with one of these takes occurring outside the closed area. Therefore, there is the potential for sea turtles to become entangled in leaders less than 12 inches stretched mesh outside the closed area. As such, retaining this measure is necessary to ensure that sea turtles can be protected from additional take should monitoring document the entanglement of a live or dead sea turtle outside the closed area. The framework mechanism was excluded from the 2004 proposed rule due to difficulties experienced with enacting regulations on a real time basis. NOAA Fisheries recognizes that delays have been experienced with the framework mechanism, as observed in 2003. To alleviate some of the temporal delays associated with the enactment of a framework, NOAA Fisheries is preparing portions of the required documents ahead of time, in the event that a mid-season framework mechanism is necessary.

The rule also provides an exception to the prohibition on incidental take of threatened sea turtles, for those who comply with the pound net restrictions and prohibitions.

The May 2002 BO was reinitiated due to the exceedence of the ITS and that sea turtles were being taken in less than 12 inches stretched mesh, and the leader prohibitions included in the upcoming final rule would take the place of the leader restrictions established by the 2002 action in a portion of the Chesapeake Bay. NOAA Fisheries believes it would not be prudent to conduct a reinitiated consultation on the previous restrictions as well as a consultation on the newly proposed measures, when the some of the leader restrictions considered in the reinitiated consultation would not be in effect after the upcoming final rule is published. The effects of the actions considered in the two consultations would be almost identical. As such, the two consultations have been combined and the proposed action considered in this section 7 consultation includes the continuation of the measures included in the 2002 interim final rule, except as modified by the new proposed leader prohibition.

This proposed action, taken under the ESA, is necessary to conserve sea turtles listed as threatened or endangered and to enable NOAA Fisheries to gather further information about sea turtle interactions with the pound net fishery. Several of the components in the proposed action apply to the pound net fishery throughout the year (e.g., the monitoring and reporting requirements established by the 2002 interim final rule). In the development of the gear restrictions in the final rule, NOAA Fisheries considered pound net and sea turtle interactions throughout the year, and the time period of the regulations was determined based upon the best available information indicating that the potential for sea turtle entanglement and impingement, and subsequent mortality, in Virginia pound net leaders is highest in the spring. The final rule would restrict the use of pound net leaders from May 6 to July 15, but the pound net fishery operates largely throughout the year. As such, NOAA Fisheries recognizes that the take of sea turtles could continue to occur. The year round monitoring and reporting that is a part of the proposed action will provide additional information to NOAA Fisheries so that other measures necessary for sea turtle conservation may be identified.

Description of affected pound net fishery

The pound net fishery has been previously described in various documents (Kirkley et al. 2001, Mansfield et al. 2001, Bellmund et al. 1987, Dumont and Sundstrom 1961), and the following will serve as a brief summary.

A pound net is a fixed entrapment gear consisting of an arrangement of fiber netting supported upon stakes or piling with the head ropes or lines above the water. Typically, there are three distinct segments: the pound, which is the enclosed end with a netting floor where the fish entrapment takes place; the heart, which is a net in the shape of a heart that aids in funneling the fish into the pound; and the leader, which is a long straight net that leads the fish offshore towards the pound (Figure 2). There may also be an outer compartment or heart, and pound nets fished in deeper water may have a middle compartment (round pound). Fish swimming along the shore are turned towards the pound by the leader, guided in the heart, and then into the pound where they are removed periodically by devices such as dip nets. Pound net leaders can consist of mesh, stringers, and/or buoys. NOAA Fisheries considers a pound net leader with stretched mesh greater than 12 inches to be a large mesh leader. A stringer leader consists of vertical lines spaced apart in a portion of the leader and mesh in the rest of the leader (Figure 3). Alternatively, a leader that does not have a stringer fishes the first row of mesh at the water surface.

Pound nets are passive fishing devices, as they will trap the fish that swim into the pound. Species of fish that are caught within a net depend upon a variety of factors, including the season and the location of the pound net. Appendix A identifies the species of fish that have been landed using pound net gear in Virginia. In 2002, bait fish, Atlantic croaker, and menhaden comprised 83.2% of the total catch by pound nets (VMRC 2002 fishing data).

Table 1 identifies the metric tons landed in May and June 2002 by gear type in the Virginia Chesapeake Bay, Virginia nearshore state waters, and, for comparison, the federal waters off Virginia. May and June landings are shown because those months typically have the highest number of sea turtle strandings. However, for reasons included elsewhere in this document (e.g., Effects of the Action), the final rule includes leader restrictions from May 6 to July 15. As such, Table 2 denotes the metric tons landed in May, June, and July 2002 by gear type in the Virginia Chesapeake Bay, Virginia nearshore state waters, and, for comparison, the federal waters off Virginia. This data was obtained from the NOAA Fisheries NEFSC Dealer Database.

Landings by pound nets represented approximately 5 percent of the total landings in the Virginia Chesapeake Bay during May and June 2002 (956 metric tons (mt); Table 1), and approximately 3 percent of the total landings from May to July 2002 (1300 mt; Table 2). Based on 2000 to 2002 VMRC data, annual landings per fisherman were 280,996 pounds in the upper portion of the Virginia Chesapeake Bay (the location of the leader mesh size restrictions in the proposed action) and 257,491 pounds in the southern portion of the Chesapeake Bay (the location where all leaders are prohibited in the proposed action). Annual revenues per harvester were $64,483 and $105,298 in the upper and lower region, respectively. Pound net landings from 1990 to 1999 have increased at an annual rate of 8.33 percent, while the annual revenues from pound net landings have increased by 17.31 percent (Kirkley et al. 2001).

Table 1. Chesapeake Bay, state waters, and ocean landings in the State of Virginia for May and June 2002 by gear type.

Virginia						
May and June 2002	**Chesapeake Bay**		**State Waters**		**Ocean**	
Gear Type	Landings (metric tons)	Percent	Landings (metric tons)	Percent	Landings (metric tons)	Percent
Fish Trawl	0	-	0	-	86.3	0.4
Scallop Trawl	0	-	0	-	2,712.8	12.1
Beach Seine	165.7	0.8	4.4	1.1	0	-
Gillnet	426.8	2.2	142.1	35.6	180.1	0.8
Purse Seine	17,392.4	87.7	0	-	6,009.9	26.8
Scallop Dredge	0	-	0	-	13,311.2	59.5
Pound Nets	956.1	4.8	0	-	0	-
Fish Pots	4.6	0.02	15.6	3.9	37.4	0.2
Conch Pots	1.1	< 0.01	5.4	1.4	43.2	0.2
Crab Pots	864.5	4.4	224.7	56.4	0	-
Conch Dredge	21.6	0.1	0	-	5.1	0.02
Clam Dredge	0	-	6.5	1.6	0	-
TOTAL	19,832.8	100.0	398.7	100.0	22,386.0	100.0

Table 2. Chesapeake Bay, state waters, and ocean landings in the State of Virginia for May, June, and July 2002 by gear type.

Virginia						
May to July 2002	**Chesapeake Bay**		**State Waters**		**Ocean**	
Gear Type	Landings (metric tons)	Percent	Landings (metric tons)	Percent	Landings (metric tons)	Percent
Fish Trawl	0	-	0	-	138.0	0.5
Scallop Trawl	0	-	0	-	3759.2	12.5
Beach Seine	273.1	0.6	4.6	0.2	0	-
Gillnet	726.8	1.5	178.7	7.1	180.1	0.6
Purse Seine	44317.0	92.2	1910.3	75.5	6009.9	20.0
Scallop Dredge	0	-	0	-	19915.2	66.2
Pound Nets	1299.6	2.7	0	-	0	-
Fish Pots	10.2	0.02	23.0	0.9	53.4	0.2
Conch Pots	1.1	< 0.01	5.4	0.2	43.4	0.1
Crab Pots	1415.0	2.9	305.6	12.1	0	-
Picks	0	-	91.3	3.6	0	-
Conch Dredge	22.4	0.05	0	-	5.1	0.02
Clam Dredge	0	-	10.8	0.4	0	-
TOTAL	48065.2	100.0	2529.7	100.0	30104.3	100.0

Boundary Definitions for Tables 1 and 2:
Chesapeake Bay = Mainstem Chesapeake Bay, does not include rivers, small bays, or tributaries.
State Waters = All waters out to 3 miles, including seaside bays.
Ocean = All federal waters beyond 3 miles in which catch was landed in Virginia.

Virginia has maintained a limited entry system for pound nets in the mainstem Chesapeake Bay and near reaches of the tributaries since 1994. According to VMRC, only 161 pound net licenses are issued in Virginia, where one license is assigned to each pound net. Annual attrition of licenses results in licenses being transferred to new participants, so it appears that the number of licenses has been relatively stable since 1994. However, due to economic reasons (e.g., expensive fishing gear, labor costs), the number of participants in the pound nets fishery has declined from the 1980s (Mansfield et al. 2001). So while the number of pound nets has apparently decreased since the 1980s, the number of licenses issued (n=161) has been approximately the same since 1994. This suggests that the number of pound nets in the Virginia

Chesapeake Bay has been approximately the same since 1994, but NOAA Fisheries recognizes that the number of active nets in any given season may vary among years.

According to licensee information provided by VMRC, there were 67 licensed Virginia pound net fishermen in 2003. However, not all of these fishermen hang their nets in the action area. According to VMRC data, there were 53 fishermen fishing pound nets in the action area in 2002; however, only 31 fishermen fished pound nets from May 6 to July 15. Most pound netters have more than one license and as such, fish more than one net. On average, each fisherman fishes approximately 2-3 pound nets. In 2002, from May 6 to July 15, approximately 60 pound nets were fished in the waters of the action area.

In 2001, the Virginia counties with the highest number of issued pound net licenses were Northumberland (50), followed by Northampton (43), Lancaster (13), Westmoreland (10), and Mathews (10). According to VMRC, pound nets are set almost exclusively offshore of the county in which the license was purchased. In Virginia, the majority of pound net stands are located around the southern Virginia shore of the mouth of the Potomac River (south of Smith Point), around the mouth of the Rappahannock River to the mouth of the York River/Mobjack Bay, and along the Eastern shore of Virginia. The locations of pound net sites observed during NOAA Fisheries monitoring efforts in 2003 are shown in Figure 4. This geographical distribution of sites is consistent with those observed during NOAA Fisheries 2002 monitoring efforts and previous studies (Mansfield et al. 2001; Mansfield et al. 2002a).

The choice of leader mesh size depends heavily on the currents where the nets are located. Large mesh leaders are utilized in the areas of strong tidal currents to prevent flotsam from washing into the leaders and causing the overburdened nets to drift away. In the southern area of the Eastern shore, typically large mesh leaders are set in deeper waters (approximately 20-35 ft), while small mesh leaders (approximately 6-8 inch mesh) are set closer to shore in up to 15 ft of water. In 2003, with the pound net leader restrictions in place, mesh size of leaders along the Eastern shore ranged from 11.5 inches in offshore nets to 6 inches in nets close to the beach.

Stringer leaders are also typically used in locations with high currents, typically found in the Western Bay around the tip of Mobjack Bay. The pounds for those stringer leaders are set in 12 to 30 feet of water. Nets in shallower protected areas are usually equipped with smaller mesh leaders (less than 8 inches stretched mesh). Only a few pound nets are set upriver of the first bridge in the Virginia Chesapeake Bay tributaries. According to information provided by VMRC in 2001, in the Potomac River, three pound nets with 5 inch stretched mesh leaders are located above the Harry W. Nice Memorial Bridge (Route 301), and in the Rappahannock River, nine pound nets with small mesh leaders (approximately 4 inch stretched mesh) are set above the Robert Opie Norris Bridge (Route 3). In 2001, there were no pound nets above the first bridge in the James River and York River.

The pound nets set above the first bridge in these tributaries are located in Virginia waters, but outside the area affected by the final rule. As this opinion considers the total operation of the pound net fishery, the potential impacts of these pound nets on listed species must be determined. However, listed species, sea turtles in particular, are not likely to be in Virginia Chesapeake Bay waters outside the area affected by the final rule. As such, the continued operation of the pound net fishery outside the area for which the final rule applies will not be included in the action area or discussed further, as these nets are not likely to adversely affect listed species.

Action Area

The action area for this consultation includes the Virginia waters of the mainstem Chesapeake Bay from the Maryland-Virginia State line (approximately 37° 55' N. lat., 75° 55' W. long.) to the COLREGS line at the mouth of the Chesapeake Bay; the James River downstream of the Hampton Roads Bridge Tunnel (I-64); the York River downstream of the Coleman Memorial Bridge (Route 17); the Great Wicomico River downstream of the Jessie Dupont Memorial Highway Bridge (Route 200); the Rappahannock River downstream of the Robert Opie Norris Jr. Bridge (Route 3); and the Piankatank River downstream of the Route 3 Bridge.

STATUS OF AFFECTED SPECIES

NOAA Fisheries has determined that the action being considered in this biological opinion may affect the following endangered or threatened species under NOAA Fisheries' jurisdiction:

Sea Turtles	
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempi*)	Endangered
Green sea turtle (*Chelonia mydas*[1])	Endangered/Threatened
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered

No critical habitat for any of the affected species has been identified in the action area, and as such, no critical habitat will be affected.

Several species of endangered whales, including right whales (*Eubalaena glacialis*), humpback whales (*Megaptera novaeangliae*), and fin whales (*Balaenoptera physalus*) have been documented in Virginia waters, most frequently in offshore areas. It is unlikely that these species would be present in the action area and be impacted by the proposed action. As such, the proposed action is not likely to affect these endangered whales, and this opinion will not further assess of the potential impacts to these species.

This section will focus on the status of the various species within the action area, summarizing information necessary to establish the environmental baseline and to assess the effects of the proposed action. Background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents including recent

[1] Pursuant to NOAA Fisheries regulations at 50 CFR 227.71, the prohibitions of Section 9 of the Endangered Species Act apply to all green turtles, whether endangered or threatened.

shortnose sturgeon (NOAA Fisheries 1996) and sea turtle (NOAA Fisheries and USFWS 1995, USFWS 1997) status reviews, Recovery Plans for the shortnose sturgeon (NOAA Fisheries 1998b), loggerhead sea turtle (NOAA Fisheries and USFWS 1991a), Kemp's ridley sea turtle (USFWS and NOAA Fisheries 1992), green sea turtle (NOAA Fisheries and USFWS 1991b), leatherback sea turtle (NOAA Fisheries and USFWS 1992), and hawksbill sea turtle (NOAA Fisheries and USFWS 1993), and Turtle Expert Working Group reports (1998, 2000).

This BO treats the sea turtle populations in the Atlantic Ocean as distinct from the Pacific Ocean populations for the purposes of this consultation. This approach is allowable based on interagency policy on the recognition of distinct vertebrate populations (61 FR 4722). To address specific criteria outlined in that policy, sea turtle populations in the Atlantic Ocean are geographically discrete from populations in the Pacific Ocean, with limited genetic exchange (see NOAA Fisheries and USFWS 1998). The loss of sea turtle populations in the Atlantic Ocean would result in a significant gap in the distribution of each turtle species, which makes these populations biologically significant. Finally, the loss of these sea turtle populations in the Atlantic Ocean would dramatically reduce the distribution and abundance of these species and would, by itself, appreciably reduce the entire species' likelihood of surviving and recovering in the wild. This BO treats the sea turtle populations in the Atlantic Ocean as distinct from the Pacific Ocean populations for the purposes of this consultation. Therefore, this consultation will focus on the Atlantic populations of loggerhead sea turtles, leatherback sea turtles, Kemp's ridley sea turtles, green sea turtles, and hawksbill sea turtles, but a summary of the species status in the Pacific will be provided at the beginning of each section.

Loggerhead Sea Turtles

Loggerhead sea turtles are a cosmopolitan species, found in temperate and subtropical waters and inhabiting pelagic waters, continental shelves, bays, estuaries and lagoons. Loggerhead sea turtles are the most abundant species of sea turtle in U.S. waters, commonly occurring throughout the inner continental shelf from Florida through Cape Cod, Massachusetts, and may occur as far north as Nova Scotia when oceanographic and prey conditions are favorable (NEFSC survey data 1999). Aerial surveys of loggerhead turtles north of Cape Hatteras indicate that they are most common in waters from 22 to 49 meters deep, although they range from the beach to waters beyond the continental shelf (Sh

oop and Kenney 1992). Loggerhead sea turtles are primarily benthic feeders, opportunistically foraging on crustaceans and mollusks (Wynne and Schwartz, 1999). Under certain conditions they may also scavenge fish, particularly if they are easy to catch (e.g., caught in nets; NOAA Fisheries and USFWS, 1991a).

Pacific Ocean. In the Pacific Ocean, major nesting grounds are generally located in temperate and subtropical regions, with scattered nesting in the tropics. Within the Pacific Ocean, loggerhead sea turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. Based on available information, the Japanese nesting aggregation is significantly larger than the southwest Pacific nesting aggregation. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten et al. 1996). More recent estimates are unavailable; however, qualitative reports infer that the Japanese nesting aggregation has declined since 1995 and continues to decline (Tillman 2000). We have no recent, quantitative estimates of the size of the nesting aggregation in the southwest Pacific, but the nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

Pacific loggerhead turtles are captured, injured, or killed in numerous Pacific fisheries including Japanese longline fisheries in the western Pacific Ocean and South China Seas; direct harvest and commercial fisheries off Baja California, Mexico; commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru; purse seine fisheries for tuna in the eastern tropical Pacific Ocean; and California/Oregon drift gillnet fisheries. Loggerhead turtle colonies in the western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (e.g., egg poaching).

Atlantic Ocean. Like cetaceans, sea turtles were listed under the ESA at the species level rather than individual populations or recovery units; therefore, any jeopardy determinations need to be made by considering the effects of the proposed action on the entire species. Nevertheless, for the purposes of this section 7 consultation, the Opinion will consider the effects of the proposed action on the specific subpopulations or species groupings that occur in the action area before considering the consequences of those effects on the species as they are listed under the ESA. With respect to loggerhead sea turtles, NOAA Fisheries recognizes five subgroups: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29°N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29°N on the east coast to Sarasota, Florida on the west coast (approximately 83,400 nests in 1998); (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (approximately 200 nests per year) (NOAA Fisheries SEFSC 2001). Genetic analyses conducted at these nesting sites since the listing indicate that they are distinct subpopulations (TEWG 2000). Therefore, any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species likelihood of survival and recovery in the wild. Consequently, this biological opinion will treat the five nesting aggregations of loggerhead sea turtles as subpopulations whose survival and recovery is critical to the survival and recovery of the species. Loggerheads from any of these nesting sites may occur within the action area. However, the majority of the loggerhead turtles in the action area are expected to have come from the northern nesting subpopulation and the south Florida nesting subpopulation. For the purposes of this BO, NOAA Fisheries will therefore focus on these two subpopulations.

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182, annually with a mean of 73,751.

On average, 90.7% of these nests were of the south Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle nest sites. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation the nesting turtles belong. Nesting data can also be used to indirectly estimate both the number of females nesting in a particular year (based on an average of 4.1 nests per nesting female, Murphy and Hopkins (1984)) and of the number of adult females in the entire population (based on an average remigration interval of 2.5 years; Richardson *et al.* 1978). However, an important caveat is that this data may reflect trends in adult nesting females, but it may not reflect overall population growth rates. With this in mind, using data from 1989-1998, the average adult female loggerhead population was estimated to be 44,970. The number of nests in the northern subpopulation from 1989 to 1998 ranged from 4,370 to 7,887 with a 10-year average of 6,247 nests. With each female producing an average of 4.1 nests in a nesting season, the average number of nesting females per year in the northern subpopulation was 1,524. Assuming an average remigration rate of 2.5 years, the total number of nesting and non-nesting adult females in the northern subpopulation is estimated at 3,810 adult females (TEWG 1998, 2000).

The status of the northern population based on the number of loggerhead nests has been classified as stable or declining (TEWG 2000). Although nesting data from 1990 to the present for the northern loggerhead subpopulation suggests that nests have been increasing annually (2.8 - 2.9%) (NOAA Fisheries SEFSC 2001), there are confidence intervals about these estimates that include no growth[2]. Adding to concerns for the long-term stability of the northern subpopulation, genetics data has shown that, unlike the much larger south Florida subpopulation which produces predominantly females (80%), the northern subpopulation produces predominantly males (65%; NOAA Fisheries SEFSC 2001). The role of males from the northern subpopulation also needs further investigation. New results from nuclear DNA analyses indicate that males do not show the same degree of site fidelity as do females. It is possible then that the high proportion of males produced in the northern subpopulation are an important source of males throughout the southeast U.S., lending even more significance to the critical nature of this small subpopulation (NOAA Fisheries SEFSC 2001).

Based upon annual nesting totals from all beaches over the last 25 years, the South Florida subpopulation of loggerheads appears to be increasing. However, a more recent analysis limited to nesting data from the Index Nesting Beach Survey program from 1989 to 2002, a period encompassing index surveys that are more consistent and more accurate than surveys in previous years, has shown no detectable trend (B. Witherington, Florida Fish and Wildlife Conservation Commission, pers. comm., 2002).

Several published reports have presented the problems facing long-lived species that delay sexual maturity (Crouse et al. 1987; Crowder et al. 1994; Crouse 1999). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high annual survival as juveniles through adults to ensure that enough juveniles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes. Crouse (1999)

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[2] Meta-analyses conducted by NOAA Fisheries' Southeast Fisheries Science Center to produce these estimates were unweighted analyses and did not consider a beach's relative contribution to the total nesting activity of a subpopulation. Consequently, the results of these analyses must be interpreted with caution.

concluded that relatively small decreases in annual survival rates of both juvenile and adult loggerhead sea turtles will adversely affect large segments of the total loggerhead sea turtle population. The survival of hatchlings seems to have the least amount of influence on the survivorship of the species, but historically, the focus of sea turtle conservation has been involved with protecting the nesting beaches. While nesting beach protection and hatchling survival are important, recovery efforts and limited resources might be more effective by focusing on the protection of juvenile and adult sea turtles.

Like other sea turtles, loggerhead hatchlings enter the pelagic environment upon leaving the nesting beach. Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years before settling into benthic environments where they opportunistically forage on crustaceans and mollusks (Wynne and Schwartz 1999). However, some loggerheads may remain in the pelagic environment for longer periods of time or move back and forth between the pelagic and benthic environment (Witzell 2002). Loggerheads that have entered the benthic environment appear to undertake routine migrations along the coast that appear to be limited by seasonal water temperatures. Loggerhead sea turtles are found in Virginia foraging areas as early as April but are not usually found on the most northern foraging grounds in the Gulf of Maine until June. The large majority leave the Gulf of Maine by mid-September but some may remain in Mid-Atlantic and Northeast areas until late fall. Loggerheads appear to concentrate in nearshore and southerly areas influenced by warmer Gulf Stream waters off North Carolina during November and December (Epperly et al. 1995a). Support for these loggerhead movements are provided by the collected work of Morreale and Standora (1998) who showed through satellite tracking that 12 loggerheads traveled along similar spatial and temporal corridors from Long Island Sound, New York, in a time period of October through December, within a narrow band along the continental shelf before taking up residence for one or two months south of Cape Hatteras.

Although foraging grounds contain cohorts from nesting colonies from throughout the Western North Atlantic, loggerhead subpopulations are not equally represented on all foraging grounds. In general, south Florida turtles are more prevalent on southern foraging grounds and their concentrations decline to the north. Conversely, loggerhead turtles from the northern nesting group are more prevalent on northern foraging grounds and less so in southern foraging areas (Table 3; NOAA Fisheries SEFSC 2001; Bass et al. 1998).

Table 3. Contribution of loggerhead subpopulations to foraging grounds

SUBPOPULATION1	% CONTRIBUTION TO FORAGING GROUND				
	Western Gulf	Florida	Georgia	Carolinas	North of Cape Hatteras/ Virginia2
South Florida	83%	73%	73%	65-66%	46%
Northern	10%	20%	24%	25-28%	46%
Yucatán	6-9%	6-9%	3%	6-9%	6-9%

[1]- The Florida Panhandle population was not included because it contributes less than 1% in the

overall nesting effort and including it could result in overestimating its contribution.
[2]- Virginia was the most northern area sampled for the study (Bass et al. 1998)

It has been estimated that between 5,000 to 10,000 loggerheads inhabit the Chesapeake Bay each summer (Byles 1988; Keinath et al. 1987 in Musick and Limpus 1997). Approximately 95% of the loggerheads in the Chesapeake Bay are juveniles (Musick and Limpus 1997).

The diversity of a sea turtle's life history leaves them susceptible to many natural and human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. Hurricanes are particularly destructive to sea turtle nests. Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. For example, in 1992, all of the eggs over a 90-mile length of coastal Florida were destroyed by storm surges on beaches that were closest to the eye of Hurricane Andrew (Milton et al. 1994). Other sources of natural mortality include cold stunning and biotoxin exposure.

Anthropogenic factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, beach armoring and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; and poaching. An increased human presence at some nesting beaches or close to nesting beaches has lead to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs and an increased presence of native species (e.g., raccoons, armadillos, and opossums), which raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merrit Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection. Sea turtle nesting and hatching success on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation; marine pollution; underwater explosions; hopper dredging, offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; poaching, and fishery interactions. In the pelagic environment loggerheads are exposed to a series of long-line fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean long-line fleet, a Spanish long-line fleet, and various fleets in the Mediterranean Sea (Aguilar *et al.* 1995; Bolten *et al.* 1994; Crouse 1999). In the waters off the coastal U.S., loggerheads are exposed to a suite of fisheries in Federal and State waters including trawl, purse seine, hook and line, gillnet, pound net, longline, dredge, and trap fisheries (see further discussion in the Environmental Baseline of this BO).

Summary of Status for Loggerhead Sea Turtles
The global status and trend of loggerhead turtles is difficult to summarize. In the Pacific Ocean, loggerhead turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier

Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. The abundance of loggerhead turtles on nesting colonies throughout the Pacific basin have declined dramatically over the past 10 to 20 years. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten *et al.* 1996), but has probably declined since 1995 and continues to decline (Tillman 2000). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

NOAA Fisheries recognizes five subpopulations of loggerhead sea turtles in the western Atlantic based on genetic studies. Although these subpopulations mix on the foraging grounds, cohorts from the northern subpopulation appear to be predominant on the northern foraging grounds. Although nesting data from 1990 to the present for the northern loggerhead subpopulation suggests that nests have been increasing annually (2.8 - 2.9%) (NOAA Fisheries SEFSC 2001), there are confidence intervals about these estimates that include no growth. In addition, over half of the hatchlings produced are males (NOAA Fisheries SEFSC 2001). In contrast, nest rates for the south Florida subpopulation appear to be increasing (approximately 83,400 nests laid in 1998). Over 80% of the hatchlings produced are females. All loggerhead subpopulations are faced with a multitude of natural and anthropogenic effects. Many anthropogenic effects occur as a result of activities outside of U.S. jurisdiction (*i.e.*, fisheries in international waters). For the purposes of this consultation, NOAA Fisheries will assume that the northern subpopulation of loggerhead sea turtles is declining (the conservative estimate) or stable (the optimistic estimate) and the southern Florida subpopulation of loggerhead sea turtles is increasing (the optimistic estimate) or stable (the conservative estimate).

Leatherback Sea Turtle

Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic and Pacific Oceans, the Caribbean Sea, and the Gulf of Mexico (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtles species; their large size and tolerance of relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NOAA Fisheries and USFWS 1995). In 1980, the leatherback population was estimated at approximately 115,000 adult females globally (Pritchard 1982). By 1995, this global population of adult females had declined to 34,500 (Spotila *et al.* 1996).

Although leatherbacks are a long lived species (> 30 years), they mature at a younger age than loggerhead turtles, with an estimated age at sexual maturity of about 13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NOAA Fisheries SEFSC 2001). In the U.S. and Caribbean, female leatherbacks nest from March through July. They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30%) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. The eggs will incubate for 55-75 days before hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm ccl, Eckert (1999) found that leatherback juveniles remain in waters warmer than 26°C until they exceed 100 cm ccl.

Pacific Ocean. Based on published estimates of nesting female abundance, leatherback populations have collapsed or have been declining at all major Pacific basin nesting beaches for the last two decades (Spotila et al., 1996; NOAA Fisheries and USFWS 1998b; Sarti et al. 2000; Spotila et al. 2000). Leatherback turtles had disappeared from India before 1930, have been virtually extinct in Sri Lanka since 1994, and appear to be approaching extinction in Malaysia (Spotila et al. 2000). Nesting assemblages of leatherback turtles along the coasts of the Solomon Islands, which supported important nesting assemblages historically, are also reported to be declining (D. Broderick, personal communication, in Dutton *et al.* 1999). In Fiji, Thailand, Australia, and Papua-New Guinea (East Papua), leatherback turtles have only been known to nest in low densities and scattered colonies.

Only an Indonesian nesting assemblage has remained relatively abundant in the Pacific basin. The largest, extant leatherback nesting assemblage in the Indo-Pacific lies on the north Vogelkop coast of Irian Jaya (West Papua), Indonesia, with over 1,000 nesting females during the 1996 season (Suarez *et al.* 2000). During the early-to-mid 1980s, the number of female leatherback turtles nesting on the two primary beaches of Irian Jaya appeared to be stable. More recently, however, this population has come under increasing threats that could cause this population to experience a collapse that is similar to what occurred at Terengganu, Malaysia. In 1999, for example, local Indonesian villagers started reporting dramatic declines in sea turtle populations near their villages (Suarez 1999); unless hatchling and adult turtles on nesting beaches receive more protection, this population will continue to decline. Declines in nesting assemblages of leatherback turtles have been reported throughout the western Pacific region where observers report that nesting assemblages are well below abundance levels that were observed several decades ago (for example, Suarez 1999).

In the western Pacific Ocean and South China Seas, leatherback turtles are captured, injured, or killed in numerous fisheries including Japanese longline fisheries. Leatherback turtles in the western Pacific are also threatened by poaching of eggs, killing of nesting females, human encroachment on nesting beaches, incidental capture in fishing gear, beach erosion, and egg predation by animals.

In the eastern Pacific Ocean, nesting populations of leatherback turtles are declining along the Pacific coast of Mexico and Costa Rica. According to reports from the late 1970s and early 1980s, three beaches located on the Pacific coast of Mexico support as many as half of all leatherback turtle nests. Since the early 1980s, the eastern Pacific Mexican population of adult female leatherback turtles has declined to slightly more than 200 during 1998-99 and 1999-2000 (Sarti et al. 2000). Spotila et al. (2000) reported the decline of the leatherback turtle population at Playa Grande, Costa Rica, which had been the fourth largest nesting colony in the world. Between 1988 and 1999, the nesting colony declined from 1,367 to 117 female leatherback turtles. Based on their models, Spotila et al. (2000) estimated that the colony could fall to less than 50 females by 2003-2004.

In the eastern Pacific Ocean, leatherback turtles are captured, injured, or killed in commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru, purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries. Because of the limited available data, we cannot accurately estimate the number of leatherback turtles captured, injured, or killed through interactions with these fisheries. However, between 8 and 17 leatherback turtles were estimated to have died annually between 1990 and 2000 in interactions with the California/ Oregon drift gillnet fishery; 500 leatherback turtles are estimated to die annually in Chilean and Peruvian fisheries; 200 leatherback turtles are estimated to die in direct harvests in Indonesia; and before 1992, the North Pacific driftnet fisheries for squid, tuna, and billfish captured an estimated 1,002 leatherback turtles each year, killing about 111 of them each year.

Atlantic Ocean. Evidence from tag returns and strandings in the western Atlantic suggests that adults engage in routine migrations between boreal, temperate and tropical waters (NOAA Fisheries and USFWS 1992). In the U.S., leatherback turtles are found in the action area of this consultation. A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Shoop and Kenney (1992) estimated the leatherback population for the northeastern U.S. at approximately 300-600 animals(from near Nova Scotia, Canada to Cape Hatteras, North Carolina) based on aerial survey data.

Leatherbacks are predominantly a pelagic species and feed on jellyfish (i.e., *Stomolophus, Chryaora*, and *Aurelia* (Rebel 1974)), and tunicates (salps, pyrosomas). Leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore.

Leatherback populations in the eastern Atlantic (i.e., off Africa) and Caribbean appear to be stable, but there is conflicting information for some sites (Spotila, pers. comm) and it is certain that some nesting populations (e.g., St. John and St. Thomas, U.S. Virgin Islands) have been extirpated (NOAA Fisheries and USFWS 1995). Data collected in southeast Florida clearly indicate increasing numbers of nests for the past twenty years (9.1-11.5% increase), although it is critical to note that there was also an increase in the survey area in Florida over time (NOAA Fisheries SEFSC 2001). However, the largest leatherback rookery in the western North Atlantic remains along the northern coast of South America in French Guiana and Suriname. Recent information suggests that Western Atlantic populations declined from 18,800 nesting females in 1996 (Spotila et al. 1996) to 15,000 nesting females by 2000 (Spotila, pers. comm). The nesting population of leatherback sea turtles in the Suriname-French Guiana trans-boundary region has been declining since 1992 (Chevalier and Girondot 1998). Poaching and fishing gear interactions are, once again, believed to be the major contributors to the decline of leatherbacks in the area (Chevalier et al. 2002, Hilterman et al. 2002). While Spotila et al.(1996) indicated that turtles may have been shifting their nesting from French Guiana to Suriname due to beach erosion, analyses show that the overall area trend in number of nests has been negative since 1987 at a rate of 15.0 -17.3 % per year (NOAA Fisheries SEFSC 2001). If turtles are not nesting elsewhere, it appears that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females. Tag return data emphasize the global nature of the leatherback and the link between these South American nesters and animals found in U.S. waters. For example, a nesting female tagged May 29, 1990, in French Guiana was later recovered and released alive from the York River, VA. Another nester tagged in French Guiana on June 21, 1990, was later found dead in Palm Beach, Florida (STSSN database).

Of the Atlantic turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), and their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, and perhaps to the lightsticks used to attract target species in longline fisheries. They are also susceptible to entanglement in gillnets (used in various fisheries) and capture in trawl gear (e.g., shrimp trawls). Sea turtles entangled in fishing gear generally have a reduced ability to feed, dive, surface to breathe or perform any other behavior essential to survival (Balazs 1985). They may be more susceptible to boat strikes if forced to remain at the surface, and entangling lines can constrict blood flow resulting in necrosis.

Leatherbacks are exposed to pelagic longline fisheries in many areas of their range. Unlike loggerhead turtle interactions with longline gear, leatherback turtles typically do not ingest longline bait. Therefore, leatherbacks are foul hooked (e.g., on the flipper or shoulder area) rather than mouth or throat hooked by longline gear. Nevertheless, according to observer records, an estimated 6,363 leatherback sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were released dead (NOAA Fisheries SEFSC 2001). Since the U.S. fleet accounts for only 5-8% of the hooks fished in the Atlantic Ocean, adding up the under-represented observed takes of the other 23 countries actively fishing in the area would likely result in annual take estimates of thousands of leatherbacks over different life stages. Leatherbacks also make up a significant portion of takes in the Gulf of Mexico and South Atlantic areas, but are more often released alive. Research has been conducted on sea turtle interaction rates with longline gear in the Northeast Distant statistical reporting zone in the Western Atlantic from 2001 to 2003. The results of the 2003 research confirmed the 2002 results that found 18/0 circle hooks with both mackerel and squid bait significantly reduce both loggerhead and leatherback interactions when compared to industry standard J hooks and squid bait (Watson et al. 2004). Circle hooks also reduced the incidence of hook ingestion by loggerheads, reducing post-hooking mortality associated with the interactions.

Leatherbacks are susceptible to entanglement in the lines associated with trap/pot gear used in several fisheries. In the Northeast, leatherbacks are known to become entangled in lobster trap gear. One hundred nineteen leatherback entanglements were reported from New York through Maine for the years 1980 - 2000, but the majority (92) were reported from 1990-2000 (NOAA Fisheries 2001a) and these represented known entanglements between the months of June and October, only (NEFSC, unpublished data). Entanglement in lobster pot lines was cited as the leading determinable cause of adult leatherback strandings in Cape Cod Bay, Massachusetts (Prescott 1988; R. Prescott, pers. comm.). In addition, many of the stranded leatherbacks for which a direct cause of death could not be documented showed evidence of rope scars or wounds and abraded carapaces, implicating entanglement. Data collected by the NEFSC in 2001 also support that whelk pot gear was involved in a number of reported leatherback entanglements in Massachusetts and New Jersey waters. The Mid-Atlantic blue crab fishery is another potential source of leatherback entanglement. In May and June 2002, three leatherbacks were documented entangled in crab pot gear in various areas of the Chesapeake Bay. In the Southeast, leatherbacks are vulnerable to entanglement in Florida's lobster pot and stone crab fisheries as documented on stranding forms. In the U.S. Virgin Islands, where one of five leatherback strandings from 1982 to 1997 were due to entanglement (Boulon 2000), leatherbacks have been observed with their flippers wrapped in the line of West Indian fish traps (R. Boulon, pers. comm.). Since many entanglements of this typically pelagic species likely go unnoticed, entanglements in fishing gear may be much higher.

Leatherback interactions with the southeast shrimp fishery are also common. The National Research Council Committee on Sea Turtle Conservation identified incidental capture in shrimp trawls as the major anthropogenic cause of sea turtle mortality (Magnuson et al. 1990). Leatherbacks are likely to encounter shrimp trawls working in the nearshore waters off the Atlantic coast as they make their annual spring migration north. Turtle Excluder Devices (TEDs) are used in the southeast shrimp fishery and summer flounder trawl fishery (in certain geographical areas) to minimize sea turtle/fishery interactions. The TED regulations have been modified over the years to ensure sea turtles are being effectively excluded from trawl gear. On February 21, 2003, NOAA Fisheries issued a final rule to amend the sea turtle protection regulations to enhance their effectiveness in reducing sea turtle mortality resulting from trawling in the Atlantic and Gulf Areas of the southeastern United States (68 FR 8456). These regulations included modifications to the TED design in order to exclude leatherbacks and large, sexually mature loggerhead and green turtles.

Gillnet fisheries operating in the nearshore waters of the Mid-Atlantic states are likely to take leatherbacks when these fisheries and leatherbacks co-occur. However, there is very little quantitative data on capture rate and mortality. Data collected by the NOAA Fisheries NEFSC Fisheries Observer Program from 1994 through 1998 (excluding 1997) on drift gillnet fisheries in offshore fisheries from Maine to Florida indicate that a total of 37 leatherbacks were incidentally captured (16 lethally) in drift gillnets set in offshore waters from Maine to Florida during this period. Observer coverage for this period ranged from 54% to 92%. The NOAA Fisheries NEFSC Fisheries Observer Program also had observers on the bottom coastal gillnet fishery which operates in the Mid-Atlantic, but no takes of leatherback sea turtles were observed from 1994-1998. Observer coverage of this fishery, however, was low and ranged from <1% to 5%.

Poaching is not known to be a problem for nesting populations in the continental U.S. However, the NOAA Fisheries SEFSC (2001) notes that poaching of juveniles and adults is still occurring in the U.S. Virgin Islands. Four of five strandings in St. Croix were the result of poaching (Boulon 2000). A few cases of fishermen poaching leatherbacks have been reported from Puerto Rico, but most of the poaching is for eggs.

Leatherback sea turtles may be more susceptible to marine debris ingestion than other species due to their pelagic existence and the tendency of floating debris to concentrate in convergence zones that adults and juveniles use for feeding areas and migratory routes (Lutcavage *et al.* 1997; Shoop and Kenney 1992). Investigations of the stomach contents of leatherback sea turtles revealed that a substantial percentage (44% of the 16 cases examined) contained plastic (Mrosovsky 1981). Along the coast of Peru, intestinal contents of 19 of 140 (13%) leatherback carcasses were found to contain plastic bags and film (Fritts 1982). The presence of plastic debris in the digestive tract suggests that leatherbacks might not be able to distinguish between prey items and plastic debris (Mrosovsky 1981). Balazs (1985) speculated that the object may resemble a food item by its shape, color, size or even movement as it drifts about, and induce a feeding response.

Summary of Status for *Leatherback Sea Turtles*
The global status and trend of leatherback turtles is difficult to summarize. In the Pacific Ocean, the abundance of leatherback turtles on nesting colonies has declined dramatically over the past 10 to 20 years: nesting colonies throughout the eastern and western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (for example, egg poaching). At current rates of decline, leatherback turtles in the Pacific basin are a critically endangered species with a low probability of surviving and recovering in the wild.

In the Atlantic Ocean, the status and trends of leatherback turtles appears much more variable. The number of female leatherbacks reported at some nesting sites in the Atlantic Ocean has increased, while at others they have decreased. Some of the same factors that led to precipitous declines of leatherbacks in the Pacific also affect leatherbacks in the Atlantic: leatherbacks are captured and killed in many kinds of fishing gear and interact with fisheries in State, Federal and international waters; poaching is a problem and affects leatherbacks that occur in U.S. waters; and leatherbacks also appear to be more susceptible to death or injury from ingesting marine debris than other turtle species. Nevertheless, the trend of the Atlantic population is uncertain. For the purposes of this Opinion, NOAA Fisheries will assume that the Atlantic population of leatherback sea turtles is declining (the conservative estimate) or stable (the optimistic estimate).

Kemp's Ridley Sea Turtles

The Kemp's ridley is the most endangered sea turtle species. The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963), but the population has been drastically reduced from these historical numbers. However, the TEWG (1998, 2000) indicated that the Kemp's ridley population appears to be in the early stage of a recovery trajectory. Conservation efforts by Mexican and U.S. agencies have aided this species by eliminating egg harvest, protecting eggs and hatchlings, and reducing at-sea mortality through fishing regulations. Nesting data, estimated number of adults, and percentage of first time nesters have all increased from lows experienced in the 1970's and 1980's. From 1985 to 1999, the number of nests observed at Rancho Nuevo and nearby beaches has increased at a mean rate of 11.3 percent per year, allowing cautious optimism that the population is on its way to recovery. For example, data from nests at Rancho Nuevo, North Camp and South Camp, Mexico, have indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and 702 nests in 1985, then increased to produce 1,940 nests in 1995 and about 3,400 nests in 1999. Total nests for the state of Tamaulipas and Veracruz in 2003 was 8,323 (E. Possardt, USFWS, pers. comm.); Rancho Nuevo alone documented 4,457 nests. Estimates of adult abundance followed a similar trend from an estimate of 9,600 in 1966 to 1,050 in 1985 and 3,000 in 1995. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6 to 28 percent from 1981 to 1989 and from 23 to 41 percent from 1990 to 1994. The population model in the TEWG report projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2020, if the assumptions of age to sexual maturity and age specific survivorship rates plugged into their model are correct. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular internesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable.

Kemp's ridley nesting occurs from April through July each year. Little is known about mating but it is believed to occur at or before the nesting season in the vicinity of the nesting beach. Hatchlings emerge after 45-58 days. Once they leave the beach, neonates presumably enter the Gulf of Mexico where they feed on available sargassum and associated infauna or other epipelagic species (USFWS and NOAA Fisheries 1992). The presence of juvenile turtles along both the Atlantic and Gulf of Mexico coasts of the U.S., where they are recruited to the coastal benthic environment, indicates that post-hatchlings are distributed in both the Gulf of Mexico and Atlantic Ocean (TEWG 2000). The location and size classes of dead turtles recovered by the STSSN suggests that benthic immature developmental areas occur in many areas along the U.S. coast and that these areas may change given resource quality and quantity (TEWG 2000).

Juvenile Kemp's ridleys use northeastern and mid-Atlantic coastal waters of the U.S. Atlantic coastline as primary developmental habitat during summer months, with shallow coastal embayments serving as important foraging grounds. Ridleys found in mid-Atlantic waters are primarily post-pelagic juveniles averaging 16 inches in carapace length, and weighing less than 44 pounds (Terwilliger and Musick 1995). Next to loggerheads, Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath *et al.* 1987; Musick and Limpus 1997). In the Chesapeake Bay, where the juvenile population of Kemp's ridley sea turtles is estimated to be 211 to 1,083 turtles (Musick and Limpus 1997), ridleys frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Blue crabs and spider crabs are key components of the Virginia Kemp's ridley diet, as noted during examination of stranded sea turtle stomach contents (Seney 2003). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds and smaller juveniles from New York and New England to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Musick and Limpus 1997; Epperly *et al.* 1995a; Epperly *et al.* 1995b)

Kemp's ridleys face many of the same natural threats as loggerheads, including destruction of nesting habitat from storm events, natural predators at sea, and oceanic events such as cold-stunning. Although cold-stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. For example, in the winter of 1999/2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and 5 green turtles were found on Cape Cod beaches (R. Prescott, pers. comm.). In the winter of 2003/2004, 79 Kemp's ridleys were found cold stunned on Cape Cod beaches. Although many cold-stun turtles can survive if found early enough, cold-stunning events can represent a significant cause of natural mortality.

Anthropogenic impacts to the Kemp's ridley population are similar to those discussed above. Like other turtle species, the severe decline in the Kemp's ridley population appears to have been heavily influenced by a combination of exploitation of eggs and impacts from fishery interactions. From the 1940s through the early 1960s, nests from Ranch Nuevo were heavily exploited (USFWS and NOAA Fisheries 1992), but beach protection in 1966 helped to curtail this activity (USFWS and NOAA Fisheries 1992). Following World War II, there was a substantial increase in the number of trawl vessels, particularly shrimp trawlers, in the Gulf of Mexico where the adult Kemp's ridley turtles occur. Information from fishers helped to demonstrate the high number of turtles taken in these shrimp trawls (USFWS and NOAA Fisheries 1992). Subsequently, NOAA Fisheries has worked with the industry to reduce turtle takes in shrimp trawls and other trawl fisheries, including the development and use of TEDs. Sea sampling coverage in the Northeast otter trawl fishery, and southeast shrimp and summer flounder bottom trawl fisheries have recorded takes of Kemp's ridley turtles.

Summary of Status of Kemp's Ridley Sea Turtles
The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). From 1985 to 1999, the number of nests observed at Rancho Nuevo, and nearby beaches increased at a mean rate of 11.3% per year. It has been suggested that Kemp's ridley sea turtles mature much sooner (6-7 years) but there is some doubt that these figures are accurate given the disparity with age at sexual maturity for other carnivorous sea turtles, namely loggerheads (USFWS and NOAA Fisheries 1992). Anthropogenic impacts to the Kemp's ridley population are similar to those discussed above for loggerhead sea turtles. Despite these, there is cautious optimism that the Kemp's ridley sea turtle population is increasing.

Green Sea Turtle

Green turtles are the largest chelonid (hard-shelled) sea turtle, with an average adult carapace of 91 cm SCL and weight of 150 kg. Ninety percent of green turtles found in Long Island Sound are between 25 and 40 cm SCL, with the largest reported being 68 cm (Burke et al. 1991). Based on growth rate studies of wild green turtles, greens have been found to grow slowly with an estimated age of sexual maturity ranging from 18 to 40 years (Balazs 1982; Frazer and Ehrhard 1985; B. Schroeder pers. comm.). Green turtles are distributed circumglobally, and can be found in the Pacific and Atlantic Oceans.

Pacific Ocean. In the Pacific Ocean, green sea turtles can be found along the west coast of the United States, the Hawaii islands, Oceania, Guam, the Northern Mariana Islands, and American Samoa. Along the Pacific coast, green turtles have been reported as far north as British Columbia, but a large number of the Pacific coast sightings occur in northern Baja California and southern California (NOAA Fisheries and USFWS 1996). The main nesting sites for the East Pacific green turtle are located in Michoacan, Mexico, and in the Galapagos Islands, Ecuador, with no known nesting of East Pacific green turtles occurring in the United States. Between 1982 and 1989, the estimated nesting population in Michoacan ranged from a high of 5,585 females in 1982 to a low of 940 in 1984 (NOAA Fisheries and USFWS 1996). Current population estimates are unavailable.

Atlantic Ocean. In the western Atlantic, green sea turtles range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean (Wynne and Schwartz 1999). Green turtles' occurrence are infrequent north of Cape Hatteras, but they do occur in mid-Atlantic and Northeast waters (e.g., documented in Long Island Sound (Morreale 2003) and cold stunned in Cape Cod Bay (NOAA Fisheries unpub. data)). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and directed fisheries in the United States and throughout the Caribbean are largely to blame for the decline of the species. In the Gulf of Mexico, green turtles were once abundant enough in the shallow bays and lagoons to support a commercial fishery. In 1890, over one million pounds of green turtles were taken in the Gulf of Mexico green sea turtle fishery (Doughty 1984). However, declines in the turtle fishery throughout the Gulf of Mexico were evident by 1902 (Doughty 1984).

In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Occasional nesting has been documented along the Gulf coast of Florida, at southwest Florida beaches, as well as the beaches on the Florida Panhandle (Meylan *et al.* 1995). More recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic Coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Certain Florida nesting beaches have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan et al. 1995). Recent population estimates for the western Atlantic area are not available.

While nesting activity is obviously important in determining population distributions, the remaining portion of the green turtles life is spent on the foraging and breeding grounds. Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages (Bjorndal 1985). At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet but may also consume jellyfish, salps, and sponges (Bjorndal 1997). Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). In North Carolina, green turtles are known to occur in estuarine and oceanic waters and to nest in low numbers along the entire coast. The summer developmental habitat for green turtles also encompasses estuarine and coastal waters of Chesapeake Bay and as far north as Long Island Sound (Musick and Limpus 1997).

Green turtles face many of the same natural threats as loggerhead and Kemp's ridley sea turtles. In addition, green turtles appear to be susceptible to fibropapillomatosis, an epizootic disease producing lobe-shaped tumors on the soft portion of a turtles body. Juveniles are most commonly affected. The occurrence of fibropapilloma tumors may result in impaired foraging, breathing, or swimming ability, leading potentially to death.

As with the other sea turtle species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of other mortality. Stranding reports indicate that between 200-400 green turtles strand annually along the Eastern U.S. coast from a variety of causes most of which are unknown (STSSN database). Sea sampling coverage in the pelagic driftnet, pelagic longline, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles.

Summary of Status of Green Sea Turtles
The global status and trend of green sea turtles is difficult to summarize. In the Pacific Ocean, green turtles are frequent along a north-south band from 15° N to 5° S along 90° W, and between the Galapagos Islands and Central American coast (NOAA Fisheries and USFWS 1996), but current population estimates are unavailable. Green turtles range in the western Atlantic from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean. Green turtles face many of the same natural and anthropogenic threats as loggerhead and Kemp's ridley sea turtles. In addition, green turtles are also susceptible to fibropapillomatosis which can result in death. In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Recent population estimates for the western Atlantic area are not available. However, the pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of index beaches in 1989. There is cautious optimism that the green sea turtle population is increasing in the Atlantic.

Hawksbill Sea Turtle

The hawksbill turtle is relatively uncommon in the waters of the continental United States. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. However, there are accounts of hawksbills in south Florida and a surprising number are encountered in Texas. Most of the Texas records report small turtles, probably in the 1-2 year class range. Many captures or strandings are of individuals in an unhealthy or injured condition

(Hildebrand 1982). The lack of sponge-covered reefs and the cold winters in the northern Gulf of Mexico probably prevent hawksbills from establishing a viable population in this area. In the north Atlantic, small hawksbills have stranded as far north as Cape Cod, Massachusetts (STSSN database). Many of these strandings were observed after hurricanes or offshore storms. Although there have been no reports of hawksbills in the Chesapeake Bay, one has been observed taken incidentally in a fishery just south of the Bay (Anonymous 1992).

Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. The Culebra Archipelago of Puerto Rico contains especially important foraging habitat for hawksbills. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands.

No takes of hawksbill sea turtles have been recorded in northeast or mid-Atlantic fisheries covered by the NEFSC observer program.

Shortnose Sturgeon

Shortnose sturgeon occur in large rivers along the western Atlantic coast from the St. Johns River, Florida (possibly extirpated from this system), to the Saint John River in New Brunswick, Canada. The species is anadromous in the southern portion of its range (i.e., south of Chesapeake Bay), while northern populations are amphidromous (NOAA Fisheries 1998b). Population sizes vary across the species' range. From available estimates, the smallest populations occur in the Cape Fear (~8 adults; Moser and Ross 1995) and Merrimack Rivers (~100 adults; M. Kieffer, United States Geological Survey, personal communication), while the largest populations are found in the Saint John (~100,000; Dadswell 1979) and Hudson Rivers (~61,000; Bain et al. 1998).

Total instantaneous mortality rates (Z) are available for the Saint John River (0.12 - 0.15; ages 14-55; Dadswell 1979), Upper Connecticut River (0.12; Taubert 1980), and Pee Dee-Winyah River (0.08-0.12; Dadswell et al. 1984). Total instantaneous natural mortality (M) for shortnose sturgeon in the lower Connecticut River was estimated to be 0.13 (T. Savoy, Connecticut Department of Environmental Protection, personal communication). There is no recruitment information available for shortnose sturgeon because there are no commercial fisheries for the species. Estimates of annual egg production for this species are difficult to calculate because females do not spawn every year (Dadswell et al. 1984). Further, females may abort spawning attempts, possibly due to interrupted migrations or unsuitable environmental conditions (NOAA Fisheries 1998b). Thus, annual egg production is likely to vary greatly in this species.

Shortnose sturgeon are benthic fish that mainly occupy the deep channel sections of large rivers. They feed on a variety of benthic and epibenthic invertebrates including molluscs, crustaceans (amphipods, chironomids, isopods), and oligochaete worms (Vladykov and Greeley 1963; Dadswell 1979). Shortnose sturgeon are long-lived (30 years) and, particularly in the northern extent of their range, mature at late ages. In the north, males reach maturity at 5 to 10 years, while females mature between 7 and 13 years.

In the northern extent of their range, shortnose sturgeon exhibit three distinct movement patterns that are associated with spawning, feeding, and overwintering periods. In spring, as water temperatures rise above 8° C, pre-spawning shortnose sturgeon move from overwintering grounds to spawning areas. Spawning occurs from mid/late April to mid/late May. Post-spawned sturgeon migrate downstream to feed throughout the summer. As water temperatures drop below 8° C again in the fall, shortnose sturgeon move to overwintering concentration areas and exhibit little movement until water temperatures rise again in spring (Dadswell et al. 1984; NOAA Fisheries 1998b). Young-of-the-year shortnose sturgeon are believed to move downstream after hatching (Dovel 1981) but remain within freshwater habitats. Older juveniles tend to move downstream in fall and winter as water temperatures decline and the salt wedge recedes. Juveniles move upstream in spring and feed mostly in freshwater reaches during summer.

Shortnose sturgeon spawn in freshwater sections of rivers, typically below the first impassable barrier on the river (e.g., dam). Spawning occurs over channel habitats containing gravel, rubble, or rock-cobble substrates (Dadswell et al. 1984; NOAA Fisheries 1998b). Additional environmental conditions associated with spawning activity include decreasing river discharge following the peak spring freshet, water temperatures ranging from 9-12° C, and bottom water velocities of 0.4 to 0.7 m/sec (Dadswell et al. 1984; NOAA Fisheries 1998b).

Shortnose sturgeon historically occurred in the Chesapeake Bay, but prior to 1996, the best available information suggested that the species was either extirpated or very rare from the area. However, the presence of shortnose sturgeon in the Chesapeake Bay has recently been detected (Skjeveland et al. 2000) due to the initiation in 1996 of a U.S. Fish and Wildlife Service reward program for Atlantic sturgeon in Maryland waters of the Chesapeake Bay. Before the reward program, there were only 15 published historic records of shortnose sturgeon in the Chesapeake Bay, and most of these were based on personal observations from the upper Chesapeake Bay during the 1970s and 1980s (Dadswell et al. 1984). From 1996 to September 2003, over 50 shortnose sturgeon have been reported in Maryland waters through the FWS Atlantic sturgeon reward program. Most of the shortnose sturgeon were caught in waters in the upper Chesapeake Bay north of Hart-Miller Island (Skjeveland et al. 2000; Kim Damon-Randall, NOAA Fisheries, pers. comm. 2003).

In the Chesapeake Bay, this species has been more frequently encountered in Maryland waters, but shortnose sturgeon have historically been found as far south as the Rappahannock River (Skjeveland et al. 2000). From February through November 1997, a FWS reward program was in effect for Atlantic sturgeon in Virginia's major tributaries (James, York, and Rappahannock Rivers). A sturgeon captured from the Rappahannock River in May 1997 was confirmed as a shortnose sturgeon (Spells 1998). Additionally, during trawling activities to relocate sea turtles near hopper dredging operations in Thimble Shoal Channel (at the mouth of the Chesapeake Bay), a shortnose sturgeon was found on October 22, 2003. The shortnose sturgeon was 138 cm total length and was released alive and apparently uninjured. Nevertheless, distribution and movements of shortnose sturgeon in the Chesapeake Bay are poorly understood, in part because this species is often confused with Atlantic sturgeon. No population estimates for shortnose sturgeon in the Chesapeake Bay area are available at this time.

The major known sources of anthropogenic mortality and injury of shortnose sturgeon include entrainment in dredges and entanglement in fishing gear. Injury and mortality can also occur at power plant cooling water intakes and structures associated with dams in rivers inhabited by this species. Shortnose sturgeon may also be adversely affected by habitat degradation or exclusion associated with riverine maintenance and construction activities and operation of power plants. Entanglement could include incidental catch in commercial or recreational gear as well as directed poaching activities. Shortnose sturgeon are most likely to interact with fisheries in and around the mouths of rivers where they are found. Thus, interactions are more likely to occur in state fisheries or unregulated fisheries than in the EEZ. Interactions are also most likely to occur during the spring migration (NOAA Fisheries 1998b). According to information summarized in NOAA Fisheries (1998b), operation of gillnet fisheries for shad may result in lethal takes of as many as 20 shortnose sturgeon per year in northern rivers. Shortnose sturgeon may be taken in ocean fisheries near rivers inhabited by this species. No comprehensive analysis of entanglement patterns is available at this time, in part due to the difficulty of distinguishing between shortnose and Atlantic sturgeon with the similarity in appearance of these two species. For example, several thousand pounds of "sturgeon" were reported taken in the squid/mackerel/butterfish fishery in 1992; however, this information is not broken down by species.

ENVIRONMENTAL BASELINE

Environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this biological opinion includes the effects of several activities that may affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation include vessel operations, fisheries, dredging, and marine pollution/water quality, as well as conservation and recovery actions that have occurred or are occurring in the action area.

Vessel Operations

Potential adverse effects from federal vessel operations in the action area of this consultation include operations of the U.S. Navy (USN) and the U.S. Coast Guard (USCG), which maintain the largest federal vessel fleets, the EPA, the National Oceanic and Atmospheric Administration (NOAA), and the Army Corps of Engineers (ACOE). NOAA Fisheries has conducted formal consultations with the USCG, the USN, and is currently in early phases of consultation with the other federal agencies on their vessel operations. The operation of federal vessels may have resulted in collisions with sea turtles and their subsequent injury or mortality.

Private and commercial vessels also operate in the action area of this consultation and also have the potential to interact with sea turtles, especially those that participate in high speed marine events. These activities have the potential to result in lethal (through entanglement or boat strike) or non-lethal (through harassment) takes of listed species that could prevent or slow a species' recovery. The magnitude of these marine interactions is not currently known. The STSSN also reports regular incidents of vessel interaction (e.g., propeller-like injuries, carapace damage) with sea turtles. From January through October 2002, 52 sea turtles in Virginia were found with propellor-like or crushing injuries. During the approximate time period of the management measures included in the final rule (May 16 to July 31, 2003), a preliminary count of 26 of 375 turtles were found on Virginia beaches with carapace/plastron damage or propellor-like wounds. However, it is unknown as to how many of these injuries were pre or post-mortem. It is likely that interactions with commercial and recreational vessels result in a higher level of sea turtle mortality than what is documented on Virginia beaches, as some impacted animals may not strand.

Effects of fishing vessels on listed species may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines. Listed species or critical habitat may also be affected by fuel oil spills resulting from fishing vessel accidents. No collisions between commercial fishing vessels and listed species or adverse effects resulting from disturbance have been documented. However, the commercial fishing fleet represents a significant portion of marine vessel activity. Due to differences in vessel speed, collisions during fishing activities are less likely than collisions during transit to and from fishing grounds. Because most fishing vessels are smaller than large commercial tankers and container ships, collisions are less likely to result in mortality. Although entanglement in fishing vessel anchor lines has been documented historically, no information is available on the prevalence of such events. Fuel oil spills could affect animals directly or indirectly through the food chain. Fuel spills involving fishing vessels are common events. However, these spills typically involve small amounts of material that are unlikely to adversely affect listed species. Larger spills may result from accidents, although these events would be rare and involve small areas. No direct adverse effects on listed species or critical habitat resulting from fishing vessel fuel spills have been documented. Given the current lack of information on prevalence or impacts of interactions, there is no basis to conclude that the level of interaction represented by any of the various fishing vessel activities discussed in this section would be detrimental to the recovery of listed species.

Other than injuries and mortalities resulting from collisions, the effects of disturbance caused by vessel activity on listed species is largely unknown. The difficulty in interpreting animal behavior makes studying the effects of vessel activities problematic, and no conclusive detrimental effects have been demonstrated.

Fishery Operations

Several commercial fisheries operating in the action area use gear which is known to take listed species. Gillnet, longline, trawl, seine, dredge, and pot fisheries have all been documented as interacting with sea turtles. For all fisheries for which there is a federal fishery management plan (FMP) or for which any federal action is taken to manage that fishery, impacts have been evaluated through the ESA section 7 process. However, the fisheries in the action area are not subject to section 7 consultations as they operate in state waters.

Very little is known about the level of listed species take in fisheries that operate strictly in state waters. However, depending on the fishery in question, many state permit holders also hold federal licenses; therefore, section 7 consultations on federal actions in those fisheries address some state-water activity. Impacts on sea turtles and shortnose sturgeon from state fisheries may be greater than those from federal activities in certain areas due to the distribution of these species. Nearshore entanglements of turtles have been documented; however, information is not currently available on whether the vessels involved were permitted by the state or by NOAA Fisheries. NOAA Fisheries is actively participating in a cooperative effort with the Atlantic States Marine Fisheries Commission (ASMFC) and member states to standardize and/or implement programs to collect information on level of effort and bycatch of protected species in state fisheries.

While the Environmental Baseline considers all of the fisheries active in Virginia waters throughout the year, this document will concentrate on the fisheries active in the spring only for several reasons. Sea turtle interactions with Virginia fisheries may be highest in the spring (as suggested by high spring strandings). This would result in a worse case scenario of potential sea turtle and fishery interactions occurring in the spring, which is presented in this baseline. Also, the different spring fisheries are relatively complex and are likely to be representative of the type of fisheries that may occur in any given month throughout the year in Virginia. The best available information on Virginia fisheries is also currently available for only these spring months.

As identified previously in Tables 1 and 2, there is a complex mix of fisheries operating in Virginia Chesapeake Bay waters. Appendix B identifies Virginia commercial landings from January through March 2003 and the species targeted, while Appendix C denotes the landings from April through June 2003 (VMRC web site 2003). The remainder of 2003 landings were not available at the time of this document preparation, but July through September 2002 landings are included in Appendix D, and October through December 2002 landings are listed in Appendix E. This landings data is for all Virginia state waters, not only the Chesapeake Bay (the action area). The targeted species are landed by a variety of gear types, including gillnets, pound nets, pots, and haul seines.

In the spring, gillnets in the area target a number of species including black drum, Atlantic croaker and dogfish. The black drum 10-14 inch mesh anchored sink gillnet fishery occurs in state waters, along the tip of the Eastern shore. While depending on fish migrations, this fishery occurs from approximately mid-April to mid-May. These fisheries may take sea turtles given the gear type, but no interactions have been observed during alternative platform observer coverage (approximately 75 hauls) from 2000 to 2003. No large mesh gillnet fishing in the vicinity of the mouth of the Chesapeake Bay occurs from June 1 to June 30; during this time, gillnets with a stretched mesh size greater than 6 inches are prohibited in Virginia's portion of the Chesapeake Bay south of Smith Island (VMRC regulations 2001).

The amount of gillnet effort occurring in the Chesapeake Bay waters during the spring appears to be relatively small (e.g., approximately 2 percent of total Virginia Chesapeake Bay landings (Tables 1 and 2)). Further, aerial surveys were conducted by VIMS in the Virginia Chesapeake Bay and minimal gillnet effort was observed during May and June 2001 and 2002. Most of the gillnet effort in the Chesapeake Bay uses small mesh. While these gillnet fisheries are suspected to take turtles, no interactions have been observed in Virginia. For example, in May and June 2001, NOAA Fisheries observed 2 percent of the trips in the Atlantic croaker fishery and 12 percent of the trips in the dogfish fishery (which represent approximately 82% of Virginia's total small mesh gillnet landings from offshore and inshore waters during this time), and no turtle takes were observed. Nevertheless, small mesh gillnets may entangle sea turtles in Virginia waters.

VMRC restricted the use of trawls in Virginia's portion of the Chesapeake Bay in 1989. No trawling effort occurs in the Chesapeake Bay, so marine species interactions with this gear type do not occur in the area.

A whelk fishery using pot/trap gear is known to occur in Virginia. This fishery operates when sea turtles may be in the area and may contribute to turtle mortality. Sea turtles (loggerheads and Kemp's ridleys in particular) are believed to become entangled in the top bridle line of the whelk pot, based upon a few documented entanglements of loggerheads in whelk pots, the configuration of the gear, and the turtles' preference for the pot contents. However, the majority of the whelk pot effort is found offshore, particularly outside Virginia's state waters, and few fishermen set their pots inside the Chesapeake Bay (Mansfield et al. 2001). The peak spring months for the whelk pot fishery are April and May. Research is underway to determine the magnitude of these interactions and to develop gear modifications to reduce these potential entanglements. In New England waters, leatherbacks have been found entangled in whelk pot lines, so if leatherback turtles overlap with this gear set in the area, entanglement may occur.

The blue crab fishery using pot/trap gear also occurs in the area. Crab pot fishing occurs throughout the Chesapeake Bay, including along the Eastern shore and tip of the Delmarva Peninsula. Approximately 3 percent of the total Virginia Chesapeake Bay landings in May, June, and July 2002 were from crab pots. Sea turtles may become entangled in crab pot gear, but due to the nature of the gear and manner in which it's fished, interactions are difficult to detect. For instance, given the size of the fishing vessels, traditional observers are not feasible for the crab pot fishery, and sea turtle interactions with crab pot gear at depth are not able to be observed at the surface. The magnitude of interactions with these pots and sea turtles is unknown, but loggerheads and leatherbacks have been found entangled in this gear. For instance, in May and June 2002, three leatherbacks were documented entangled in crab pot gear in various areas of the Chesapeake Bay. Given the plethora of crab pot gear throughout the action area, it is possible that these interactions are more frequent than what has been documented.

NOAA Fisheries is also currently investigating the Virginia whelk dredge fishery and the haul seine fisheries to determine the interactions between these fisheries and sea turtles, and their potential contribution to sea turtle strandings. Menhaden purse seines operate in the spring and comprise the majority of the spring landings (Tables 1 and 2), but VIMS has previously observed this fishery and determined it was not a notable problem with respect to sea turtle interactions (Austin et al. 1994).

Note that NOAA Fisheries is comprehensively evaluating the impacts of fishing gear types on sea turtles throughout the U.S. Atlantic Ocean and Gulf of Mexico, as part of the Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic Ocean and Gulf of Mexico Fisheries ((NOAA Fisheries 2001). This strategy should address the incidental capture of sea turtles in fishing gear (pound net gear included) in all areas where this gear is found. Public involvement to help determine the occurrence and frequency of sea turtle and fishing gear interactions as well as appropriate management solutions, if deemed necessary, will be an integral component of this strategy.

Recreational fishermen may also impact sea turtles. Sea turtles have been caught on recreational hook and line gear. For example, from May 24 to June 21, 2003, five live Kemp's ridleys were reported as being taken by recreational fishermen on the Little Island Fishing Pier near the mouth of the Chesapeake Bay. The Virginia Marine Science Museum recovered, treated, and released these animals. There have also been anecdotal reports that several Kemp's ridleys were caught each week earlier in the spring of 2003. These animals are typically alive, and while the hooks should be removed whenever possible and when it would not further injure the turtle, NOAA Fisheries suspects that the turtles are probably often released with hooks remaining.

Dredging Activities

Close coordination is occurring with the ACOE through the section 7 process on both dredging and disposal sites to develop monitoring programs and to minimize the potential for dredging-related impacts. Whole sea turtles and sea turtle parts have been taken in hopper dredging operations in the action area. Dredging operations in Cape Henry Channel, York Spit Channel, and Thimble Shoals Channel (in the Virginia Chesapeake Bay) have incidentally taken sea turtles. The impacts of hopper dredging in these channels on listed species were previously considered via formal section 7 consultations (NOAA Fisheries NER 2002, NOAA Fisheries NER 2003). From July 2000 to October 2003, 54 sea turtles have been taken by Virginia dredge operations. Some of the incidents involved decomposed turtle flippers and/or carapace parts, but most of these takes were fresh dead turtles. As such, hopper dredging in the action area has resulted in the mortality of a number of sea turtles, most of which were loggerheads. There have also been several strandings (e.g., 13 in 2002, 3 turtles in 2003) with injuries consistent with dredge interactions. Dredging in the surrounding area could have influenced the distribution of sea turtles and/or disrupted potential foraging habitat.

While dredging activities in the action area have not documented the incidental take of any shortnose sturgeon to date, dredging activities may also entrain (and subsequently kill) shortnose sturgeon and disrupt their benthic foraging habitat.

Marine Pollution/Water Quality

Within the action area, sea turtles and optimal sea turtle habitat most likely have been impacted by pollution. Marine debris (e.g., discarded fishing line or lines from boats) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990). Given that most of the Chesapeake Bay shoreline is populated, it would not be unexpected to find debris in the water.

Sources of contamination in the action area include atmospheric loading of pollutants, stormwater runoff from coastal development, groundwater discharges, and industrial development. Chemical contaminants may also have an effect on sea turtle reproduction and survival. While the effects of contaminants on turtles is relatively unclear, pollution may be linked to the fibropapilloma virus that kills many turtles each year (NOAA Fisheries 1997). If pollution is not the causal agent, it may make sea turtles more susceptible to disease by weakening their immune systems. Furthermore, the Bay watershed is highly developed and may contribute to impaired water quality via stormwater runoff or point sources. However due to the volume of water in the mainstem Chesapeake Bay, the impacts of pollutants may be slightly reduced in the action area. In a characterization of the chemical contaminant effects on living resources in the Chesapeake Bay's tidal rivers, the mainstem Bay was not characterized due to the historically low levels of chemical contamination, but the James River was characterized as an area with potential adverse chemical contaminant effects to living resources (Chesapeake Bay Program Office 1999).

Excessive turbidity due to coastal development and/or construction sites could influence sea turtle foraging ability. Turtles are not very easily directly affected by changes in water quality or increased suspended sediments, but if these alterations make habitat less suitable for turtles and hinder their capability to forage, eventually they would tend to leave or avoid these less desirable areas (Ruben and Morreale 1999).

Toxins introduced to the water column become associated with the benthos and can be particularly harmful to benthic organisms (Varanasi 1992) like sturgeon. Heavy metals and organochlorine compounds are known to accumulate in fat tissues of sturgeon, but their long term effects are not yet known (Ruelle and Henry 1992; Ruelle and Keenlyne 1993). Available data suggest that early life stages of fish are more susceptible to environmental and pollutant stress than older life stages (Rosenthal and Alderdice 1976). Although there have not been any studies to assess the impact of contaminants on shortnose sturgeon, elevated levels of environmental contaminants, including chlorinated hydrocarbons, in several other fish species are associated with reproductive impairment (Cameron et al. 1992; Longwell et al. 1992), reduced egg viability (Von Westernhagen et al. 1981; Hansen 1985; Mac and Edsall 1991), and reduced survival of larval fish (Berlin et al. 1981; Giesy et al. 1986). Some researchers have speculated that PCBs may reduce the shortnose sturgeon's resistance to fin rot (Dovel et al. 1992). Several characteristics of shortnose sturgeon (i.e., long lifespan, extended residence in estuarine habitats, benthic predator) predispose the species to long-term and repeated exposure to environmental contamination and potential bioaccumulation of heavy metals and other toxicants (Dadswell 1979).

Although there is scant information available on levels of contaminants in shortnose sturgeon tissues, some research on other, related species indicates that concern about effects of contaminants on the health of sturgeon populations is warranted. Detectable levels of chlordane, DDE, DDT, and dieldrin, and elevated levels of PCBs, cadmium, mercury, and selenium were found in pallid sturgeon tissue from the Missouri River (U.S. Fish and Wildlife Service 1993).

These compounds may affect physiological processes and impede a fish's ability to withstand stress. PCBs are believed to adversely affect reproduction in pallid sturgeon (Ruelle and Keenlyne 1993). Ruelle and Henry (1992) found a strong correlation between fish weight $r = 0.91$, $p < 0.01$), fish fork length $r = 0.91$, $p < 0.01$), and DDE concentration in pallid sturgeon livers, indicating that DDE concentration increases proportionally with fish size.

Conservation and Recovery Actions

A number of activities are in progress that ameliorate some of the adverse effects on listed species posed by activities summarized in the Environmental Baseline. Education and outreach activities are considered one of the primary tools to reduce the risk of collision represented by the operation of private and commercial vessels.

NOAA Fisheries has implemented a series of regulations aimed at reducing the potential for incidental mortality of sea turtles in commercial fisheries. In particular, NOAA Fisheries has required the use of TEDs in southeast U.S. shrimp trawls since 1989 and in summer flounder trawls in the Mid-Atlantic area (south of Cape Henry, Virginia) since 1992. While the implementation of TEDs is outside the action area of this consultation, TED use may benefit those turtles found in the Virginia Chesapeake Bay as sea turtles are highly migratory and TEDs must be used in certain trawls near the mouth of the Bay. It has been estimated that TEDs exclude 97% of the turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use. For instance, on February 21, 2003, NOAA Fisheries issued a final rule to amend the sea turtle protection regulations to enhance their effectiveness in reducing sea turtle mortality resulting from trawling in the Atlantic and Gulf Areas of the southeastern United States (68 FR 8456). These regulations included modifications to the TED design in order to exclude leatherbacks and large, sexually mature loggerhead and green turtles. Note that with the expansion of fisheries to previously underutilized species of fish, trawl effort directed at species other than shrimp or summer flounder -- and that does not meet the definition of a summer flounder trawl as specified in the TED regulations -- may be an undocumented source of mortality for which TEDs should be considered. Additionally, if observer data support the need for extending the existing TED requirements northward, NOAA Fisheries will consider this requirement.

NOAA Fisheries has also developed a TED which can be used in a type of trawl known as a flynet, which is sometimes used in the mid-Atlantic and northeast fisheries for summer flounder, scup, and black sea bass. This TED is currently being tested in flynets. If observer data conclusively demonstrate a need for such TEDs, regulations will be formulated to require use of TEDs in this fishery, once such a device has been perfected.

On December 3, 2002, NOAA Fisheries published restrictions on the use of gillnets with larger than 8 inch stretched mesh, in federal waters (3-200 nautical miles) off of North Carolina and Virginia (67 FR 71895). These restrictions were implemented to reduce the impact of the monkfish and other large-mesh gillnet fisheries on endangered and threatened sea turtles in areas where sea turtles are known to concentrate. As a result, gillnets with larger than 8 inch stretched mesh are prohibited in federal waters north of the North Carolina/South Carolina border at the coast to Oregon Inlet at all times; north of Oregon Inlet to Currituck Beach Light, NC from March 16 through January 14; north of Currituck Beach Light, NC to Wachapreague Inlet, VA from April 1 through January 14; and, north of Wachapreague Inlet, VA to Chincoteague, VA from April 16 through January 14. Federal waters north of Chincoteague, VA are not affected by these new restrictions, although NOAA Fisheries is looking at additional information to determine whether expansion of the restrictions are necessary to protect sea turtles in state waters and as they move into northern Mid-Atlantic and New England waters. These measures are in addition to Harbor Porpoise Take Reduction Plan measures that prohibit the use of large-mesh gillnets in southern Mid-Atlantic waters (territorial and federal waters from Delaware through North Carolina out to 72° 30'W longitude) from February 15-March 15, annually.

NOAA Fisheries regulations require fishermen to handle sea turtles in such a manner as to prevent injury. As stated in 50 CFR 223.206(d)(1), any sea turtle taken incidentally during fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to a series of procedures. In addition, NOAA Fisheries has been active in public outreach efforts to educate fishermen regarding sea turtle handling and resuscitation techniques. NOAA Fisheries has developed a recreational fishing brochure that outlines what to do should a sea turtle be hooked and includes recommended marine mammal and sea turtle conservation measures.

There is an extensive array of Sea Turtle Stranding and Salvage Network (STSSN) participants along the Atlantic and Gulf of Mexico coasts which not only collect data on dead sea turtles, but also rescues and rehabilitates live stranded turtles. The Virginia STSSN has been established since 1979 and includes an extensive volunteer network. Data collected by the STSSN are used to monitor stranding levels and compare them with anthropogenic activities in order to determine whether conservation measures need to be implemented on a particular activity to reduce sea turtle mortality. These data are also used to monitor incidence of disease, study toxicology and contaminants, and conduct genetic studies to determine population structure. All of the states that participate in the STSSN are collecting tissue for and/or conducting genetic studies to better understand the population dynamics of the loggerhead subpopulations. Since the spring of 2002, the Virginia STSSN has improved sea turtle stranding response on Virginia's Eastern shore. This increased level of training, equipment, and effort has enabled timely and effective response to strandings, which has contributed to the better understanding of sea turtle strandings in this area.

There is currently no organized, formal program for at-sea disentanglement of sea turtles. However, recommendations for such programs are being considered by NOAA Fisheries pursuant to conservation recommendations issued with several recent Section 7 consultations. Protocols for sea turtle disentanglement in fixed fishing gear are currently being developed at the NOAA Fisheries NER. Entangled sea turtles found at sea in recent years have been disentangled on an ad hoc basis by STSSN members, the whale disentanglement team, the USCG, and fishermen.

Recovery plans have been developed for all species of sea turtles found in Atlantic waters (NOAA Fisheries and USFWS 1991a, NOAA Fisheries and USFWS 1991b, NOAA Fisheries and USFWS 1992, USFWS and NOAA Fisheries 1992, NOAA Fisheries and USFWS 1993). Note that the recovery plans for both the loggerhead and Kemp's ridley sea turtles are currently undergoing revision.

Summary and Synthesis of the Status of the Species and Environmental Baseline

In summary, the potential for activities that may have previously impacted listed species (dredging, vessel operations, commercial and recreational fisheries, etc.), to affect sea turtles and shortnose sturgeon remains throughout the action area of this consultation. A number of factors in the existing baseline for sea turtles leave cause for considerable concern regarding the status of these populations, the current impacts upon these populations, and the impacts associated with future activities planned by the state and federal agencies. Given the current status of threatened and endangered species in the action area, and the magnitude of known and suspected mortalities affecting these species, it is reasonable to assume that the combined effects of factors existing in the environmental baseline hinder the recovery of all of the species considered in this Opinion. However, for the purposes of this consultation, NOAA Fisheries will consider that:

1. the northern subpopulation of loggerhead sea turtles is declining (the conservative estimate) or stable (the optimistic estimate);
2. the south Florida subpopulation of loggerhead sea turtles is increasing (the optimistic estimate) or stable (the conservative estimate);
3. the population of Kemp's ridley sea turtles is stable (the conservative estimate) or increasing (optimistic estimate);
4. the Atlantic population of green sea turtles is stable (the conservative estimate) or increasing (optimistic estimate);
5. the Atlantic population of leatherback sea turtles is declining (the conservative estimate) or stable (the optimistic estimate); and,
6. the Chesapeake Bay distinct population segment of shortnose sturgeon status is unknown, but considered to be either decreasing (the conservative estimate) or stable (the optimistic estimate).

Additionally, as noted, recovery actions have been undertaken as described and continue to evolve. Although those actions have not been in place long enough for a detectable change in most listed species populations to have occurred, those actions are expected to benefit listed species in the foreseeable future. These actions should not only improve conditions for listed sea turtles and shortnose sturgeon, they are expected to reduce sources of human-induced mortality as well.

EFFECTS OF THE ACTION

This section of a Biological Opinion assesses the direct and indirect effects of the proposed action on threatened and endangered species or critical habitat, together with the effects of other activities that are interrelated or interdependent (50 CFR 402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

The proposed action, NOAA Fisheries' continuation of sea turtle conservation measures first implemented in 2002 and implementation of new sea turtle conservation measures on the Virginia pound net fishery, is anticipated to result in beneficial impacts on sea turtles. The issuance of a final rule that prohibits the use of offshore pound net leaders in a portion of the southern Chesapeake Bay and retaining the restriction on the use of leaders with stretched mesh greater than or equal to 12 inches and leaders with stringers in the remainder of the Virginia Chesapeake Bay from May 6 to July 15 is anticipated to benefit listed species in the action area, in particular sea turtles, by reducing potential entanglement in and impingements on these leaders. The portion of the proposed action that retains the framework mechanism and requires year round monitoring (if necessary) and reporting of sea turtle takes enables NOAA Fisheries to gather further information on sea turtle and pound net interactions and may lead to additional measures or restriction extensions that would also benefit sea turtles. As these monitoring and reporting measures are in effect throughout the year, the continued operation of the pound net fishery must be addressed in conjunction with the proposed action. With the implementation of the proposed action, sea turtles may continue to be adversely affected either directly or indirectly by the continued operation of the pound net fishery, through entanglement in leaders with less than 12 inches during the time frame of the final rule, entanglement/impingement in leaders during the remainder of the year, or take (typically live) in the pounds. Shortnose sturgeon may be impacted to a lesser extent. The following assessment will first identify the beneficial impacts of the issuance of a final rule, and then the impacts associated with the continued operation of the pound net fishery.

Beneficial Impacts of Issuing a Final Rule

The intent of the final rule prohibiting the use of certain pound net leaders is to reduce sea turtle interactions with these leaders. While threatened loggerheads are the most common species found both entangled/impinged in pound nets and stranded on Virginia beaches, endangered Kemp's ridley, leatherback, and green sea turtles have also been documented in Virginia state waters and stranded on Virginia beaches and may interact with pound net leaders as well. While hawksbill turtles are not common in the action area, this species would have the same likelihood of take in pound net leaders should the species occur in Virginia waters. Due to the similarities in sea turtle species' morphology, NOAA Fisheries assumes that the potential for different sea turtle species to interact with pound net leaders is similar as well. As such, the biological impacts from the proposed action will be addressed for all sea turtles combined, rather than by each individual species. It should be noted however that individual species characteristics (e.g., life history stage, foraging ecology, diving behavior) may play a role in the potential for entanglement or impingement, but NOAA Fisheries cannot determine this likelihood at this time.

Historical Sea Turtle/Pound Net Interactions

High turtle mortalities in late May and early June in Virginia have previously been attributed to entanglement in large mesh pound net leaders in the Chesapeake Bay (Lutcavage 1981; Bellmund et al. 1987). Specifically, studies conducted in the 1980s speculated that pound net entanglement may account for up to 33 percent of sea turtle mortality in the Chesapeake Bay during some summers (Lutcavage and Musick 1985), but more turtles are likely entangled in Virginia pound net leaders and drown than are reported (Lutcavage 1981). A pound net survey in the 1980s documented "many dead loggerheads and one [Kemp's] ridley hung by heads or limbs in area poundnet hedging [leaders]" (Lutcavage 1981). Bellmund et al. (1987) states that entanglements in pound net leaders began in mid-May, increased in early June, and reached a plateau in late June. In 1984, no entanglements were observed after late June. Data collected in 1983 and 1984 found that in 173 pound nets examined with large mesh leaders (defined as >12 to 16 inch stretched mesh), 0.2 turtles per net were found entangled (30 turtles; Bellmund et al., 1987). This study also found that in 38 nets examined with stringer mesh, 0.7 turtles per net were documented entangled (27 turtles). Turtle entanglement in pound nets with small mesh leaders (defined as 8 to 12 inch stretched mesh) was found to be insignificant. It appears that turtles were documented entangled in small mesh leaders during the 1983 and 1984 VIMS sampling seasons, but this report does not identify the number of turtles entangled in small mesh nets that VIMS considered "insignificant". The sampling area was concentrated in the western Chesapeake Bay, with some sampling occurring in other portions of the Virginia Chesapeake Bay.

Surveys conducted in Virginia Chesapeake Bay waters in 1979 and 1980 also found that most pound net leaders that captured sea turtles had large mesh (12 to 16 inches) and were found in the lower Bay (Lutcavage 1981). No turtles were reported entangled in mesh sizes of 8 inches or less, suggesting that some turtles were entangled in mesh between 8 and 12 inches. However, NOAA Fisheries does not have access to those data and this interpretation is speculative. It could be that there were no pound net leaders with mesh ranging from 8 to 12 inches. Lutcavage (1981) also discussed potential turtle entanglement in small mesh leaders: "I believe that any runner [leader] mesh size large enough to accommodate a turtle's fin or head may entangle turtles that swim into it. I observed that smaller mesh size in hedging may snag a turtle carapace but should not immobilize the turtle...It is likely that as sea turtles encounter poundnet mesh, they struggle to escape and further entangle their heads or fins."

While smaller mesh nets (considered here to be less than 12 inches) were speculated to pose an entanglement risk to sea turtles, prior to 2002, the degree of small mesh entanglement in Virginia pound net leaders had not been as adequately documented as entanglement in larger mesh. Small mesh entanglements have been documented in other areas however. Anecdotal information from North Carolina fishermen indicates that turtle entanglement with approximately 8 inch and greater mesh leaders can and has occurred. In the 1980s, North Carolina pound netters switched to mesh smaller than or equal to 7 inches, a coarser webbing (24-30 strand), and floating leaders, largely as a result of interactions with sea turtles in 8 inch and greater mesh leaders, and found that entanglements were reduced. These pound nets are set in shallow, low current waters, which is not the case for many of the pound nets set in the Virginia Chesapeake Bay. While it was considered, data from North Carolina were not used to base the leader mesh size restrictions in the 2002 interim final rule, because NOAA Fisheries recognized that the specific conditions between waterbodies and fishing methods may vary.

Recent Sea Turtle/Pound Net Interactions
In recent years, sea turtles have also been documented in Virginia pound net leaders. During the spring of 2001, with limited monitoring effort, a NOAA Fisheries observer reported finding five moderately to severely decomposed loggerhead turtles against four different large mesh pound net leaders (approximately 13 inch mesh) on the Eastern shore in early June. The turtles were not conclusively determined to be entangled in the leaders, and the cause of death was uncertain. The four pound nets were set in deep water (approximately 25 feet) and were the farthest out in the water relative to the other smaller mesh nets in the area. VMRC law enforcement agents also documented one live and three dead sea turtles in pound net leaders along the Eastern shore during the spring of 2001. The live turtle was entangled in a leader with greater than 12 inches stretched mesh, but the leader mesh size of the other entanglements was not recorded. Additionally, during June of 2000, VMRC law enforcement agents reported disentangling two live sea turtles from two Eastern shore leaders with greater than 12 inches stretched mesh.

NOAA Fisheries conducted pound net monitoring in the spring of 2002 and 2003 to learn more about the interactions between sea turtles and pound net leaders. In 2002, NOAA Fisheries monitored the active pound nets throughout the Virginia Chesapeake Bay from April 25 to June 1. Out of a total 98 nets characterized, 70 nets were actively fishing. A total of 394 surveys were completed on pound net leaders, and the number of times an individual leader was surveyed was dependent upon location and environmental characteristics (e.g., current). From April 21 to June 11, 2003, NOAA Fisheries monitored pound net leaders with stretched mesh measuring less than 12 inches. A total of 101 net sites were characterized, but only 56 of these sites were actively fishing (Figure 4). Throughout the project period, a total of 444 surveys were completed, with some nets being surveyed more than others (Figure 5). Survey effort was dependent upon prior entanglement history, location of the nets (e.g., in high current areas or not), and assumed threat to turtles.

These efforts documented the entanglement and impingement of sea turtles on pound net leaders with various mesh sizes. During the past two years, a total of 28 sea turtles were found in association with pound net leaders, of which 9 were entangled, 14 were impinged on the leaders by the current, and 5 were either inconclusive or previously dead. As NOAA Fisheries is not certain as to the cause of death of those 5 sea turtles (i.e., mortality may or may not be pound net related) given their decomposition state and lack of wrapped, entangled line around their extremities, they will not be considered further in this section.

Table 3 provides cursory details on the 9 entangled animals. In total, 2 animals were found alive and 7 were dead, including 5 Kemp's ridleys and 4 loggerheads. There were 6 entanglements in leader mesh sizes not restricted by the 2002 interim final rule (8 and 11.5 inches stretched mesh) and several larger mesh and stringer entanglements prior to the enactment of the 2002 restrictions on greater than or equal to 12 inch mesh leaders and stringers. One entanglement occurred in a nearshore net (outside the closed area), and the rest were found in offshore nets. A total of 838 surveys were completed in 2002 and 2003 combined.

Table 3. Entangled sea turtles observed during pound net leader monitoring in 2002 and 2003.

Date	Species	Disposition	Leader stretched mesh size	Location of entanglement	Geographic location[3]
May 2002	Kemp's ridley	Dead	8"	Neck	Eastern shore, offshore net
May 2002	Loggerhead	Dead	14"	Left front flipper	Eastern shore, offshore net
May 2002	Kemp's ridley	Dead	14"	Left front flipper	Eastern shore, offshore net
May 2002	Loggerhead	Dead	Stringer	Left front flipper	Western Bay, offshore net
May 2003	Loggerhead	Alive	11.5"	Both front flippers	Eastern shore, offshore net
May 2003	Kemp's ridley	Dead	11.5"	Left front flipper	Eastern shore, offshore net
June 2003	Kemp's ridley	Dead	11.5"	Left front flipper	Eastern shore, offshore net
June 2003	Loggerhead	Dead	8"	Left front flipper	Eastern shore, nearshore net
June 2003	Kemp's ridley	Alive	11.5"	Right front flipper	Eastern shore, offshore net

Necropsies were performed on 4 of the 7 dead entangled turtles. One additional Kemp's ridley sea turtle is anticipated to be necropsied (found in May 2003); NOAA Fisheries is waiting for the necropsy results from this animal. The other two dead animals were left in situ to monitor their status. Necropsy results obtained from 3 of the 7 turtles showed that the turtles had adequate fat stores, full stomach and/or intestines, and no evidence of disease. For the case of one of these 3 turtles (Kemp's ridley), a professional necropsy by the Armed Forces Institute of Pathology found that "the animal was active and in good nutritional condition at the time of death" and concluded that entrapment in fishing gear was the cause of death. One of the 4

[3]All but one of these observed entanglements were located within the closed area in the proposed action.

necropsy reports only stated that the turtle was female with nematodes and digested tissue in its digestive tract. Based upon available information, NOAA Fisheries concluded that the death of these 7 turtles was attributable to entanglement in the pound net leaders given the tight multiple wrapping of line around their flippers, their decomposition state (fresh dead to moderately decomposed), their buoyancy (negatively buoyant, which typically suggests recent mortality), and the necropsy results (when available).

Impingements were also documented during 2002 and 2003 monitoring efforts. Table 4 depicts the instances of sea turtle impingement on pound net leaders. Of the total 14 impingements in 2002 and 2003, there were 12 loggerheads, 1 Kemp's ridley and 1 unidentified species of hard shelled sea turtle. Only one turtle was found dead. All of the impingements in 2003 (n=12) occurred on leaders in compliance with the 2002 interim final rule and were found in offshore nets.

Table 4. Observed impingements during pound net leader monitoring in 2002 and 2003.

Date	**Species**	**Disposition**	**Leader stretched mesh size**	**Location of impingement (approx. depth)**	**Geographic location**[4]
May 2002	Loggerhead	Alive	14"	Surface; head and left front flipper through mesh	Eastern shore, offshore net
May 2002	Loggerhead	Alive	14"	Surface; head and front flipper through mesh	Eastern shore, offshore net
May 2003	Loggerhead	Alive	11.5"	4 ft below surface	Eastern shore, offshore net
May 2003	Loggerhead	Alive	11.5"	3 ft below surface	Eastern shore, offshore net
May 2003	Loggerhead	Alive	8"	Surface	Eastern shore, offshore net
June 2003	Loggerhead	Dead (fresh)	11.5"	5 ft below surface	Eastern shore, offshore net
June 2003	Loggerhead	Alive	8"	Surface	Eastern shore, offshore net
June 2003	Unknown	Alive, but condition unknown[5]	11.5"	Surface, facing downwards with flippers active	Western Bay, offshore net

[4]All of these observed impingements were located within the closed area in the proposed action.
[5]Turtle was first observed alive, held against the net facing downward with its front flippers active, but when observer went on the other side of the leader to better evaluate the animal, it was gone. It is unknown whether the turtle slipped deeper down the net and could not be seen, or if it became unimpinged by the boat wake or other means.

June 2003	Loggerhead	Alive	11.5"	Surface, head and flipper through mesh	Eastern shore, offshore net
June 2003	Loggerhead	Alive	11.5"	2 ft below surface, left front flipper through mesh	Western Bay, offshore net
June 2003	Loggerhead	Alive	8"	3+ ft below surface	Eastern shore, offshore net
June 2003	Loggerhead	Alive	8"	3 ft below surface	Eastern shore, offshore net
June 2003	Loggerhead	Alive	8"	3 ft below surface	Eastern shore, offshore net
June 2003	Kemp's ridley	Alive	11.5"	3 ft below surface	Eastern shore, offshore net

The observation of impingements is noteworthy given that sea turtles would only remain on the leader, untangled, for the duration of the tidal cycle. If an animal was impinged on a leader by the current with its flippers inactive, based on observations of impinged sea turtles, NOAA Fisheries believes that without any human intervention it could either swim away alive when slack tide occurred, become entangled in the leader mesh when trying to free itself, or float away dead if it drowned prior to slack tide. Those dead animals could then strand on nearby beaches, wash into another nearby pound net leader, or drift off with the current. The likelihood that a turtle remains alive after an impingement depends on the stage of the tide cycle and the location of the turtle in the leader. For example, if the turtle becomes impinged at the beginning of the tide cycle and its head is under the surface, it would likely remain that way for several hours and subsequently drown (particularly if it was struggling in the net as turtles were observed to do).

Forced submergence is a concern for sea turtles. Sea turtles forcibly submerged in any type of restrictive gear eventually suffer fatal consequences from prolonged anoxia and/or seawater infiltration of the lung (Lutcavage et al. 1997). A study examining the relationship between otter trawl tow time and sea turtle mortality showed that mortality was strongly dependent on trawling duration, with the proportion of dead or comatose turtles rising from 0% for the first 50 minutes of capture to 70% after 90 minutes of capture (Henwood and Stuntz 1987). However, metabolic changes that can impair a sea turtles ability to function can occur within minutes of a forced submergence. While most voluntary dives appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status, the story is quite different in forcibly submerged turtles where oxygen stores are rapidly consumed, anaerobic glycolysis is activated, and acid-base balance is disturbed, sometimes to lethal levels (Lutcavage and Lutz 1997). While a public comment on the proposed rule noted that sea turtles in Virginia have been found to dive for durations of 40 minutes under normal conditions, it is unlikely that struggling, physiologically stressed animals in fishing gear would do the same. Forcibly submerged turtles rapidly consume their oxygen stores (Lutcavage and Lutz 1997). In forcibly submerged loggerhead turtles, blood oxygen was depleted to negligible levels in less than 30 minutes (Lutz and Bentley 1985 in Lutcavage and Lutz 1997). Forced submergence of Kemp's ridley sea turtles in shrimp trawls resulted in an acid-base imbalance after just a few minutes (times that were within the normal dive times for the species) (Stabenau et al. 1991). The rapidity and extent of internal changes are likely functions of the intensity of underwater struggling and the length of submergence. For instance, oxygen stores were depleted within 15 minutes in tethered green sea turtles diving to escape (Wood et al. 1984 in Lutcavage and Lutz 1997). Recovery times for acid-base levels to return to normal may also be prolonged. Henwood and Stuntz (1987) found that it took as long as 20 hours for the acid-base levels of loggerhead sea turtles to return to normal after capture in shrimp trawls for less than 30 minutes. This effect is expected to be worse for sea turtles that are recaptured before metabolic levels have returned to normal. Respiratory and metabolic stress due to forced submergence is also correlated with additional factors such as size and activity of the turtle, water temperatures, and biological and behavioral differences between species. For instance, Magnuson et al. (1990) suggested that physical and biological factors that increase energy consumption, such as high water temperatures and increased metabolic rates characteristic of small turtles, would be expected to exacerbate the harmful effects of forced submergence from trawl capture. Forced submergence from impingement on pound net leaders is likely comparable to forced submergence in other kinds of fishing gear, given that both instances involve sea turtles unable to reach the surface in a relatively stressful situation.

In 2002 and 2003, 6 of the live impingements occurred near the surface, but 7 turtles were found underwater, unable to reach the surface to breathe, with an average of 3 hours until slack tide. It can be speculated that if a turtle could not breathe from the position where it was impinged on the net, it would have a low likelihood of survival if it remained on the net for longer than approximately an hour. Besides the one unknown species of sea turtle found in June 2003, the turtles observed impinged in 2002 and 2003 were not observed as being able to move vertically on the net, given that in most cases, at least one of their flippers were rendered inactive as they were held against the net. Often these turtles were held against the nets by very slight, almost slack, currents. It remains unknown how long those animals were impinged on the net before being observed. It could be that those animals were held against the net for more than approximately an hour and when observed impinged with the slight current, they were already in a compromised state. If a turtle remains alive until slack tide, it can be assumed that it would survive. Note, however, that if a sea turtle remains alive after an impingement and swims freely, it could become impinged on or entangled in another nearby pound net leader. This animal would likely already be in a potentially compromised state, which would further augment the impacts of forced submergence.

Impingements occur when the sea turtles are held against the net by the current. Given that impingements occurred in areas where the currents are considered "strong" and on varying mesh sizes during monitoring efforts in 2002 and 2003, it is reasonable to conclude that impingements could occur on leaders with smaller mesh sizes in those areas. A leader with 6 or 7.5 inches stretched mesh (or smaller) will likely have the same probability of impinging a sea turtle as an 8 inch mesh leader if it is set in the same area where impingements have been previously documented (e.g., offshore nets in the southern portion of the Eastern shore, where currents appear to be strong). At this time, NOAA Fisheries cannot determine the current strength that results in impingements, but available monitoring data show that impingements have only occurred in certain areas, locations where observer reports and anecdotal information suggest currents are "strong".

Caveats Associated with Sea Turtle/Pound Net Interactions
It should be noted that the pound net monitoring efforts represent a minimum record of potential sea turtle entanglements and/or impingements. The sampling effort was confined to two boats in 2002 and one vessel during 2003, and each net could not be sampled during every tidal cycle, every hour, or even every day. Some impingements, and some entanglements, were likely missed. Further, sea turtle interactions in pound net leaders are difficult to detect. The sea turtles observed in leaders were found at depths ranging from the surface to approximately 6 feet under the surface. The ability to observe a turtle below the surface depends on a number of variables, including water clarity, sea state, and weather conditions. Generally, turtles entangled a few feet below the surface cannot be observed due to the poor water clarity in the Chesapeake Bay. In several instances in 2002 and 2003, due to tide state and water clarity, even the top line of the leader was unable to be viewed.

In 2001 and 2002, side scan sonar was used to attempt to detect sub-surface sea turtle entanglements; no verified sea turtle acoustical signatures were observed during these surveys (Mansfield et al. 2002a; Mansfield et al. 2002b). In 2001, 7 days of side scan sonar surveys were completed from May 24 through August 3 (with no surveys completed from June 24 to July 22 due to weather), for a total of 825 images for the 55 active pound net leaders surveyed (Mansfield et al., 2002a). In 2002, 9 days of surveys were conducted from May 22 to June 27, for a total of 1848 images for the 61 active pound net leaders surveyed (Mansfield et al., 2002b). In 2001 and 2002, surveys were conducted almost equally in the Western Bay and along the Eastern shore. The use of side scan sonar as a means to detect sub-surface sea turtle entanglements may have potential, but additional research on sub-surface interactions is needed. Mansfield et al. (2002a, 2002b) state that a number of factors may influence the use of side scan sonar, including weather, sea conditions, water turbidity, the size and decomposition state of the animal, and the orientation of the turtle in the net. NOAA Fisheries recognizes that survey scheduling was limited by the weather and sea conditions, but considers that side scan survey results may continue to be affected by water turbidity, the size and decomposition state of the animal, and the orientation of the turtle in the net. These issues must be addressed in future surveys before conclusively determining that sea turtles are not captured in pound net leaders sub-surface. NOAA Fisheries conducted forward searching sonar testing in April 2003 to further explore the issue, but due to technical difficulties (e.g., narrow band width, time needed to familiarize staff with equipment and image interpretation, scheduling), testing had to be curtailed while visual monitoring was conducted. Additional sonar testing is anticipated to be conducted in the spring of 2004.

While most of the previously observed sea turtles were found near the surface in NOAA Fisheries surveys, it remains unclear whether the visual surface monitoring biased the location of the take results. Sea turtles may be found throughout the water column given their preferences for water temperature (e.g., generally greater than 11° C) and foraging (e.g., loggerheads and Kemp's ridleys in Virginia waters are primarily benthic foragers). For instance, according to STSSN reports, most stranded turtles in Virginia that have been necropsied in recent years have had relatively good fat stores, suggesting that they have been foraging. Musick et al. (1984) found that crustaceans aggregate on large epibiotic loads that grow on the pound net stakes and horseshoe crabs become concentrated at the bottom of the net. Turtles may be more common in the upper water column, but if they are foraging for their preferred prey, which appears to be present around pound nets, they must be periodically near the bottom, thus subject to entanglement in leaders below the surface. Furthermore, Mansfield and Musick (2003) found that 7 sea turtles (6 loggerheads and 1 Kemp's ridley) tracked in the Virginia Chesapeake Bay from May 22 to July 17, 2002, dove to maximum depths ranging from approximately 13.1 ft to 41 ft. Further, Byles (1988) and Mansfield and Musick (2003, 2004) found that sea turtles in the lower Chesapeake Bay commonly make dives of over 40 minutes during the day. While the percentage of time spent at each depth range needs to be clarified, it is improbable that turtles, during a 40 minute period, are never found at depths deeper than the depth at which sea turtles were observed entangled and impinged (e.g., approximately 6 feet). While the percentage of time sea turtles spend at the surface compared to at depth is still being clarified, sea turtles may be found throughout the water column and it is possible that subsurface entanglements and impingements occur. Pound net leader characteristics are generally consistent from top to bottom and, according to field observations and discussions with pound net fishermen, in most nets, leader mesh size appears to be uniform from top to bottom. It is possible that more sea turtles are in pound net leaders than are observed or reported.

A pound net survey in the 1980s determined that based upon constriction features on stranded turtles, some beached carcasses had previously floated free of pound net leaders and that it was plausible that unidentified pound net leader deaths could account for many of the carcasses for which no mortality sources have been identified (Lutcavage 1981). However, if a turtle is moderately to severely decomposed, it is unlikely that constriction wounds would be visible. Five turtles entangled in pound net leaders were examined during 1984 and none of these turtles became disentangled by natural causes, but instead completely decomposed in situ within five weeks (Bellmund et al. 1987). In 2002 and 2003, NOAA Fisheries observers left 3 of the documented dead entangled sea turtles in the leaders to monitor the status. These turtles were fresh dead to moderately decomposed. One of the turtles was gone when the location was observed 3 days later, another fell out after 9 days when its flipper tore away from its body, and another turtle was still in the leader 5 days later but in a severely decomposed condition. While additional information is necessary to adequately determine how often sea turtles become disentangled from pound net leaders, it is plausible that turtles may become dislodged from pound net leaders either by the strong current in certain areas of the Chesapeake Bay, by the decomposition process, or by fishermen disentangling dead sea turtles if found in their gear. This needs to be explored. Based upon information such as the decomposition stage of the sea turtle, the position of the turtle in the leader, and the monitoring schedule of pound net leaders, some sea turtles found in association with pound net leaders during 2002 may have washed into the leader post-mortem. However, they may also have become entangled in or impinged on a neighboring pound net leader, drowned, and drifted into a different leader. Nevertheless, there have been several documented sea turtle entanglements in leaders that were determined to have caused mortality by drowning, there have been observations of live turtles entangled in leaders under water, and there have been sea turtles found alive and impinged on leaders both at the surface and under the water.

It should also be noted that during the public comment period, it was recognized that an 8 inch leader may in fact be slightly smaller than 8 inches, after it is coated and hung in the water. For example, NOAA Fisheries observers measured nets to the nearest 0.125 inches, so a sea turtle entanglement recorded in an 8 inch stretched mesh leader may have in fact been in a leader with 7.95 inches stretched mesh. Whenever NOAA Fisheries mentions that sea turtles have been taken in 8 inch stretched mesh leaders, it refers to those nets that may have been slightly smaller or larger (within 0.125 inches) than 8 inches.

Benefits to Sea Turtles
NOAA Fisheries has sufficient evidence to conclude that there is a localized interaction between sea turtles and pound nets along the Eastern shore of Virginia and in the Western Chesapeake Bay. Sea turtles have been observed in pound net gear along the Eastern shore in recent years. Sea turtles have also been found impinged on and entangled in leaders in the Western Bay, during recent monitoring studies as well as surveys in the 1980s. Entanglements in and impingements on pound net leaders have been documented on leaders with as small as 8 inch stretched mesh. Impingements occur when the sea turtles are held against the net by the current, which could happen with any mesh size (i.e., on leaders smaller than 8 inches stretched mesh) in areas where impingements were previously documented (e.g., offshore nets in the southern portion of the Eastern shore and in the Western Bay). During 2003 monitoring efforts, there were few active pound nets found in the southern Chesapeake Bay outside the Eastern shore and Mobjack Bay areas. The area where leaders would be prohibited in the final rule was defined to exclude those pound nets in locations where sea turtles have never been found impinged, despite monitoring efforts. Only one sea turtle was found entangled in a leader outside the closed area, and that occurred along the Eastern shore in an 8 inch stretched mesh leader. The difference in takes between offshore and nearshore nets is statistically significant ($p<0.01$). The geographical leader prohibition component of the final rule is proposed to prevent turtle entanglements and impingements in pound net leaders (leading to the potential subsequent drowning of sea turtles).

As mentioned, based upon available analysis, NOAA Fisheries is not making an additional modification to the mesh size threshold that would be protective of turtles. It does not appear that further reducing mesh size has a significant conservation benefit to turtles. This statement is based upon the comparison of ratios of entanglements to impingements. The probability of a sea turtle interaction with a leader may in fact be a function of where the net is set (e.g., offshore in swift moving currents), and if leaders with mesh measuring 7 inches can be used in these areas, it is possible that a sea turtle would have the same likelihood of entanglement and impingement. Without additional analysis, and perhaps data collection, NOAA Fisheries is not able to identify the relationship between mesh size and turtle interaction rates. Retaining the status quo leader mesh size restrictions outside the closed area should still serve to protect sea turtles (Bellmund et al. 1987), even though that extent cannot be quantified. It should be noted that sea turtles may continue to be entangled in leaders with less than 12 inches stretched mesh outside the closed area. One turtle was found entangled outside the closed area in two years of monitoring. Additionally, given that gillnets with less than 8 inches stretched mesh have been found to entangle sea turtles (Gearhart 2002), there is the possibility that entanglements in leader mesh smaller than 8 inches stretched mesh could occur. However, the differences between gillnet gear and pound net leaders (e.g., monofilament vs. multifilament material; drift, set, and runaround vs. fixed stationary gear; gilling vs. herding fishing method) should be considered in any mesh size comparison. NOAA Fisheries believes sea turtle impingements on pound net leaders outside the leader prohibited area would be unlikely, given the lack of observed impingements on pound net leaders in that area, which appears to be related to geographical location and current strength.

NOAA Fisheries recognizes that there have not been the same number of entanglements/impingements documented as the number of strandings. Due to the monitoring caveats discussed earlier, one would not expect to find the same number. NOAA Fisheries acknowledges that other factors likely contribute to spring sea turtle mortality in Virginia. The level of sea turtle interactions with other potential mortality sources (e.g., other fisheries or vessels) has not yet been determined as few takes have been documented, but NOAA Fisheries has data showing that pound net leaders result in sea turtle entanglement and impingement. NOAA Fisheries believes that it is likely that pound nets contribute to the high sea turtle strandings documented each spring on Virginia beaches.

The proposed action also continues a framework mechanism contained in the 2002 interim final rule in which NOAA Fisheries could enact additional measures to respond to new information or extend the end date of the restrictions. Should monitoring of pound net leaders from May 6 to July 15 document a sea turtle entanglement, NOAA Fisheries may implement additional restrictions as deemed necessary, including the prohibition of pound net leaders with stretched mesh greater than or equal to 8 inches, or the prohibition of all pound net leaders regardless of mesh size. If additional measures are enacted, sea turtles will likely benefit to a greater extent. For instance, if all leaders are prohibited in a certain area or in the entire Virginia Chesapeake Bay, sea turtle interactions with pound net leaders will be prevented as there would be less potentially entangling gear in the water. If additional analysis and data collection determine that there is a significant difference in sea turtle interaction rates between mesh sizes, and a leader mesh size restriction of 8 inches and greater is determined appropriate, this should serve to reduce additional sea turtle entanglement. If leader restrictions are extended to July 30, this will serve to provide additional protection to sea turtles by minimizing any other entanglements during that 2 week period.

By publishing the final rule, which would prohibit leaders in an area with the most documented sea turtle entanglements and impingements, sea turtle interactions with pound net gear are expected to be reduced. NOAA Fisheries anticipates that in the absence of the implementation of the proposed action, sea turtles would continue to interact with and become entangled in and impinged on leaders in the Chesapeake Bay, leading to potential mortality. As such, the implementation of the proposed action would benefit sea turtles by reducing the potential of entanglement in and impingement on leaders from May 6 to July 15.

As included in the 2002 interim final rule, the reporting of sea turtle takes in pound net gear and the monitoring of pound net fishing operations if deemed necessary by the Northeast Regional Administrator, may result in additional measures to benefit sea turtles and further sea turtle conservation.

Time Frame of the Measures Included in the Final Rule

The dates of the gear restriction in the proposed action were determined from previous sea turtle strandings data collected on Virginia beaches. Strandings are used in this case to indicate when sea turtles begin to enter the Chesapeake Bay. In one year, the first documented stranding was on April 21 (2002), while in another year, sea turtles were not reported on Virginia beaches until May 19 (2001). From 1994 to 2003, the average date of the first reported stranding in Virginia was May 13. However, sea turtle mortality would have occurred before the animals stranded on Virginia beaches. It is unknown exactly how long it takes a sea turtle in Virginia to strand once the mortality incident has occurred, as the stranding would be dependent upon a number of factors including the location of the mortality, wind patterns, and water currents. A one week estimate from the mortality incident to stranding date appears to be realistic for Virginia Chesapeake Bay waters. In order for the pound net restrictions to be in effect by the time sea turtles are entering the Bay and reduce spring sea turtle interactions with pound net leaders, the measures in the final rule must go into effect at least 1 week prior to the stranding commencement date, or on May 6. Information received from the Commonwealth of Virginia in response to the March 29, 2002 proposed rule (67 FR 15160) shows that in approximately 7 years prior to 1994, the date of the first turtle stranding was earlier than May 15. This also supports the implementation of the leader restrictions in early May.

Water temperature data also support the enactment of the proposed measures on May 6. Mansfield et al. (2001) and Mansfield and Musick (2003) state that VIMS analyses estimated that sea turtles migrate into the Chesapeake Bay when water temperatures warm to approximately 16 to 18° C. Cold blooded sea turtles prefer warmer waters, but species occur in waters as cold as 11° C. In fact, in March 1999, an incidental take of a loggerhead sea turtle in the monkfish gillnet fishery off North Carolina occurred in 8.6° C water. Generally, sea turtles frequent waters as cool as 11° C (Epperly et al. 1995a). From 1999 to 2003, the average water temperature on May 6 at the NOAA National Ocean Service Kiptopeke, Virginia station was 15.7° C, with average water temperatures increasing to 16.3° C on May 7 and 17.1° C on May 8. An additional analysis conducted by the NOAA Fisheries Southeast Fisheries Science Center found that in week 18 (April 30 to May 6) and week 19 (May 7 to May 13), approximately 85 percent and 90 percent, respectively, of the area encompassing the mouth of the Chesapeake Bay (from the COLREGS line to the 20 m depth contour) contained sea surface temperatures of 11° C and warmer (NOAA Fisheries, unpub. data, 2003). This indicates that water temperatures around the mouth of the Chesapeake Bay are well within sea turtles' preferred temperature range in early May and, therefore, supports the effective date of the measures included in the final rule.

A previous study in 1983 and 1984 found that sea turtle entanglements in pound net gear increased slowly until early June, then increased sharply and reached a plateau by late June, with few entanglements occurring after June (Bellmund et al. 1987). Since the early 1980s, there has not been a directed pound net monitoring effort from mid-June to July, but monitoring for sea turtle strandings has continued during this time frame. As mentioned, typically the peak of Virginia strandings has been from mid-May to mid-June, with strandings typically remaining at high elevated levels until June 30. However, strandings data show that the peak can occur earlier and later. For instance, in 2003, the stranding peak occurred during the last two weeks of June and strandings remained consistent through the second week of July (e.g., 48 sea turtles stranded from July 1-15, 2003). The 2003 stranding peak rate was 10-15 days later than in 2001 and 2002 (Swingle and Barco 2003). Given that sea turtle presence in the Chesapeake Bay is dependent upon water temperature, which makes the stranding peak somewhat variable, it is important to ensure sea turtles are protected during the period of apparent vulnerability (as indicated by elevated strandings).

It is unlikely that endangered shortnose sturgeon will benefit significantly from the proposed action. The occurrence of shortnose sturgeon in Virginia waters is rare. NOAA Fisheries is not aware of any instances or reports documenting shortnose sturgeon entangled in pound net leaders of any mesh size. However, the potential exists for shortnose sturgeon to become trapped by the pound net like other fish species. From 1996 to 2003, as a result of the U.S. Fish and Wildlife Service reward program for Atlantic sturgeon, shortnose sturgeon were reported taken in pounds, alive, in the Maryland waters of the Chesapeake Bay. If shortnose sturgeon are present in Virginia waters, they may become trapped in the pounds of pound nets. NOAA Fisheries is not aware of the documentation of such a take in Virginia, but there is no shortnose sturgeon or Atlantic sturgeon reward program currently in Virginia that may provide such documentation. Nevertheless, should shortnose sturgeon be subject to entrapment by pound nets or entanglement in pound net leaders, the proposed action would minimize this potential to some extent because prohibiting leaders in a portion of the southern Bay will likely reduce fish catch and reduce the potential of entanglement in some pound nets in the Virginia Chesapeake Bay.

Potential for Entanglement in and Impingement on Leaders from Mid-July to April

As described previously, sea turtles have been documented entangled in and impinged on leaders with greater than or equal to 8 inches stretched mesh and leaders with stringers in the Virginia Chesapeake Bay, and all but one of these interactions have occurred in the closed area. While interactions with pound net leaders and sea turtles appear to be highest in the spring, entanglements and impingements may theoretically occur whenever sea turtle distribution and the use of these leaders overlap. Note that the typical sea turtle residency period in the Chesapeake Bay occurs from approximately May to November. For the purposes of this analysis and to account for potential variability, this opinion considered July 16 to May 5 as the time period for estimating take in leaders, instead of separating out the winter months when sea turtles are not present in Virginia (e.g., July 16 to November 30, and May 1 to May 5).

Pound nets are set in Virginia's Chesapeake Bay during the period of May through November, which coincides with the time when the majority of sea turtles are found in this area. Though strandings occur throughout this time period, they are concentrated significantly in the spring. For example, Table 5 depicts the average monthly strandings for Virginia (oceanside and in the Chesapeake Bay) from 1995 to 2002. June has the highest reported sea turtle strandings, followed by May, July and August.

Table 5. The number of sea turtle strandings in Virginia by month, averaged over the years 1995 to 2002. Data collected by the Virginia STSSN.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

2	0.25	0.5	0.5	38.8	116.5	28	26.1	17.4	18.25	8.4	4.13

NOAA Fisheries used direct observations of sea turtle entanglement in and impingement on the leaders of pound nets as a basis for developing the measures included in the final rule (the proposed action). These direct observations of entanglements in and impingements on pound net leaders during the spring coupled with the fact that there is a high level of strandings in the Virginia Chesapeake Bay during the spring (although a direct cause and effect relationship between the strandings and pound net fishery interactions is not now known) serve as a reasonable basis to concentrate management measures on this fishery during the spring. Certainly, given the high level of strandings in the spring and the direct observations of entanglements and impingements in and on pound net leaders, NOAA Fisheries believes it is judicious to draw the inference that pound net leaders in the area where these strandings occur is a factor in such strandings.

NOAA Fisheries considered regulating pound net leaders in Virginia's Chesapeake Bay during the period of May through November, which would encompass the full time period when sea turtle presence and pound net fishing in the Chesapeake Bay overlap. There is some concern that entanglements could continue throughout the sea turtle residency period in the Chesapeake Bay. However, few direct observations of sea turtle impingement on and entanglement in pound net leaders exist after the spring. Bellmund et al. (1987) found that no sea turtle entanglements were observed after late June in 1984. However, a pound net characterization study by VIMS documented the entanglement of one dead juvenile loggerhead sea turtle in a pound net leader (approximately 11 inches) in October of 2000 (Mansfield et al. 2001). Further, one dead loggerhead was found entangled in a pound net leader in August 2001 (Mansfield et al. 2002a). It is not know if those animals were dead prior to entanglement or if the interaction with the pound net leader resulted in their death.

Further, the level of strandings is substantially diminished during the summer and fall months. With few direct observations of sea turtle entanglement in and impingement on pound net leaders and without high levels of strandings, similar to those documented in the spring, there is not a sufficiently defensible basis at this time to conclude that pound net leaders are responsible for high levels of sea turtle mortality during the summer and fall months. Absent such a conclusion, there is no basis to impose gear restrictions on the Virginia pound net fishery during the full time period of May through November. Based upon the available data on sea turtle entanglements and impingements and stranding patterns, it appears that the greatest potential impact of pound net leaders on sea turtles would occur during May and June, and extend into the first half of July. Again, it should be recognized that entanglements and impingements in pound net gear may occur from mid-July to November nonetheless.

While the potential of turtle entanglement in leaders in the summer and fall is unknown at this time and appears to be small, turtles have been found to become entangled and impinged in this gear type, so there is the potential for mortality to occur in months when sea turtles are present in the Chesapeake Bay. For instance, sea turtles can be found in the Chesapeake Bay from approximately May through November. The proposed action would reduce interactions with pound net leaders in May, June and half of July, but turtles may still interact with this gear. Depending on the location of turtle's entanglement in the gear, the health of the sea turtle, and whether the sea turtle is eventually disentangled, these interactions may result in mortality. Furthermore, as sea turtles have been documented taken in the pounds of pound net gear throughout their residency period in the Chesapeake Bay, they may be periodically in close proximity to pound net leaders from mid-July to April. If sea turtles are swimming around pound net gear in attempts to enter the pound (i.e., in search of prey), they may be subject to entanglement in or impingement on the leaders.

As mentioned, NOAA Fisheries is not aware of any instances or reports documenting shortnose sturgeon entangled in pound net leaders of any mesh size. Further, the distribution and seasonality of shortnose sturgeon in Virginia waters is unknown. Nevertheless, should shortnose sturgeon be subject to entanglement in pound net leaders, they may continue to be entangled these leaders after mid-July.

Potential for Entanglement in and Impingement on Less than 12 Inches Mesh Leaders

The proposed action does not impact those pound net leaders with smaller than 12 inches stretched mesh outside the closed area (Figure 1). As such, sea turtles and shortnose sturgeon may be affected by pound nets using these leaders. Sea turtles have been found to become entangled in and impinged on pound net leaders with greater than or equal to 8 inches stretched mesh and leaders with stringers. All but one of these interactions have occurred in the closed area, so it is possible that takes will continue to occur with the implementation of the proposed action. Further, it appears that large mesh (greater than or equal to 12 inches stretched) and stringer leaders may present more of a threat to sea turtle entanglement than smaller mesh leaders (Bellmund et al. 1987). The proposed action would continue to prevent sea turtle entanglements in those leaders. However, as shown during monitoring efforts in 2003, sea turtles may still become entangled in and impinged on leaders with stretched mesh smaller than 12 inches. This action would offer no additional protection to sea turtles interacting with leaders smaller than 12 inches outside the closed area. As mentioned previously, based upon additional analysis on impingement to entanglement ratios by NOAA Fisheries, it appears that restricting various mesh sizes would not necessarily provide the anticipated conservation benefit to sea turtles. This suggests that reducing the mesh size may not be the integral factor in minimizing sea turtle takes. The frequency of sea turtle takes may be a function of where the pound nets are set, and not necessarily the mesh size used. Additional analyses, and perhaps data collection, will provide insights into the relationship between mesh size and sea turtle interactions, because at this time, the mesh size threshold that would prevent sea turtle entanglements cannot be determined.

Note that sea turtles could also interact with pound net leaders with smaller than 8 inches stretched mesh, and as a result, entanglements could occur. Sea turtles may theoretically become entangled in any type of net that has an opening in which the turtles' head or flipper may fit. For example, from 1998 to September 2003, the average head width of sea turtles stranding in Virginia was 13.67 cm (5.38 inches) for loggerheads (n=182) and 8.63 cm (3.4 inches) for

Kemp's ridleys (n=31) (VIMS unpub. data 2003). Entanglements may occur when a turtle gets any body part (e.g., nail, ragged piece of carapace, extremity) caught on a net, and these head widths demonstrate that a turtle's head could poke through stretched mesh sizes less than 8 inches (4 inches bar), leading to potential entanglement. Gillnets with less than 8 inches stretched mesh have also been found to entangle sea turtles (Gearhart 2002). Note, however, that there are differences between gillnet gear and pound net leaders (e.g., monofilament vs. multifilament material; drift, set, and runaround vs. fixed stationary gear; gilling vs. herding fishing method), which makes a direct mesh size comparison of potential sea turtle take difficult. Sea turtle entanglement in leaders with stretched mesh below 8 inches has not been documented, but future monitoring studies may address this potential occurrence. There may be other factors that influence potential sea turtle entanglement that NOAA Fisheries is not aware of, such as the tautness of the leader or twine size. Until further information is received, NOAA Fisheries recognizes that turtles may potentially become entangled in leaders with varying mesh sizes.

Impingements on pound net leaders with smaller than 12 inches stretched mesh in areas where sea turtles have previously been documented impinged is likely. As sea turtles may become impinged on leaders by the current, the mesh size of the leader would not matter if the net was set in an area where impingements are likely to occur (the area were they have been previously documented). If set in the same area (with high currents), the likelihood of an impingement on a leader with 12 inch mesh compared to a leader with 4 inch mesh would be the same, given our current knowledge of sea turtle impingements on leaders. However, the proposed action would reduce the potential for this to occur, as the areas where impingements have previously been documented are closed to the use of all leaders. NOAA Fisheries does not expect sea turtle impingements on pound net leaders to occur outside the closed area, given the lack of observed impingements on pound net leaders, which appears to be related to geographical location and current strength. Note, however, that while unanticipated, impingements on less than 12 inch mesh leaders could occur outside the closed area.

So while sea turtle takes may continue to occur in less than 12 inches stretched mesh, the proposed action prohibits leaders in the area with the most documented takes. Further, the available analysis does not provide enough evidence to further reduce mesh size, as it may not be the integral factor in influencing sea turtle take rates, and until this can be explored further, the beneficial impact to sea turtles from changing mesh sizes is uncertain. However, if monitoring determines that less than 12 inches stretched mesh leaders are resulting in sea turtle entanglement outside the closed area, then NOAA Fisheries would determine whether to proceed with additional restrictions via the framework mechanism (mid-season) or an additional proposed rule.

As mentioned, NOAA Fisheries is not aware of any instances or reports documenting shortnose sturgeon entangled in pound net leaders of any mesh size. Further, the distribution and seasonality of shortnose sturgeon in Virginia waters is unknown. Nevertheless, should shortnose sturgeon be subject to entanglement in pound net leaders, the species may also become entangled in less than 12 inches stretched mesh leaders. Other fish species have been found entangled in a variety of leader mesh sizes (NOAA Fisheries unpub. data).

Potential for Take in Pounds

Sea turtles are frequently found in the pound portion of pound net gear. The sea turtles documented in pounds are almost always alive, as the mesh used in the pounds is small (i.e., 2-4 inches stretched mesh), precluding sea turtle entanglement, and the top of the pound is open, allowing turtles to surface for air. Therefore, the continued operation of the pound net fishery may result in the take of sea turtles in the pounds, but it is unlikely that these turtles will be injured or killed.

Researchers at VIMS have received reports of sea turtles trapped in pounds since 1979. VIMS has identified, tagged, measured, and weighed most of the turtles reported from the pounds. These animals have always been reported as alive, with the only documented injuries occurring from previous interactions (e.g., old bite wounds, propellor-like injuries). Prior to 2003, no injuries have been documented from the sea turtles' inhabitancy in the pound itself. Note that the 2002 interim final rule required Virginia pound net fishermen to report all interactions with pound net gear (50 CFR 223.206(d)(2)(v)), but even with this requirement, it is unknown how many turtles are reported compared to the number caught. As of October 2003, 12 sea turtles have been reported to NOAA Fisheries as being captured alive and uninjured in pounds. One of these turtles was found alive and subsequently died at VIMS. Upon necropsy, foam was discovered in the trachea and both lungs, and blood was found in the left lung. The turtle was underweight with a mostly empty gastrointestinal tract, and, while uncertain, it is improbable that interactions with the pound contributed to its death.

While several pound netters have reported live turtle captures over the years, only one fisherman has fished regularly over time and consistently reported live turtles taken in his pounds to VIMS. Therefore, the most reliable data on sea turtle capture in pounds are from one fisherman who has set approximately 5 to 7 nets (depending on the year) at the mouth of the Potomac River along the Virginia shore. From 1980 to 1999, 457 loggerhead turtles have been caught in this fisherman's pounds (Mansfield and Musick, in press). The smallest number of turtles found in his nets annually was 14, while a high of 92 turtles was caught another year. The average number loggerheads caught per year for that fisherman is 31 (+/- 19.57), with an average of 5 turtles captured per net (assuming an average of 6 nets fished). Note that data were only compiled for years in which turtles were reported consistently to VIMS throughout the season. Most of the loggerhead turtles found within these pounds were juveniles (89%), while a few were adults (7.6%). Most of the turtles (23%) were between 61 and 70 cm curved carapace length.

Incidental captures occurred throughout the sea turtles residency period in the Chesapeake Bay, with 406 of the 457 loggerheads caught from May to October. Captures in the Potomac River began in May, peaked during the second half of June, and tapered off until the fall. Peak incidental capture rates in the 5 to 7 Potomac River pound nets appear to lag behind the peak in Virginia statewide strandings, which typically occur around the mouth/southern portion of the Chesapeake Bay. It is possible that turtle captures in pounds in the lower Chesapeake Bay may be either more frequent or occur earlier in the season, as turtles enter the Bay during the spring to forage and later disperse to northern areas. It is also plausible that there may be a higher concentration of foraging turtles near the mouth of the Potomac River (as suggested by site fidelity to particular nets), or conversely, that the frequency of incidental capture in pounds is consistent throughout the Bay. These theories need to be explored. NOAA Fisheries has no consistent reliable information on captures in pounds in the lower Chesapeake Bay; the information from the Potomac River nets represents the best available data on potential turtle captures in pounds. Further, this information is a minimum estimate of the potential incidental takes in the Potomac and potentially throughout the Chesapeake Bay, as reporting and response to takes may have varied between years.

A notable number of the turtles found in the Potomac River pounds were recaptured later in the season or in future years; approximately 54 of the 457 turtles found in the Potomac River pounds were subsequently recaptured. Of these 54 turtles, the Potomac River pound net fisherman has reported recapturing these turtles on 160 occasions. While most of the turtles were captured only once, those that did return did so over an average of three to four years. VIMS preliminary tracking data suggests that some sea turtles exhibit strong site fidelity to the mouth of the Potomac River and the area where the sampled pound nets are located (Mansfield and Musick, in press).

The majority of the turtles captured in the Potomac River pounds were loggerheads (n=457). However, Kemp's ridley turtles have also been captured, albeit at a much lower level (n=44) (Mansfield and Musick, in press). During some years, 8 or 9 Kemp's ridley turtles were captured, while in other years, only 1 or 2 Kemp's ridley turtles were reported (K. Mansfield, pers. comm.). Over the 20 years of sampling effort, an average of approximately 2 Kemp's ridleys were captured per year. Only two of the 44 Kemp's ridleys have been recaptured (once) since 1980. In addition to their relatively low abundance in Virginia waters, it is possible that few Kemp's ridleys have been captured in these pounds due to the location of the Potomac River nets. These nets are set near the tidal channels, areas where radio tracking data indicate that loggerheads inhabit (Byles 1988 in Mansfield and Musick, in press). Kemp's ridleys have been found to stay within shallower areas less affected by tidal flux, which suggests that Kemp's ridley turtles would be more likely to be found in the pounds of shallow water nets. Until this theory can be supported, the Potomac River pound net information represents the best available data on Kemp's ridley captures in Virginia pounds.

Over the last 20 years, only two green turtles have been captured in the Potomac River pounds. One turtle was found in the mid-1980s, while the other green turtle was captured in 2001. While green turtle capture appears to be relatively infrequent in Virginia pounds, the potential for this take exists.

Sea turtles may be entering the pounds to feed on the fish and crustaceans that may be present. Sea turtles are generally not agile enough to capture finfish under natural conditions, and thus would only consume large quantities of finfish by interacting with fishing gear or bycatch (Mansfield et al. 2002a, Bellmund et al. 1987, Shoop and Ruckdechel 1982). Twenty three of 66 stranded loggerheads necropsied between May and December 2001 contained fish parts, indicating that these animals may have been inhabiting the pounds of pound net gear. A diet analysis of stranded loggerhead and Kemp's ridley sea turtles in Virginia found that the diet of loggerheads appears to have shifted to a fish dominated diet in the mid-1990s and in 2001 to 2002, from horseshoe crab dominance during the early to mid-1980s and blue crab dominance in the late 1980s and early 1990s (Seney 2003). Menhaden, croaker, seatrout, striped bass and bluefish were the fish species most frequently found in the loggerhead samples, with all of these fish species being commercially important in Virginia's gillnet and pound net fisheries (Mansfield et al. 2001, 2002a in Seney 2003). Seney (2003) stated that given the fish species composition and that few turtles had consumed both fish and scavenging mud snails, this suggests that the turtles examined were feeding on primarily live and fresh dead fish from nets. As mentioned, VIMS has documented the repeated capture of previously tagged sea turtles in pounds, occasionally documenting the same turtle in the same pound in the same season (Mansfield and Musick, in press). This suggests that these sea turtles may be returning to the pounds to forage. If sea turtles are entering the pounds on their own volition and continue to reoccupy pounds despite their repeated release, this is still considered a take under the ESA definition (e.g., capture). However, NOAA Fisheries is not aware of any instances in which these takes resulted in the injury or morality of the sea turtle. Note that if sea turtles are actively entering the pounds to forage, there may be few options to minimize this occurrence.

The potential exists for shortnose sturgeon to become trapped in the pound net like other fish species. From 1996 to 2003, as a result of the U.S. Fish and Wildlife Service reward program, shortnose sturgeon have been reported taken in pounds in the Maryland waters of the Chesapeake Bay. All of these reports have involved live, uninjured sturgeon. If shortnose sturgeon are present in Virginia waters, they may become trapped in the pounds of pound nets. NOAA Fisheries is not aware of the documentation of such a take in pound net gear in Virginia, but there is no shortnose sturgeon or Atlantic sturgeon reward program currently in Virginia that may ensure such documentation. The 1997 U.S. Fish and Wildlife Atlantic sturgeon reward program reported the take of a shortnose sturgeon in the Rappahannock River, but that take occurred in a gillnet. Nevertheless, shortnose sturgeon are apparently rare in Virginia and while the potential for these species to be captured in pounds exists, these takes would not result in the injury or mortality to the species.

Estimating the Number of Turtles Taken in Pound Net Activities

NOAA Fisheries estimated the amount of incidental take that may occur with the pound net fishery in the action area. No take is anticipated to occur from the implementation of the leader prohibition, reporting, and monitoring included in the final rule, as these impacts will be beneficial to sea turtles, and potentially shortnose sturgeon. Incidental take of sea turtles would continue to occur even with the implementation of the proposed action however. Turtles, and to a lesser extent shortnose sturgeon, may be incidentally taken in the pounds of pound net gear, in leaders from July 16 to May 5, and in leaders with less than or equal to 12 inches stretched mesh outside the closed area from May 6 to July 15. Again, note that while sea turtles are only found in the Chesapeake Bay from approximately May to November, for the purposes of this analysis and to account for potential variability in sea turtle distribution, the general time period of July 16 to May 5 was used for estimating take in leaders, instead of separating out the winter months when sea turtles are not present in Virginia. Additionally, based upon the available data, NOAA Fisheries does not anticipate any impingements to occur outside the closed area at any time of the year, given the lack of previously observed impingements and the environmental conditions in that area.

Based on previous levels of takes in pound nets in the project area, NOAA Fisheries anticipates that up to 5 loggerhead and 1 Kemp's ridley sea turtles per net will be captured annually in the pound portion of pound net gear. There are 161 total pound net licenses issued in Virginia, where one license is assigned to each pound net. Not all of these nets fish in the action area however. According to 2002 VMRC data, 31 fishermen fish approximately 70 pound nets from May 6 to July 15, but this consultation considered the effects of the proposed action year round. NOAA Fisheries conducted a gear survey in the spring of 2003 and identified 101 individual pound nets in the action area, of which 45 were recorded as inactive and 56 were active at the time of the survey. It cannot be determined which of those sites will be active in any given year and any given season, so for the purposes of estimating annual take of sea turtles in pounds, 101 pound nets are considered to be fished in the action area throughout the year. This may be overestimating the number of active pound nets in Virginia waters, but it is difficult to know exactly how many nets will be fished throughout the year based upon the available data. Given the best available data on the number of pounds set throughout the action area (n=101), the resultant total anticipated incidental take is 505 loggerheads and 101 Kemp's ridley sea turtles per year. These takes are anticipated to be live, uninjured animals, with this take resulting from capture and potential harassment.

These incidental takes were estimated by the number of loggerheads and Kemp's ridleys previously taken in the Potomac River pound nets. The number of nets set in the Potomac River has varied slightly among years (between 5 to 7), so for the purposes of this analysis, NOAA Fisheries assumes that an average of 6 nets were fished per year. From 1980 to 1999, the average number of loggerheads taken in the Potomac River pound nets was 31.07 turtles per year (Mansfield and Musick, in press), with an approximate 5 turtles taken per net. In 2003, 101 potential pound net sites were identified in the action area. Given the available information, the anticipated level of annual take in all pounds in the action area is 505 loggerhead sea turtles (=101 pounds * 5 turtles/net). The average number of Kemp's ridleys taken in the Potomac River pound nets was 2.2 turtles per year (=44 turtles/20 years), with an approximate 0.37 turtles taken per net, or 1 turtle per net. This would result in an anticipated level of annual take of 101 Kemp's ridley sea turtles (=101 pounds * 1 turtles/net) for all pounds in the action area. Using the average number of turtles taken in the Potomac River pounds (rather than the maximum in any given year) may account for variability among years and locations throughout the Virginia Chesapeake Bay. Note that if the number of pound nets set throughout the action area changes dramatically in future years, this consultation must be reinitiated to account for those changes to the anticipated incidental take level.

These estimates may be skewed, as the anticipated level of take was determined from data from one fisherman in the Potomac River (northern portion of Virginia waters), and was based upon the average number of turtles taken. In addition, this estimate is based on a total of 101 potential pound nets, even though some of them may not be actively fished. However this is currently the best available data on turtle captures in pounds, and if in the future, new information is obtained that suggests the anticipated take level is inaccurate, NOAA Fisheries may re-assess the anticipated amount of sea turtle take during the operation of the pound net fishery.

Green turtles and leatherback turtles are less likely to be in the project area than loggerheads or Kemp's ridley turtles, but these species could potentially be in the action area and susceptible to takes in pounds throughout the year. Over the past 20 years, two green turtles have been reported captured in pounds in the Potomac River, in two different years. Green sea turtles have also been taken during hopper dredge operations at the mouth of the Chesapeake Bay and have stranded on Virginia beaches. NOAA Fisheries anticipates that one green turtle could be captured in the pounds of pound net gear annually. Leatherbacks have been documented in Virginia waters and have stranded on Virginia beaches during the spring, summer and fall. It is relatively unlikely that leatherbacks will be found in the pound, as the individuals anticipated to be found in Virginia waters would likely be too large to enter the pound. Further, leatherbacks forage on different species than loggerheads and Kemp's ridleys (and may not be attracted to the species in the pound). As such, incidental take of leatherback turtles in the pounds of pound net gear is not anticipated.

Based upon previous level of entanglement/impingement in the spring and information noting the limited number of potential entanglements after the spring (e.g., two turtles), NOAA Fisheries anticipates that one loggerhead or one Kemp's ridley sea turtle will be entangled in or impinged on leaders from July 16 to May 5 each year. While entanglements/impingements of live turtles may occur, for the purposes of this analysis, NOAA Fisheries assumes that all these takes will result in mortality. Only two loggerhead turtles have been reported entangled in pound net leaders after the spring, in two different years, resulting in a maximum of one loggerhead entanglement in any given year. While it is not conclusively known if these two animals were dead prior to entanglement or if the interaction with the pound net leader resulted in their death, for the purposes of this take estimation analysis, we will error on the side of the species and assume that the entanglement caused their death. NOAA Fisheries has no information on potential impingements after the spring, but the potential for this type of take to occur remains. Potential entanglements/impingements from July 16 to May 5 may be more frequent than one loggerhead turtle per year, but NOAA Fisheries has no information on whether this is the case. NOAA Fisheries assumes that the potential for Kemp's ridleys to be taken in pound net leaders after June would the same as for loggerheads, given their morphology, foraging preferences, and estimated distribution and abundance in the Chesapeake Bay.

Green turtles and leatherback turtles are less likely to be in the project area than loggerheads or Kemp's ridley turtles, but these species could be in the action area and susceptible to entanglements in leaders from July 16 to May 5. Green sea turtle occurrence may be infrequent, but this species has been documented in Virginia waters and they may become entangled in large mesh and stringer leaders, similar to loggerheads and Kemp's ridleys. Green sea turtles may also be impinged on the leaders but it is unlikely that leatherbacks will become impinged given their large size. NOAA Fisheries anticipates that one green turtle could be entangled in or impinged on leaders from July 16 to May 5 each year. Leatherbacks may also be entangled in pound net leaders. In June 2000, a fisherman reported an entangled leatherback in a pound net leader off of New Point, but the turtle was released alive before the species identification could be verified. This is the only reported entanglement of a leatherback in a Virginia pound net leader. While this entanglement may or may not have involved a leatherback turtle, there is no reason to believe that entanglement could not occur in leaders. NOAA Fisheries anticipates one leatherback turtle could be entangled in leaders from July 16 to May 5 each year.

Sea turtles may also be taken in less than 12 inches stretched mesh leaders from May 6 to July 15, the time period of the leader restrictions included in the proposed action and the time period when sea turtle are considered to be most vulnerable to pound net interactions. In May and June of 2002 and 2003, NOAA Fisheries observers documented 8 alive (5 loggerheads, 2 Kemp's ridleys, 1 unknown) and 3 dead (2 loggerheads, 1 Kemp's ridley) sea turtles in leaders with 11.5 inches stretched mesh, and 5 alive (all loggerheads) and 2 dead (1 loggerhead, 1 Kemp's ridley) sea turtles were found in leaders with 8 inches stretched mesh. All but one of these takes were in the closed area of the proposed action; one dead loggerhead was found entangled outside the closed area in a 8 inch stretched mesh leader in June 2003. Observations of pound net leaders occurred throughout the Virginia Chesapeake Bay, and nets were observed outside the closed area (Figure 5). Granted, the number of times a net was observed was dependent upon prior entanglement history, location of the nets (e.g., in high current areas or not), and assumed threat to turtles. Given this information and the limited number of entanglements (and no impingements) outside the closed area despite monitoring coverage, NOAA Fisheries anticipates that one loggerhead will be entangled in a leader with less than 12 inches stretched mesh outside the closed area from May 6 to July 15. This anticipated incidental take may be underestimated, given that animals have been documented entangled in leaders with greater than or equal to 8 inches stretched mesh in certain areas of the Virginia Chesapeake Bay, but the available information supports that one loggerhead will be taken outside the closed area. NOAA Fisheries assumes that the potential for Kemp's ridleys, greens and leatherbacks to be taken in pound net leaders outside the closed area from May 6 to July 15 would the same as for loggerheads. As such, NOAA Fisheries further anticipates that one Kemp's ridley, one green, or one leatherback will be entangled in leaders with less than 12 inches stretched mesh outside the closed area from May 6 to July 15. While entanglements of live turtles may occur, for the purposes of this analysis, NOAA Fisheries assumes that all these takes will result in mortality.

Should hawksbill sea turtles be in the action area, they may interact with pound net leaders. However, based on previous observations, and due to their rare occurrence in the action area and foraging behavior, NOAA Fisheries does not anticipate that hawksbill sea turtles will be captured by pounds or become entangled in leaders in the Virginia Chesapeake Bay. Due to their rare occurrence in the action area and lack of documented takes, NOAA Fisheries does not anticipate shortnose sturgeon to be taken in pound net gear or become entangled in leaders. Shortnose sturgeon have been found in pounds in Maryland waters, but NOAA Fisheries has no data suggesting that those takes occur in the Virginia Chesapeake Bay. If in the future, new information suggests otherwise, NOAA Fisheries will re-assess the anticipated amount of shortnose sturgeon take during the operation of the pound net fishery.

Loggerhead sea turtles. Like other long-lived sea turtles, loggerheads delay maturity to allow individuals to grow larger and produce more offspring. As discussed in the Status of the Species section, more offspring may compensate for the high natural mortality in the early life stages; i.e., mortality rates of eggs and hatchling are generally high and decrease with age and growth.

The risks of delayed maturity are that annual survival of the later life stages must be high in order for the population to grow. Studies demonstrate that population growth is highly sensitive to changes in annual survival of the juvenile and adult stages. Crouse (1999) reports, "Not only have large juveniles already survived many mortality factors and have a high reproductive value, but there are more large juveniles than adults in the population. Therefore, relatively small changes in the annual survival rate impact a large segment of the population, magnifying the effect."

The loggerhead sea turtles in the action area are likely to represent differing proportions of the five western Atlantic subpopulations. Although the northern nesting subpopulation produces about 9 percent of the total loggerhead nests, they comprise more of the loggerhead sea turtles found in foraging areas from the northeastern U.S. to Georgia: between 25 and 59 percent of the loggerhead sea turtles in this area are from the northern subpopulation (Sears 1994, Norrgard 1995, Sears et al. 1995, Rankin-Baransky 1997, Bass et al. 1998). The northern subpopulation may be experiencing a significant decline (2.5 - 3.2 percent for various beaches) due to a combination of natural and anthropogenic factors, demographic variation, and a loss of genetic viability. As discussed in the status of the species section, it is possible that the loggerheads which may be taken during the operation of the pound net fishery may originate from the northern subpopulation of loggerheads. Conversely, turtles originating from the southern subpopulation could likewise be taken in large numbers.

Based on previous levels of takes in pound nets in the project area, NOAA Fisheries anticipates that up to 505 loggerhead, 101 Kemp's ridley, and 1 green sea turtle, will be captured annually in all pounds set in the action area. These takes are anticipated to be live, uninjured animals. NOAA Fisheries anticipates that 1 loggerhead, 1 Kemp's ridley, 1 leatherback, or 1 green sea turtle will be entangled (or impinged, for all species besides leatherbacks) and drown in leaders from July 16 to May 5 each year. NOAA Fisheries anticipates that 1 loggerhead, 1 Kemp's ridley, 1 leatherback, or 1 green sea turtle will be entangled and drown in leaders with less than 12 inches stretched mesh from May 6 to July 15 each year.

The impacts of the anticipated level of live turtle takes from capture in pounds on the loggerhead sea turtle population are not likely to be significant. While takes in pounds could occur, they are anticipated to be live, uninjured turtles. As such, the captured sea turtles would undergo some level of harassment and stress, but subsequent mortality or injury is unlikely. This level of take will not represent a loss to the total loggerhead population, and will not likely preclude recovery of the species. Mortality from entanglement or impingement in leaders is more likely, and for the purposes of this analysis, NOAA Fisheries anticipates that all sea turtle entanglements or impingements in leaders will result in mortality. The death of up to 2 loggerheads (1 from leader entanglement or impingement from July 16 to May 5, and 1 from leader entanglement outside the closed area from May 6 to July 15) would represent a loss of approximately 0.05 percent of the estimated number of nesting females in the northern subpopulation. These are conservative estimates, however, since the loss of loggerhead turtles during these activities are not likely limited to adult females, the only segment of the population, or subpopulation, for which NOAA Fisheries has any population estimates. Based upon previous spring strandings data in Virginia, most takes that occur in Virginia will likely be juvenile turtles, a life stage that is critical to the long term survival of the population. It is likely that some turtles entangled in leaders will be from the northern subpopulation and some from the southern subpopulation.

Even if the loggerhead turtles anticipated to be entangled and/or impinged and killed in pound net leaders were juvenile or reproductive females from the northern subpopulation, the loss of up to 2 loggerheads in Virginia is not anticipated to have a detectable effect on the numbers or reproduction of the affected subpopulation, and therefore is not expected to appreciably reduce the likelihood of survival and recovery of the species. Again note that most of the anticipated incidental take associated with the proposed action consists of live uninjured sea turtles, which should not result in a large negative impact to the population.

Kemp's ridley sea turtles. The biology of Kemp's ridleys also suggests that losses of juvenile turtles can have a magnified effect on the survival of this species. Note that most of the Kemp's ridleys captured by pound net gear each year will be live turtles and will not likely be subject to injury or mortality. As such, these takes from capture will not likely impact the recovery of the Kemp's ridley population. However, the take of Kemp's ridleys could result in mortality through entanglement or impingement in leaders. The death of 2 Kemp's ridley sea turtles (1 from leader entanglement or impingement from July 16 to May 5, and 1 from leader entanglement outside the closed area from May 6 to July 15) would represent a loss of approximately 0.07 percent of the population. Similar to information available for loggerheads, these are conservative estimates since the loss of Kemp's ridley sea turtles during the proposed activity is not likely limited to adult females, the only segment of the population for which NOAA Fisheries has any population estimates. Past spring strandings data indicate a large number of stranded turtles in Virginia are juveniles. Even if the Kemp's ridleys anticipated to be entangled and/or impinged and killed were reproductive females, this loss is not anticipated to have a detectable effect on the numbers or reproduction of the affected population and therefore is not expected to appreciably reduce the likelihood of survival and recovery of the species. Again note that most of the anticipated incidental take associated with the proposed action includes live sea turtles, which should not result in a large negative impact to the population.

Green sea turtles. Population estimates for the western Atlantic green sea turtles are not available. However, nesting beach data collected on index beaches since 1989 have shown a general positive trend. While the occurrence of green turtles in the action area would be infrequent, NOAA Fisheries anticipates that 1 green turtle may be taken alive in pounds set in the Virginia Chesapeake Bay, 1 green turtle could be entangled or impinged and killed in a leader from July 16 to May 5, and 1 green turtle could be entangled and killed in a leader with less than 12 inches stretched mesh from May 6 to July 15. At this time, the effects of the lethal incidental take of 2 green sea turtles each year on the population are not known, but this level of take is not likely to represent a significant loss to the population. Given the low numbers of anticipated take and the estimated population size, this loss is not expected to appreciably reduce the likelihood of survival and recovery of the species.

Leatherback sea turtles. Population estimates for the western Atlantic leatherback sea turtles are not available. However, the number of female leatherbacks on some nesting beaches have increased, while on others they have decreased. While the occurrence of leatherback turtles in the action area is relatively infrequent, NOAA Fisheries anticipates that 1 leatherback turtle could be entangled and killed in leaders from July 16 to May 5 and 1 leatherback turtle could be entangled and killed in a leader with less than 12 inches stretched mesh from May 6 to July 15. At this time, the effects of the lethal incidental take of 2 leatherbacks each year on the population are not known, but this level of take is not likely to represent a significant loss to the population. Given the low numbers of anticipated take and the estimated population size, this loss is not expected to appreciably reduce the likelihood of survival and recovery of the species.

In summary, this biological opinion considered the effects of NOAA Fisheries' implementation of sea turtle conservation measures for the Virginia pound net fishery. This proposed action included the analysis of the proposed issuance of a final rule that restricts the use of certain pound net leaders in the Virginia Chesapeake Bay from May 6 to July 15 and continues a framework mechanism, year round monitoring of pound net leaders (if determined necessary) and reporting of any incidental take of sea turtles in pound net gear at any time during the year. With this proposed action, incidental take of sea turtles may occur from the capture in the pound portion of the gear, entanglement in leaders from July 16 to May 5, and entanglement in leaders outside the closed area from May 6 to July 15.

NOAA Fisheries assessed the impacts of the issuance of a final rule restricting the use of certain pound net leaders from May 6 to July 15 on listed species. No take will occur from the implementation of the leader prohibition, the framework mechanism, or the reporting or monitoring requirements, as all impacts of these portions of the proposed action will be beneficial to sea turtles.

The continued operation of the pound net fishery may result in some sea turtle takes, as sea turtle captures in pounds have occurred in the action area. From 1980 to 1999, 457 loggerheads, 44 Kemp's ridleys, and 2 green sea turtles have been reported captured in 5 to 7 pounds set in the Virginia waters of the Potomac River. These animals have all been alive and apparently uninjured from the pound net capture. There have been few documented entanglements in pound net leaders in months other than May and June in the Virginia Chesapeake Bay, but the potential for sea turtles to become entangled in these leaders remains. Sea turtles may also be entangled in leaders less than 12 inches stretched mesh outside the closed area (as defined in the final rule) from May 6 to July 15.

Based on previous levels of takes in pound nets in the project area, NOAA Fisheries anticipates that up to 505 loggerhead, 101 Kemp's ridley, and 1 green sea turtle, will be captured annually in all pounds set in the action area. These takes are anticipated to be live, uninjured animals. NOAA Fisheries anticipates that 1 loggerhead, 1 Kemp's ridley, 1 green, or 1 leatherback sea turtle will be either entangled or impinged in leaders from July 16 to May 5 each year. NOAA Fisheries anticipates that 1 loggerhead, 1 Kemp's ridley, 1 leatherback, or 1 green sea turtle will be entangled in leaders with less than 12 inches stretched mesh from May 6 to July 15 each year. For the purposes of this analysis, the entanglements and/or impingements are considered to result in sea turtle mortality.

Due to the low occurrence of hawksbill sea turtles and shortnose sturgeon in the action area and the lack of hawksbill sea turtles and shortnose sturgeon documentation in the pounds or entangled in pound net leaders, NOAA Fisheries does not anticipate any hawksbill sea turtles or shortnose sturgeon will be taken in conjunction with the proposed activities.

CUMULATIVE EFFECTS

Cumulative effects, as defined in the ESA, are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Natural mortality of endangered species, including disease (parasites) and predation, occurs in Mid-Atlantic waters and will likely continue in the future. Sources of human-induced mortality and/or harassment of listed species in the action area include incidental takes in state-regulated fishing activities, private vessel interactions, marine debris and/or contamination effects.

Future commercial and recreational fishing activities in state waters may take several protected species. However, it is not clear to what extent these future activities would affect listed species differently than the current state fishery activities described in the Environmental Baseline section. NOAA Fisheries expects these commercial and recreational fishing activities to continue in the future, and while it cannot be certain, it is expected that in the future, the fisheries will affect protected resources to the same extent in years past. As such, the potential for interactions with listed species will continue.

As noted in the Environmental Baseline section, private vessel activities in the action area may adversely affect listed species in a number of ways, including entanglement, boat strike, or harassment. It is not possible to predict whether additional impacts from these private activities will occur in the future. In other areas of the Northeast, various initiatives have been planned to expand or establish high-speed ferry service. At this time, NOAA Fisheries is not aware of high-speed ferry services planned for the action area. NOAA Fisheries will continue to monitor the development of the high speed vessel industry and its potential threats to listed species and critical habitat. In the future, NOAA Fisheries will attempt to quantify the impacts of vessel interactions with sea turtles in the action area.

Excessive turbidity due to coastal development and/or construction sites could also influence sea turtle foraging ability. As mentioned previously, turtles are not very easily directly affected by changes in water quality or increased suspended sediments, but if these alterations make habitat less suitable for turtles and hinder their capability to forage, eventually they would tend to leave or avoid these less desirable areas (Ruben and Morreale 1999). Most of the Chesapeake Bay watershed is developed and it is likely that contamination impacts from point and non-point sources will continue in the future.

Marine debris (e.g., discarded fishing line, lines from boats, plastics) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990).

While dependent upon environmental stewardship and clean up efforts, impacts from marine pollution, excessive turbidity, and chemical contamination on marine resources and the Chesapeake Bay ecosystem are expected to continue in the future.

INTEGRATION AND SYNTHESIS OF EFFECTS

NOAA Fisheries has determined that its proposed implementation of sea turtle conservation measures on the Virginia pound net fishery year round may affect loggerhead, leatherback, green, Kemp's ridley, and hawksbill sea turtles, and shortnose sturgeon. The issuance of a final rule that restricts the use of certain pound net leaders in the Virginia Chesapeake Bay from May 6 to July 15, and continues a framework mechanism, year round monitoring of pound net gear and reporting of any incidental take of sea turtles in pound net gear, will only provide beneficial impacts to sea turtles, and potentially shortnose sturgeon. However, with the final rule, sea turtles may continue to be taken in pound net operations. Therefore, the impacts of the year round operation of the pound net fishery on listed species were also determined in conjunction with this action. The operation of the pound net fishery may capture sea turtles alive in the pound portion of the Virginia pound net fishery, entangle or impinge them in leaders from July 16 to May 5, and entangle them in leaders outside the closed area from May 6 to July 15.

Based on past pound net operations and other available information, NOAA Fisheries has anticipated that loggerhead and Kemp's ridley sea turtles are the most likely to be captured as a result of these activities. Green and leatherback sea turtles may be taken to a lesser extent. Based on previous levels of takes in pound nets in the project area, NOAA Fisheries anticipates that up to 505 loggerhead, 101 Kemp's ridley, and 1 green sea turtle, will be captured annually in all pounds set in the action area. These takes are anticipated to be live, uninjured animals. No incidental take of leatherback sea turtles in the pounds is anticipated. NOAA Fisheries anticipates that 1 loggerhead, 1 Kemp's ridley, 1 green, or 1 leatherback sea turtle will be entangled (or impinged, for all species besides leatherbacks) in leaders from July 16 to May 5 each year. NOAA Fisheries anticipates that 1 loggerhead, 1 Kemp's ridley, 1 leatherback, or 1 green sea turtle will be entangled in leaders outside the closed area with less than 12 inches stretched mesh from May 6 to July 15 each year. For the purposes of this analysis, these entanglements are considered to result in sea turtle mortality. While hawksbill sea turtles and shortnose sturgeon may be affected by the proposed action, should they occur in the action area, NOAA Fisheries has no data indicating that these species are subject to take in pound net gear. As such, no incidental take was anticipated for these species.

The majority of the take with this proposed action is expected to consist of live sea turtles in the form of capture in the pounds. While operational measures should be implemented to minimize the capture and entanglement/impingement of sea turtles to the extent possible, the loss of a maximum of 2 loggerhead, 2 Kemp's ridley, 2 green, or 2 leatherback sea turtles as a result of the proposed action would represent a small percentage of these populations. The estimation of the amount of take on the population is conservative since the loss of turtles from leader entanglement/impingement is not likely limited to adult females, the only segment of the population, or subpopulation, for which NOAA Fisheries has any population estimates. Even if all of the turtles anticipated to be entangled or impinged and killed were juveniles or reproductive females, NOAA Fisheries does not anticipate these losses to have a detectable effect on the numbers or reproduction of the affected population or subpopulation, and therefore is not expected to appreciably reduce the likelihood of survival and recovery of loggerhead, Kemp's ridley, green, or leatherback sea turtles.

CONCLUSION

After reviewing the best available information on the status of endangered and threatened species under NOAA Fisheries jurisdiction, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is NOAA Fisheries' biological opinion that NOAA Fisheries implementation of sea turtle conservation regulations for the Virginia pound net fishery (including the issuance of a final rule that restricts the use of certain pound net leaders in the Virginia Chesapeake Bay from May 6 to July 15, and establishes a framework mechanism, year round monitoring of pound net gear and reporting of any incidental take of sea turtles in pound net gear) may adversely affect but is not likely to jeopardize the continued existence of the loggerhead, leatherback, Kemp's ridley, green, or hawksbill sea turtle, or shortnose sturgeon. Because no critical habitat is designated in the action area, none will be affected by the proposed action.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NOAA Fisheries to include any act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken so that they become binding conditions for the exemption in section 7(o)(2) to apply. Failure to implement the terms and conditions through enforceable measures, may result in a lapse of the protective coverage of section 7(o)(2).

When a proposed NOAA Fisheries action which may incidentally take individuals of a listed species is found to be consistent with section 7(a)(2) of the ESA, section 7(b)(4) of the ESA requires NOAA Fisheries to issue a statement specifying the impact of any incidental taking, if any. It also states that reasonable and prudent measures necessary to minimize such impacts be provided along with implementing terms and conditions. Only those takes resulting from the agency action (including those caused by activities approved by the agency) that are identified in this statement and are in compliance with the specified reasonable and prudent alternatives and terms and conditions are exempt from the takings prohibition of Section 9(a), pursuant to section 7(o) of the ESA.

Amount or Extent of Take

The portion of the proposed action involving the prohibition of all offshore leaders in a portion of the southern Chesapeake Bay, monitoring, and reporting, is not anticipated to result in the incidental take of sea turtles. However, even with the implementation of NOAA Fisheries' sea turtle conservation measures for the Virginia pound net fishery, the take of sea turtles could occur in portions of the pound net fishery, such as the live take of sea turtles in the pounds, the take of sea turtles in leaders when the restrictions included in the final rule are not in effect, and the take of sea turtles in leaders outside the closed area. While it is difficult to ascertain future take of sea turtles, NOAA Fisheries based the anticipated take levels on previous sea turtle takes in pounds over the last 20 years in Virginia waters, the previous level of take in leaders, and the distribution and estimated number of sea turtles in the Chesapeake Bay.

NOAA Fisheries anticipates that the following level of incidental take will occur annually in the pound portion of the pound net gear set throughout the action area:

- Up to 505 loggerhead sea turtles,
- Up to 101 Kemp's ridley sea turtles, and
- No more than 1 green sea turtle.

These takes are anticipated to be live, uninjured sea turtles. The take of injured or dead sea turtles in the pounds is not anticipated or authorized at this time. If sea turtle takes in the pounds result in injury or mortality, this consultation must be reinitiated. If the take of any of these three sea turtle species be exceeded, this consultation must be reinitiated. No incidental take of leatherback sea turtles in the pounds is anticipated at this time.

NOAA Fisheries anticipates that the following level of incidental take will occur in pound net leaders from July 16 to May 5 each year:

- No more than 1 loggerhead,
- No more than 1 Kemp's ridley,
- No more than 1 green, or
- No more than 1 leatherback sea turtle.

These takes are assumed to result in sea turtle mortality. If the take of any of these sea turtle species be exceeded, this consultation must be reinitiated.

NOAA Fisheries further anticipates that the following level of incidental take will occur in pound net leaders with less than 12 inches stretched mesh from May 6 to July 15 each year:

- No more than 1 loggerhead,
- No more than 1 Kemp's ridley,
- No more than 1 green, or
- No more than 1 leatherback sea turtle.

These takes are assumed to result in sea turtle mortality. If the take of any of these sea turtle species be exceeded, this consultation must be reinitiated.

No incidental take for hawksbill sea turtles is anticipated as this species is uncommon in the action area and there have been no documented interactions with pound net gear. If information obtained in the future suggests otherwise, this level of anticipated incidental take will be modified.

The distribution of shortnose sturgeon in Virginia waters is relatively unknown. While NOAA Fisheries must employ a conservative approach to management and consider the species to be in the area, it is difficult to determine the abundance of this species in the action area and how the proposed project will impact shortnose sturgeon. Due to the lack of information about distribution in Virginia waters and the low likelihood that shortnose sturgeon will interact with pound net gear in Virginia, no incidental take will be exempted for shortnose sturgeon at this time. If information obtained in the future suggests otherwise, this level of anticipated incidental take will be modified.

Effect of the Take

In the accompanying Biological Opinion, NOAA Fisheries evaluated the effects of this level of anticipated take on the above listed species. NOAA Fisheries has determined that these interactions, should they occur, are not likely to jeopardize the continued existence of these species, or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

NOAA Fisheries has determined that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles. Although no takes of other listed species are authorized at this time, these measures must be undertaken in a manner which ensures detection of takes of these other species so that appropriate reinitiation action can be taken.

1. NOAA Fisheries must provide adequate guidance to pound net fishers such that any sea turtle incidentally taken is handled with due care, observed for activity, and returned to the water outside the pound and away from vessel activities.

2. NOAA Fisheries must notify all pound net permit holders of the regulation (and term and condition) that requires reporting of protected species interactions for the incidental take statement to apply.

3. NOAA Fisheries must develop and follow a system to provide timely reporting on any takes of protected species.

4. NOAA Fisheries must explore gear modification alternatives for pound net leaders that would reduce sea turtle entanglement and impingement, while retaining an acceptable level of fish catch.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the following terms and conditions must be followed, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. NOAA Fisheries must continue to distribute appropriate sea turtle resuscitation and handling techniques found in 50 CFR part 223.206(d)(1), as follows:

   "Resuscitation must be attempted on sea turtles that are comatose or inactive but not dead by placing the turtle on its breastplate (plastron) and elevating its hindquarters several inches for a period of 1 hour up to 24 hours. The amount of the elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Sea turtles being resuscitated must be shaded and kept wet or moist. Those that revive and become active must be released over the stern of the boat only when trawls are not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels."

2. At any time during the year, if a sea turtle is taken live and uninjured in a pound net operation, the operator of the vessel must report the incident to NOAA Fisheries NER PRD, at (978) 281-9328, FAX (978) 281-9394, within 24 hours of returning from the trip in which the incidental take was discovered. At any time during the year, if a sea turtle is taken in a pound net operation, and is determined to be injured, or if a turtle is captured dead, the operator of the vessel shall immediately notify NOAA Fisheries Northeast Regional Office and the appropriate rehabilitation or stranding network, as determined by NOAA Fisheries Northeast Regional Office. The reports shall include the date and time when the animal was found, location of the pound, species description, a description of the animal's condition at the time of release, or the disposition of the animal.

3. NOAA Fisheries must distribute information identifying procedures that should be followed in the event a live turtle is captured and is determined to be injured. For instance, the appropriate rehabilitation/stranding network member should be contacted.

Virginia stranding network members (for rehabilitating turtles) include Mark Swingle and/or Susan Barco at the Virginia Marine Science Museum [(757)437-4949], and Jack Musick at the Virginia Institute of Marine Science [(804)684-7313]. Mark Swingle/Susan Barco and/or Dana Hartley (NOAA Fisheries Stranding Network Coordinator: (508) 495-2090) should also be contacted immediately for any marine mammal injuries or mortalities.

4. NOAA Fisheries must conduct or fund scientific experiments to evaluate the potential for alterative pound net leader designs to be employed in Virginia Chesapeake Bay waters. Such experiments may include research and development of new alternatives or testing of gear modifications, and efforts should be made to work cooperatively with the industry.

NOAA Fisheries anticipates that no more than 505 loggerhead, 101 Kemp's ridley, and 1 green sea turtle, will be captured annually in all pounds set in the action area. These takes are anticipated to be live, uninjured animals. No incidental take of leatherback sea turtles in the pounds is anticipated. NOAA Fisheries anticipates that no more than 1 loggerhead, 1 Kemp's ridley, 1 green, or 1 leatherback sea turtle will be either entangled or impinged in leaders from July 16 to May 5 each year. NOAA Fisheries anticipates that 1 loggerhead, 1 Kemp's ridley, 1 leatherback, or 1 green sea turtle will be entangled in leaders outside the closed area with less than 12 inches stretched mesh from May 6 to July 15 each year. For the purposes of this analysis, these entanglements are considered to result in sea turtle mortality. No incidental take of hawksbill sea turtles or shortnose sturgeon is anticipated. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might result from the proposed action. If, during the course of the project, this level of incidental take is exceeded, the additional level of take would represent new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided above.

CONSERVATION RECOMMENDATIONS

In addition to Section 7(a)(2), which requires agencies to ensure that proposed projects will not jeopardize the continued existence of listed species, Section 7(a)(1) of the ESA places a responsibility on all federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species". Conservation Recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. NOAA Fisheries should expand education and outreach and establish an award program to promote incentives to assist in prevention activities. Outreach focuses on providing information to fishermen and the public about conditions, causes and solutions to protecting endangered species and continuing commercial fishing. Involvement engages people to solicit their ideas and comments to help direct conservation ideas and participate meaningfully in decision-making processes. Parties that demonstrate

innovation and leadership in resource protection should be rewarded and used as models for others.

2. NOAA Fisheries should continue to support research on the seasonal distribution, abundance, movements and health of sea turtles in Virginia to better understand the ecology of sea turtles incidentally captured in pound net gear.

3. NOAA Fisheries should work with the state of Virginia and the pound net fishermen to determine the catch species composition in pounds to better assess the potential motivation for sea turtles to enter pound nets.

4. NOAA Fisheries should support research to better understand the ecological functioning of the Chesapeake Bay and sea turtle prey availability over time. This information may provide information on the foraging ecology of sea turtles and the potential for increased foraging in and around pound net gear.

5. Because presence of shortnose sturgeon in the lower Chesapeake Bay could substantially affect the conclusions in future Section 7 consultations, the NOAA Fisheries should coordinate and collaborate with the U.S. Fish and Wildlife Service on sturgeon research efforts in Virginia.

REINITIATION OF CONSULTATION

This concludes formal consultation on NOAA Fisheries' proposed implementation of sea turtle conservation measures for the pound net fishery in the Virginia waters of the Chesapeake Bay. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) a new species is listed or critical habitat designated that may be affected by the action; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered.

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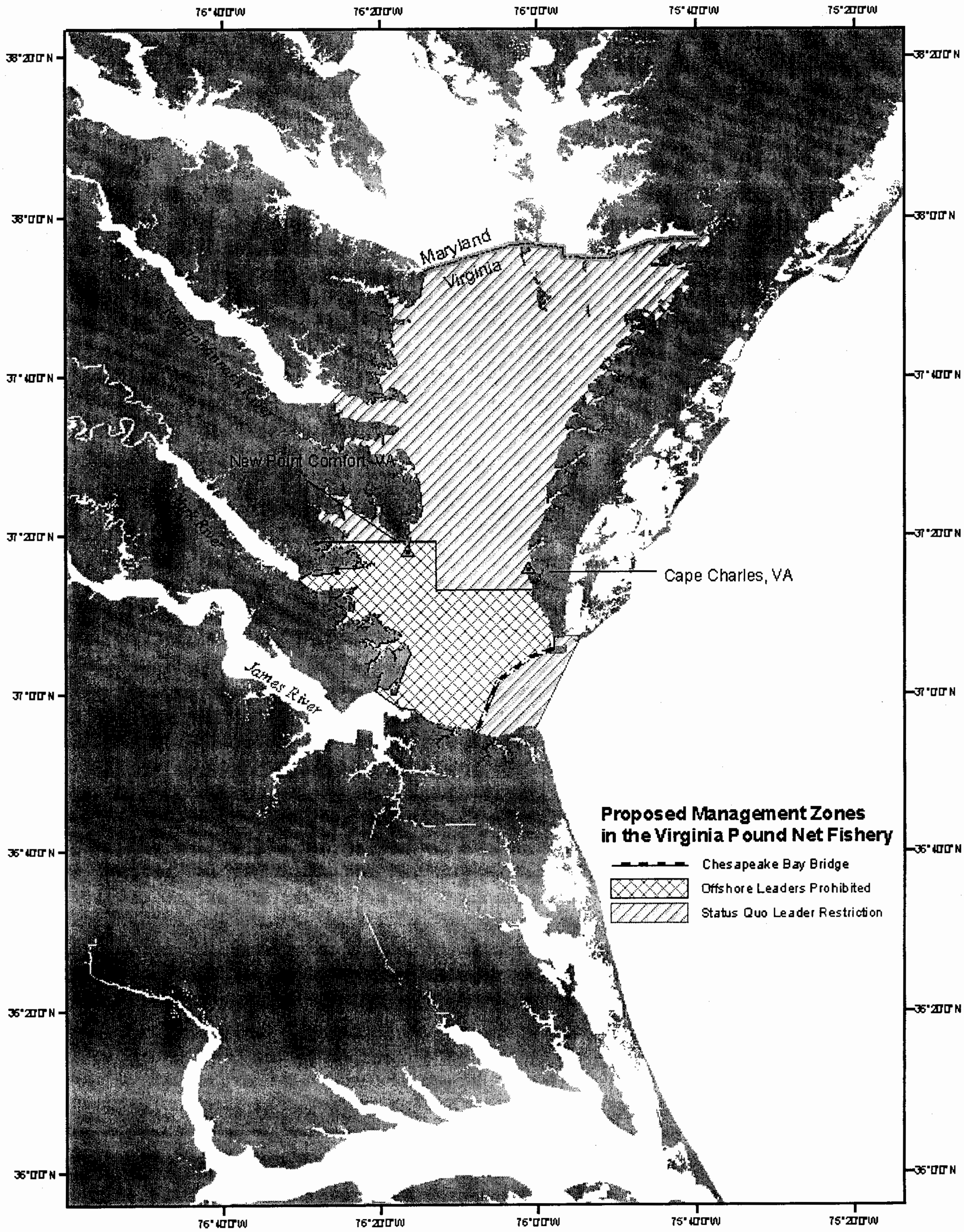
Figure 1. Geographical locations of proposed management measures for the pound net fishery in the Virginia Chesapeake Bay. The striped area depicts where status quo would be retained (prohibition of leaders with greater than or equal to 12 inches stretched mesh and leaders with stringers), and the crosshatched area shows where all offshore leaders would be prohibited. Nearshore leaders found in the crosshatched area would not be prohibited, instead they would be subject to the status quo leader mesh size restrictions.


Proposed Management Zones
in the Virginia Pound Net Fishery
Chesapeake Bay Bridge
Offshore Leaders Prohibited
Status Quo Leader Restriction
Maryland
Virginia
New Point Comfort, VA
Cape Charles, VA
James River
76°40'0"W
76°20'0"W
76°0'0"W
75°40'0"W
75°20'0"W
38°20'0"N
38°0'0"N
37°40'0"N
37°20'0"N
37°0'0"N
36°40'0"N
36°20'0"N
36°0'0"N

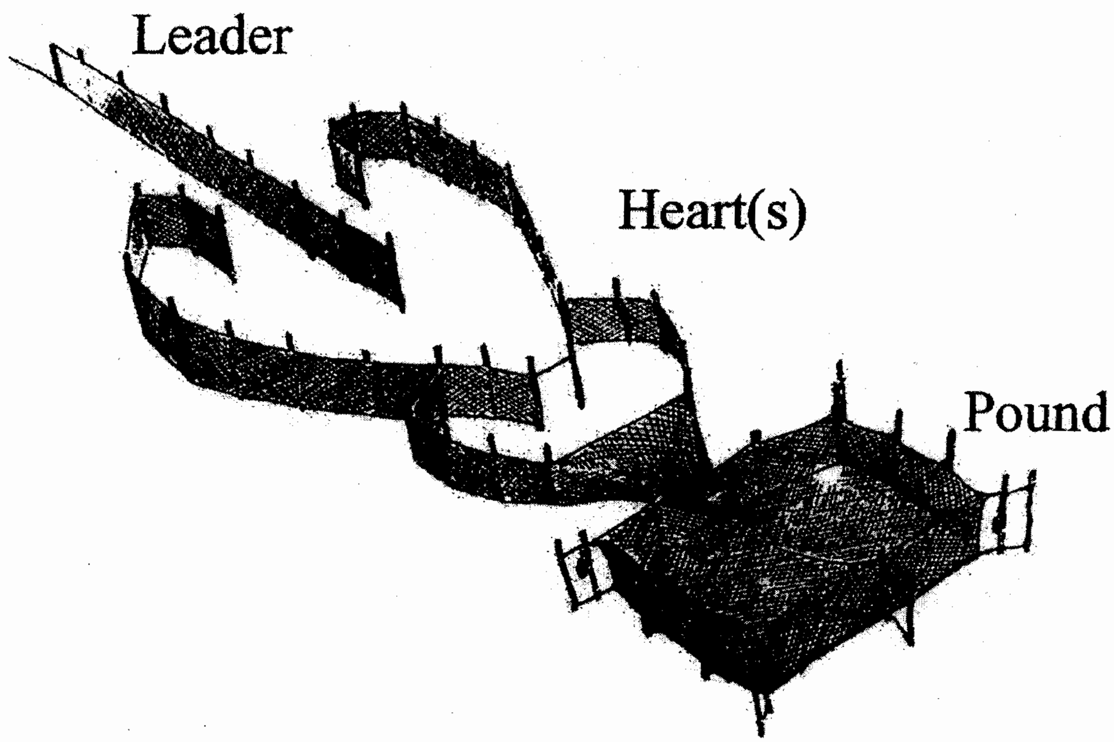
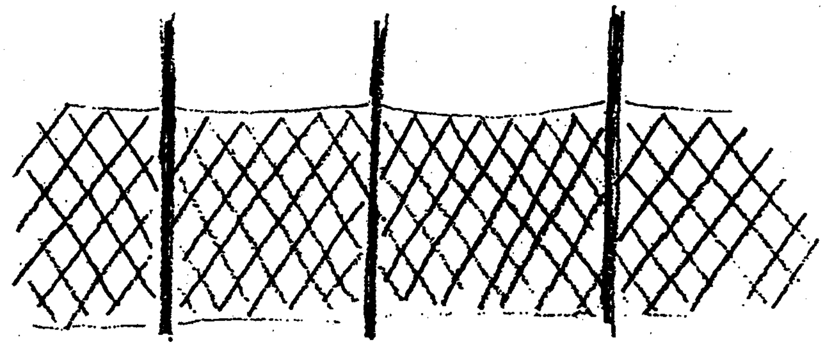


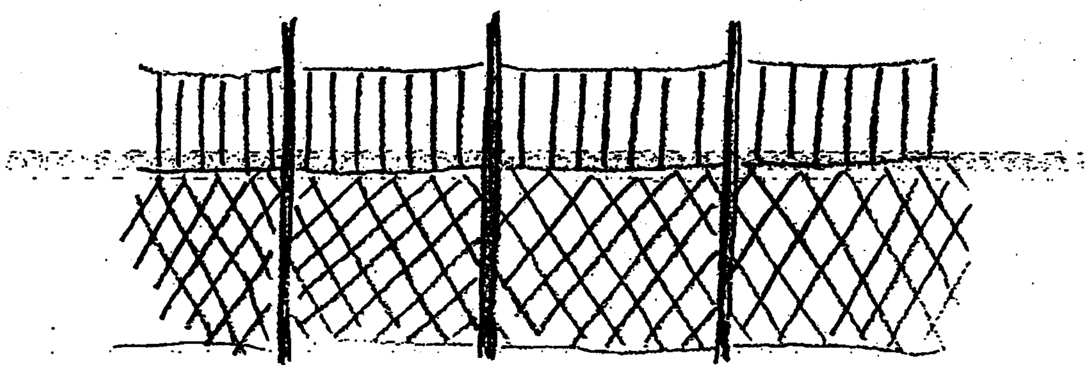
Figure 2. Configuration of a pound net (leader, heart and pound). From Mansfield et al. (2001), adapted from Austin et al. (1998).

Poundnet Leader Types:

Mesh:



Stringer:



Buoy:

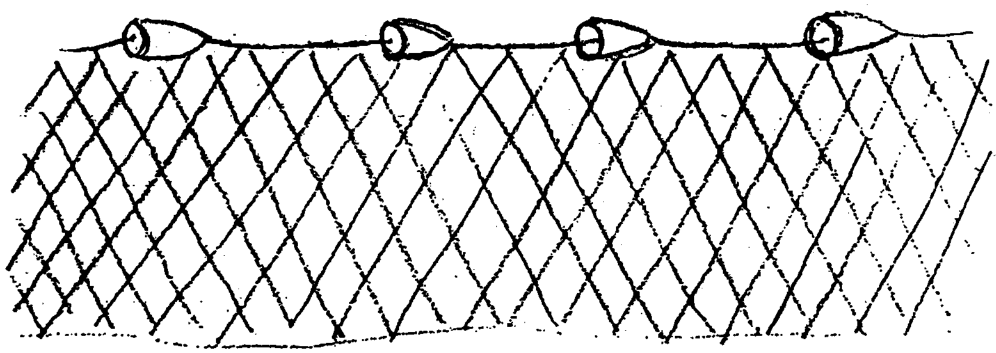


Figure 3. Pound net leader types: mesh, stringer, and buoy. From Mansfield et al. (2001).

Figure 4. Locations of documented pound net stands in the spring of 2003, depicting the active, inactive and unknown status pound net sites in the Virginia Chesapeake Bay. The locations of documented sea turtle entanglements and/or impingements are also noted. Data collected by the NOAA Fisheries Northeast Fisheries Science Center.

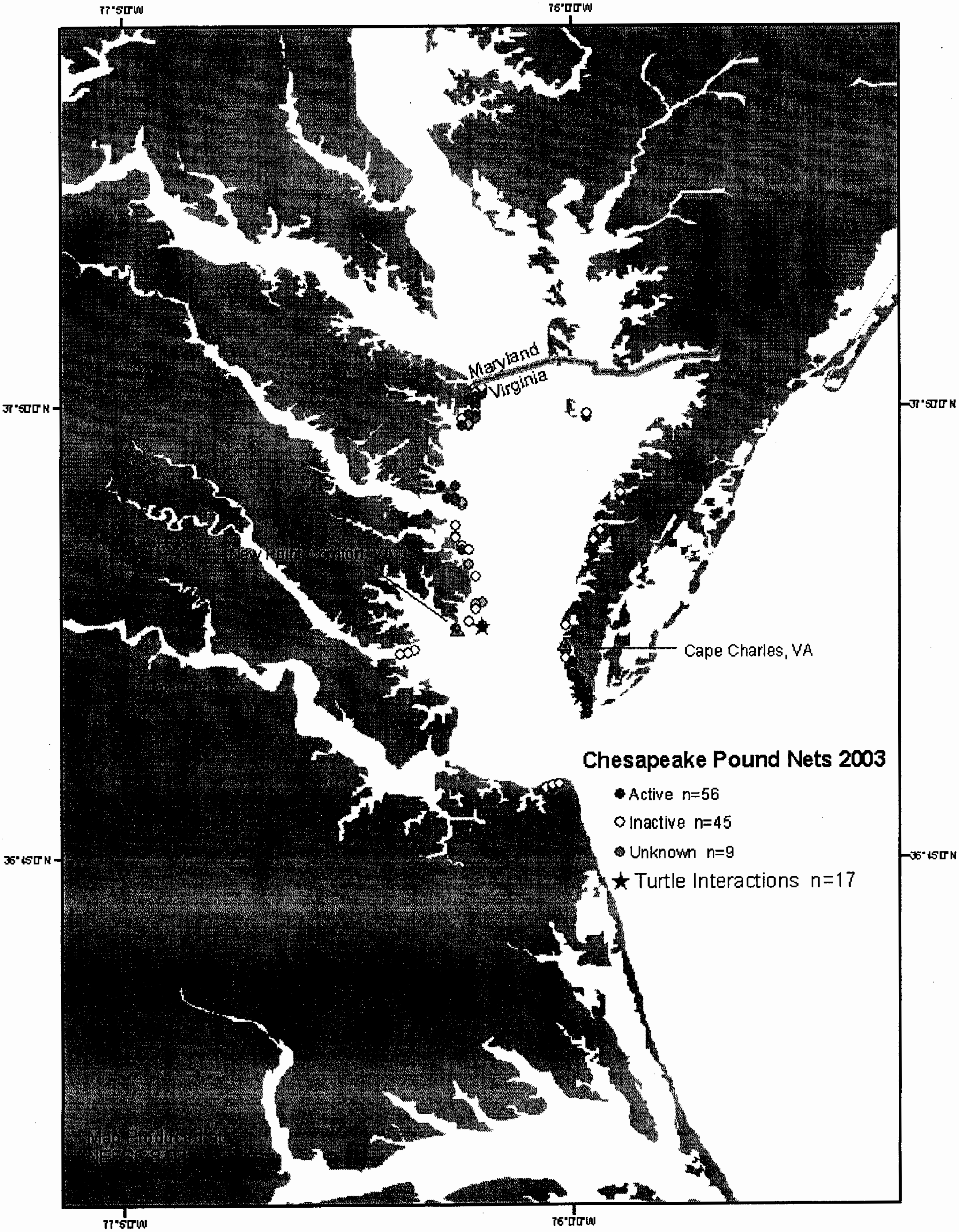
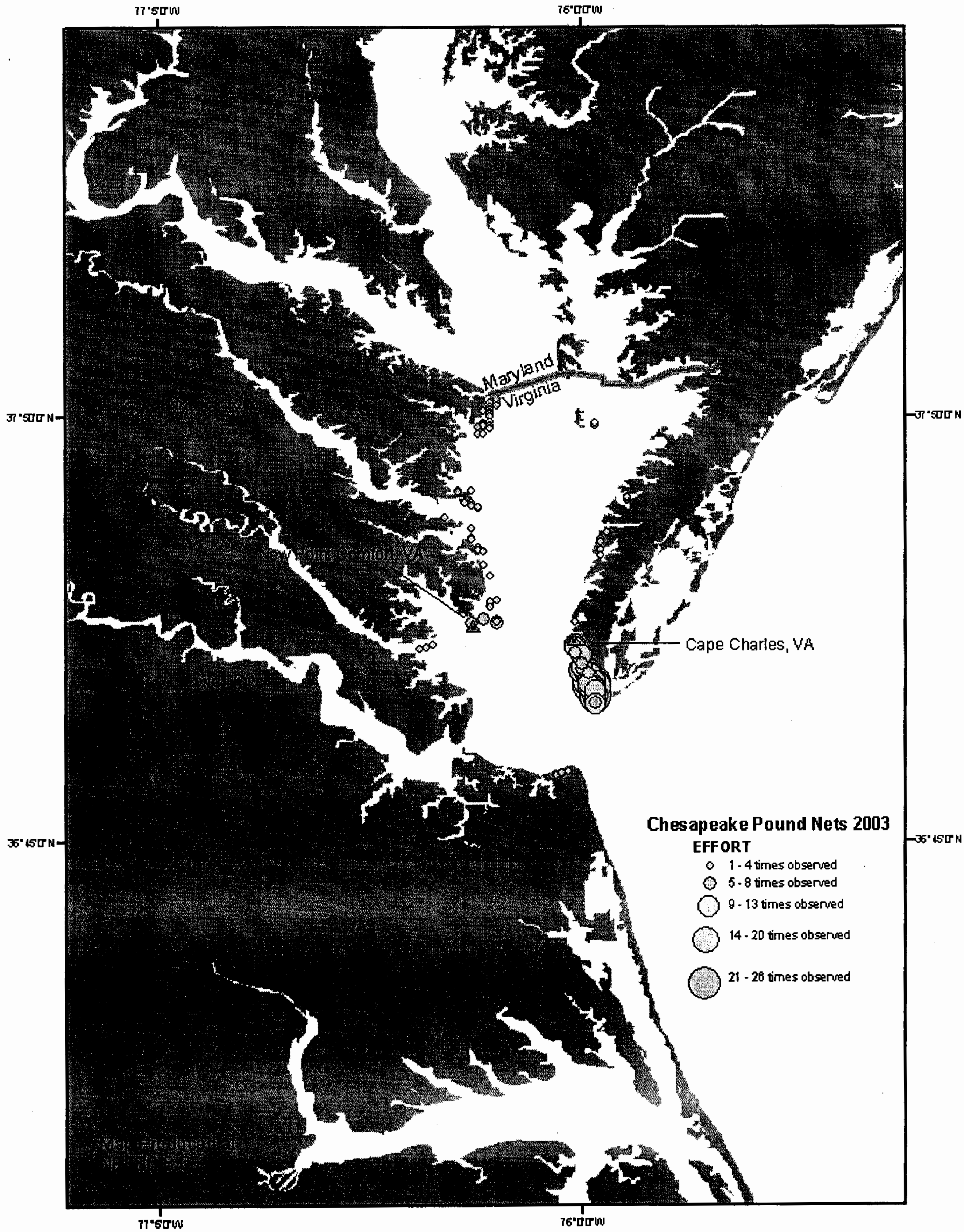

Maryland
Virginia
New Point Comfort, VA
Cape Charles, VA
Chesapeake Pound Nets 2003
Active n=56
Inactive n=45
Unknown n=9
Turtle Interactions n=17

Figure 5. Locations of documented pound net stands and associated sampling effort in the Virginia Chesapeake Bay during the spring of 2003. Data collected by the NOAA Fisheries Northeast Fisheries Science Center.


76°0'0"W
37°50'0"N
36°45'0"N
Maryland
Virginia
New Point Comfort, VA
Cape Charles, VA
Chesapeake Pound Nets 2003
EFFORT
1 - 4 times observed
5 - 8 times observed
9 - 13 times observed
14 - 20 times observed
21 - 26 times observed

Appendix A. Landings data provided by the Virginia Marine Resources Commission show that the following species have been landed in pound nets:

Alewife (*Alosa pseudoharengus*)

Bluefish (*Pomatomus saltatrix*)

Bonito (*Sarda sarda*)

Butterfish (*Peprilus tricanthus*)

Cobia (*Rachycentron canadum*)

Catfish (*Arius* or *Bagre spp.*)

Cod (*Gadus morhua*)

Atlantic Croaker (*Micropogonias undulatus*)

Black Drum (*Pogonius cromis*)

Red Drum (*Sciaenops ocellatus*)

American Eel (*Anguilla rostrata*)

Winter Flounder (*Pseudopleuronectes americanus*)

Summer Flounder (*Paralichthys dentatus*)

Harvest Fish (*Peprilus alepidotus*)

Atlantic Herring (*Clupia harengus*)

Spotted Seatrout (*Cynoscion nebulosus*)

Sheepshead (*Archosargus probatocephalus*)

Spanish Mackerel (*Scomberomorus maculates*)

White Perch (*Morone Americana*)

Red hake (*Urophycis chuss*)

Silver Hake (*Merluccius bilinearis*)

Amberjack (*Seriola spp.*)

Spadefish (*Chaetodipterus faber*)

Sturgeon (*Acipenser spp.*)

Scup (*Stenotomus chrysops*)

Tautog (*Tautoga onitis*)

Spot (*Leiostomus xanthurus*)

Dogfish (*Squalus acanthias*)

Mullet (*Mugil spp.*)

Menhaden (*Brevoortia spp.*)

Hickory Shad (*Alosa mediocris*)

Striped Bass (*Morone saxatilis*)

Skipjack Tuna (*Euthynnus pelamis*)

Gizzard Shad (*Dorosoma cepedianum*)

Northern Puffer (*Sphoeroides maculates*)

Little Tunny (*Euthynnus alletterathus*)

Appendix B.

Virginia Landings Bulletin

COMMERCIAL FISHERIES STATISTICS

1rst QUARTER (January-February) 2003

(Preliminary Report)

Click here to view index of previous commercial landings bulletins

SPECIES FINFISH	JANUARY POUNDS	JANUARY VALUE ($)	FEBRUARY POUNDS	FEBRUARY VALUE ($)	MARCH POUNDS	MARCH VALUE ($)
ALEWIFE	1	1	23	11	89790	9872
AMBERJACK	0	0	0	0	96	40
ANGLER	67679	80394	69320	85844	20571	24680
BASS, BLACK SEA	19020	59237	36970	103886	105143	232601
BASS, STRIPED	12697	20744	219061	432455	949570	1847205
BLUEFISH	839	332	3656	1601	2054	551
BULLHEADS	0	0	666	127	12690	2411
BUTTERFISH	68	40	225	168	358	230
CARP	17	2	355	36	3732	394
CATFISH	37089	23370	24759	14985	96230	52433
COD	0	0	22	28	0	0
CROAKER, ATLANTIC	254967	24969	77850	8050	675398	228384
DRUM, BLACK	0	0	0	0	4	1
DRUM, RED	6	9	0	0	51	78
EEL, AMERICAN	0	0	0	0	2702	2433
EEL, CONGER	1836	919	1645	823	318	157
FLOUNDER, SUMMER	35519	38334	727140	763809	911096	1023607
FLOUNDER, WITCH	0	0	187	112	1115	862
HAKE, RED	13	3	42	20	0	0
HAKE, SILVER	0	0	335	185	168	102
HERRING, ATLANTIC	23	5	180	36	4150	836
HERRING, BLUEBACK	0	0	100	11	233	30
JOHN DORY	0	0	0	0	1195	395
MACKEREL, ATLANTIC	1888	642	1750	438	58	20
MACKEREL, SPANISH	0	0	0	0	1	1
MENHADEN	0	0	0	0	524264	102552
MULLET	30	12	0	0	295	121
PERCH, WHITE	13355	6694	31500	15834	35215	18885
PERCH, YELLOW	2696	3371	125	157	6175	7381
PLAICE, AMERICAN	0	0	0	0	40	24
POLLOCK	0	0	0	0	72	41
PUFFER, NORTHERN	0	0	361	361	44	44
SCUP	0	0	24581	14562	148910	73388
SEA ROBIN (UNCLASSIFIED)	0	0	3	1	0	0
SEATROUT, GREY	1570	1083	1101	865	34135	26386
SEATROUT, SPOTTED	3	5	0	0	4	7
SHAD, AMERICAN	204	81	16	11	35244	14340
SHAD, GIZZARD	155	9	1110	93	79902	7024
SHAD, HICKORY	5343	1337	10	3	2615	669
SHEEPSHEAD	0	0	350	350	0	0
SKATE, WINGS	0	0	194	64	1255	85
SPOT	0	0	0	0	54	24
TAUTOG	762	881	213	227	331	332
TILEFISH	0	0	170	225	35	30
TRIGGERFISHES	14	14	0	0	0	0

WHITING, KING	185	94	0	0	167	85
WINDOWPANE-SAND DAB	0	0	0	0	10	10
FISH, OTHER (FOOD)	0	0	0	0	422	211
FISH, OTHER (INDUSTRY)	624	393	0	0	496032	35225
TOTAL FINFISH	456603	262975	1224020	1445378	4242969	3714187

SPECIES	JANUARY		FEBRUARY		MARCH	
SHELLFISH	POUNDS	VALUE ($)	POUNDS	VALUE ($)	POUNDS	VALUE ($)
BLOOD ARK, CLAM	589	362	637	390	1136	691
CRAB, BLUE	328544	100652	367901	100058	201724	57221
HORSESHOE CRABS	5894	2616	7997	3031	7172	2726
LOBSTER	0	0	375	1969	470	2689
OCTOPUS	1106	1758	97	145	7	7
QUAHOG, PUBLIC	24766	139201	27218	154540	31295	171053
SCALLOPS, SEA	273343	1188727	477468	2073709	1038608	4543924
SQUID (LOLIGO)	299	214	26841	15233	15506	13693
SQUIDS (UNCLASSIFIED)	0	0	93	40	215	109
WHELK (UNCLASSIFIED)	20896	37744	6104	3618	4619	2845
WHELK, CHANNEL	53470	128061	4111	9794	27	85
TOTAL SHELLFISH	708907	1599335	918842	2362527	1300779	4795043
FINFISH & SHELLFISH	1165510	1862310	2142862	3807905	5543748	8509230

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In cooperation with the National Marine Fisheries Service and the Potomac River Fisheries Commission

Appendix C.

Virginia Landings Bulletin
COMMERCIAL FISHERIES STATISTICS
2nd QUARTER (April-June) 2003
(Preliminary Report)

Click here to view index of previous commercial landings bulletins

SPECIES	APRIL		MAY		JUNE	
FINFISH	POUNDS	VALUE($)	POUNDS	VALUE($)	POUNDS	VALUE($)
ALEWIFE	124165	13597	8163	852	634	70
AMBERJACK	4	2	0	0	103	44
ANGLER	6835	6822	405	380	2	2
BLUEFISH	9348	3156	57430	20018	40657	10187
BULLHEADS	6230	1185	12160	2313	3935	750
BUTTERFISH	445	212	1622	764	2444	1149
COBIA	0	0	0	0	3431	8583
CARP	374	40	328	39	140	23
CATFISH	151113	84396	161236	93055	183985	107000
CROAKER, ATLANTIC	1461097	453303	1195362	386421	1112693	355339
RIBBON FISH	3	2	0	0	0	0
DOLPHIN FISH	0	0	0	0	621	932
DRUM, BLACK	8436	1687	51732	10349	18168	3633
DRUM, RED	111	168	1208	1794	145	217
HERRING, BLUEBACK	366	36	0	0	0	0
EEL, AMERICAN	26643	25761	15663	17443	1918	1798
FLOUNDER, SUMMER	19388	30612	20909	30644	13539	18713
GARFISH	0	0	0	0	691	78
SHAD, GIZZARD	119325	8964	29423	2264	40647	3515
HARVESTFISH	0	0	319	360	8872	10026
HERRING, ATLANTIC	2823	570	4264	854	0	0
SHAD, HICKORY	1476	378	146	38	0	0
MACKEREL, KING	0	0	22	41	167	314
WHITING, KING	1338	678	4477	2258	1298	674
MACKEREL, ATLANTIC	111	39	42	15	0	0
MENHADEN	434298	70378	566800	72922	644578	75816
MULLET	955	384	539	217	1285	515
POLLOCK	37	21	0	0	0	0
POMPANO, COMMON	0	0	3	5	410	686
SCUP	4	3	8	6	0	0
BASS, BLACK SEA	2	5	0	0	151	347
SEATROUT, GREY	37797	23132	78913	39474	34549	18932
SEATROUT, SPOTTED	28	50	15	26	127	224
SHAD, AMERICAN	10373	5801	2938	3733	693	942
DOGFISH, UNCLASSIFIED	6846	2397	184206	55971	1041	365
DOGFISH, SMOOTH	16072	5304	88875	29329	8453	2711
SHARK, THRESHER	107	54	3881	1944	134	68
SHEEPSHEAD	26	13	124	66	192	98
SHARK, UNCLASSIFIED	608	1271	11384	24292	51287	20035
SKATE, WINGS	650	77	0	0	0	0
SPADEFISH	0	0	2033	1206	2700	1597
MACKEREL, SPANISH	2	1	818	534	23351	15184
SPOT	87862	26453	78999	24851	70913	22396
BASS, STRIPED	48278	98005	30955	62839	21206	38533
PUFFER, NORTHERN	1745	2790	11188	20444	4242	10594
TAUTOG	1030	1030	290	290	3	3

TOADFISH, OYSTER	0	0	717	1617	0	0
TRIGGERFISHES	0	0	0	0	21	6
TUNA, FALSE ALBACORE	0	0	236	60	308	77
SHARK, SANDBAR	0	0	456	251	1411	965
SHARK, BLACKTIP	0	0	0	0	24	5
SHARK, LEMON	0	0	0	0	85	0
PERCH, WHITE	4716	2914	2878	1843	3096	2179
PERCH, YELLOW	141	94	70	89	7	6
OTHER FISH (FOOD)	138	79	1	1	0	0
FISH, OTHER(INDUSTRY)	661568	47342	733683	53060	516558	38513
TOTAL FINFISH	3257191	919206	3369811	964972	2824545	773844

SPECIES	APRIL		MAY		JUNE	
SHELLFISH	POUNDS	VALUE($)	POUNDS	VALUE($)	POUNDS	VALUE($)
BLOOD ARK, CLAM	45	29	2	2	29	17
CRAB, BLUE	978944	366841	2090688	1395532	1714973	971660
CRAB, RED	22	0	0	0	0	0
HORSESHOE CRABS	164	64	1882	718	3094	1271
QUAHOG, PUBLIC	24051	158324	34919	194170	38628	220670
WHELK (UNCLASSIFIED)	8191	3693	58089	81183	38324	43559
TOTAL SHELLFISH	1011417	528951	2185580	1671605	1795048	1237177
FINFISH & SHELLFISH	4268608	1448157	5555391	2636577	4619593	2011021

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Appendix D.

Virginia Landings Bulletin

COMMERCIAL FISHERIES STATISTICS
3rd QUARTER (July - September) 2002
(Preliminary Report)

Click here to view index of previous commercial landings bulletins

SPECIES	JULY		AUGUST		SEPTEMBER	
FINFISH	POUNDS	VALUE($)	POUNDS	VALUE($)	POUNDS	VALUE($)
ALEWIFE	225	24	170	19	98	12
AMBERJACK	134	56	0	0	0	0
ANGLER	80	76	64	50	15	23
BASS, BLACK SEA	42731	92339	12123	40510	3977	14102
BASS, STRIPED	7094	11584	5523	8948	16818	26796
BLUEFISH	54466	14360	82961	20585	71314	17588
BONITO	0	0	16	12	55	16
BUTTERFISH	5774	3468	21089	12634	5931	3659
CARP	6	1	0	0	52	5
CATFISH	219652	33065	182394	27367	201486	30233
COBIA	1938	2925	3065	4608	1580	2382
CREVALLE	1117	1117	0	0	0	0
CROAKER, ATLANTIC	1784224	604729	1791683	607984	835507	280723
DOGFISH, SMOOTH	802	199	0	0	703	232
DOGFISH, SPINY	11	2	0	0	0	0
DOGFISH, UNCLASSIFIED	3412	1193	2761	966	998	349
DOLPHIN FISH	298	532	311	474	122	147
DRUM, BLACK	1282	257	46	10	147	29
DRUM, RED	938	1323	646	911	958	1383
EEL, AMERICAN	238	233	779	684	4084	3466
EEL, CONGER	755	378	349	256	10	6
FLOUNDER, SUMMER	22928	27613	14952	17932	17066	20773
GARFISH	262	29	0	0	0	0
HAKE, RED	112	59	0	0	11	4
HARVESTFISH	19629	22181	13576	15346	1201	1358
JOHN DORY	3864	1724	1286	579	383	172
MACKEREL, ATLANTIC	223	96	2	1	39	17
MACKEREL, KING	60	113	12	25	116	213
MACKEREL, SPANISH	37680	24451	15322	10334	8540	5715
MENHADEN	402652	24406	772712	48348	457168	28081
MULLET	138	29	940	192	3109	638
PERCH, WHITE	469	339	538	403	481	354
PERCH, YELLOW	94	188	16	32	16	32
PIGFISH	0	0	3	3	2	2
POMPANO, COMMON	30	50	102	173	671	1121
PUFFER, NORTHERN	3993	8653	3661	8403	4593	9198
RIBBON FISH	36	18	948	474	498	252
SCUP	3	2	20	12	0	0
SEATROUT, GREY	51624	31097	102738	62702	135858	83678
SEATROUT, SPOTTED	80	138	25	33	927	1574
SHAD, GIZZARD	2183	185	20332	1109	16423	1093
SHAD, HICKORY	0	0	15	15	0	0
SHARK, BLACKTIP	1234	631	700	155	50	11
SHARK, DUSKY	194	86	0	0	0	0
SHARK, LARGE COASTAL	7612	3775	23453	28201	0	0
SHARK, LEMON	73	0	0	0	0	0

SHARK, SANDBAR	581	319	370	205	468	303
SHARK, UNCLASSIFIED	36738	14805	23958	10316	1477	659
SHARKS, MAKO	0	0	0	0	160	360
SHEEPSHEAD	142	28	52	11	21	4
SKATE, UNCLASSIFIED	0	0	320	16	0	0
SPADEFISH	1876	1110	1343	796	1617	954
SPOT	107306	35546	222833	68256	1403531	430406
TARPON	194	98	0	0	0	0
TAUTOG	92	119	55	91	355	496
TILEFISH	62	44	0	0	0	0
TILEFISH, GOLDEN	0	0	0	0	21	37
TRIGGERFISHES	369	231	36	25	51	26
TRIPLETAIL	0	0	26	13	16	8
TUNA, ALBACORE	14	14	0	0	90	69
TUNA, BIGEYE	0	0	58	174	0	0
TUNA, FALSE ALBACORE	0	0	1185	1185	21	7
TUNA, YELLOWFIN	7239	13157	5166	10976	1185	1534
WAHOO	0	0	116	309	43	71
WHITING, KING	28	26	1591	1290	1505	1223
FISH, OTHER (FOOD)	218	120	6803	3417	44	24
FISH, OTHER(INDUSTRY)	43673	35981	348137	27506	159612	12957
TOTAL FINFISH	3278800	1015296	3687382	1045076	3361224	984575

SPECIES	JULY		AUGUST		SEPTEMBER	
SHELLFISH	POUNDS	VALUE ($)	POUNDS	VALUE ($)	POUNDS	VALUE ($)
BLOOD ARK, CLAM	106	63	149	111	39	34
CRAB, BLUE	4107389	5265570	3673609	4126710	2890144	2850312
HORSESHOE CRABS	2338	672	4496	1653	3388	1158
LOBSTER	0	0	0	0	859	4250
OCTOPUS	16	17	0	0	195	176
OYSTERS	0	0	0	0	58	160
QUAHOG, PUBLIC	49497	276634	44794	224986	20020	88322
SCALLOPS, SEA	2024690	6524026	1778446	6202904	1604911	6451927
SQUID (ILLEX)	94875	14232	84033	12605	18850	2828
SQUID (LOLIGO)	6425	1285	11479	2439	4055	2180
WHELK, CHANNEL	268	797	46	137	0	0
WHELK, KNOBBED	2103	2101	570	693	0	0
WHELK, UNCLASSIFIED	560	150	1956	534	1288	348
TOTAL SHELLFISH	6288267	12085547	5599578	10572772	4543807	9401695
FINFISH & SHELLFISH	9567067	13100843	9286960	11617848	7905031	10386270

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Appendix E.

Virginia Landings Bulletin

COMMERCIAL FISHERIES STATISTICS

4th QUARTER (October-December) 2002

(Preliminary Report)

Click here to view index of previous commercial landings bulletins

SPECIES FINFISH	OCTOBER POUNDS	OCTOBER VALUE ($)	NOVEMBER POUNDS	NOVEMBER VALUE ($)	DECEMBER POUNDS	DECEMBER VALUE ($)
ALEWIFE	323	36	0	0	2	0
ANGLER	1143	1409	7152	9357	105134	146092
BASS, BLACK SEA	58675	113840	27020	67247	7636	27901
BASS, STRIPED	38649	63225	160161	299495	170974	339096
BLUEFISH	71447	15063	55106	16918	15748	6027
BULLHEADS	1690	321	1305	248	0	0
BUTTERFISH	3321	1523	2554	1384	993	494
CARP	1826	308	503	51	147	15
CATFISH	258658	153021	197631	124513	64568	40651
COBIA	374	568	0	0	0	0
CROAKER, ATLANTIC	599168	175828	501698	151326	386540	80550
CUNNER	38	11	0	0	0	0
DOGFISH, UNCLASSIFIED	930	326	315	111	0	0
DOGFISH, SMOOTH	1579	916	842	412	996	728
DOLPHIN FISH	67	95	0	0	0	0
DRUM, BLACK	648	129	1443	143	1048	108
DRUM, RED	1478	2220	328	491	64	83
EEL, AMERICAN	22219	21473	16297	15540	0	0
EEL, CONGER	2174	1134	1764	885	36	16
FLOUNDER, SUMMER	40186	61599	447741	405015	397083	492606
HAKE, RED	85	35	16	4	1	0
HAKE, SILVER	0	0	33	20	0	0
HARVESTFISH	94	108	3	3	0	0
HERRING, ATLANTIC	0	0	0	0	2	0
HERRING, BLUEBACK	0	0	3	0	0	0
HOGFISH	10	4	0	0	0	0
JOHN DORY	0	0	6	4	0	0
MACKERAL, CHUB	0	0	110	110	0	0
MACKEREL, ATLANTIC	2	1	0	0	2	1
MACKEREL, KING	101	178	0	0	0	0
MACKEREL, SPANISH	3167	2071	0	0	0	0
MENHADEN	116849	12559	127959	11827	2570	238
MULLET	857	342	231	95	6	2
PERCH, WHITE	1302	673	1294	730	12837	6470
PERCH, YELLOW	0	0	58	39	51	45
PIGFISH	53	20	0	0	0	0
POMPANO, COMMON	292	490	0	0	0	0
PORGY, RED & PINFISH	3	3	0	0	0	0
PUFFER, NORTHERN	4148	7308	690	710	0	0
RIBBON FISH	0	0	2	1	17	13
SCUP	222	155	11	6	0	0
SEATROUT, GREY	102979	69451	48132	33799	16477	11573
SEATROUT, SPOTTED	979	1464	5710	9993	127	200
SHAD, AMERICAN	0	0	2	1	44	18
SHAD, GIZZARD	9126	704	4783	410	2020	166
SHAD, HICKORY	0	0	231	60	1363	344
SHARK, DUSKY	43	24	0	0	0	0

SHARK, LARGE COASTAL	328	182	0	0	0	0
SHARK, MAKO SHORTFIN	0	0	0	0	125	250
SHARK, UNCLASSIFIED	3813	1592	6	2	0	0
SHARK, SANDBAR	149	106	0	0	0	0
SHARK, THRESHER	0	0	30	15	138	110
SHEEPSHEAD	1849	798	3134	1249	2600	1025
SKATE, WINGS	0	0	227	59	450	116
SPADEFISH	767	431	143	49	2047	523
SPOT	1105987	342931	4049	1224	1	0
TAUTOG	701	705	1759	1717	2905	2905
TILEFISH	30	36	51	61	24	17
TOADFISH, OYSTER	0	0	387	871	0	0
TRIGGERFISHES	2054	1977	1029	712	464	392
TRIPLETAIL	0	0	0	0	8	6
TUNA, ALBACORE	90	86	0	0	0	0
TUNA, FALSE ALBACORE	135	180	0	0	76	19
TUNA, YELLOWFIN	171	249	0	0	1308	2067
WAHOO	85	170	0	0	0	0
WHITING, KING	4749	2729	1846	966	35	21
OTHER FISH (FOOD)	31	16	37	11	90	90
FISH, OTHER(INDUSTRY)	102633	8262	65631	4854	1030	261
TOTAL FINFISH	2568477	1069085	1689463	1162738	1197787	1161239

SPECIES	OCTOBER		NOVEMBER		DECEMBER	
SHELLFISH	POUNDS	VALUE($)	POUNDS	VALUE($)	POUNDS	VALUE($)
CRAB, BLUE	2873917	1156172	994021	378809	909220	270781
HORSESHOE CRABS	11408	3959	3904	1053	15834	6077
LOBSTER	3333	14114	1517	6021	692	2768
BLOOD ARK, CLAM	4	3	178	111	417	247
QUAHOG, PUBLIC	46293	331148	19387	85658	191773	1521161
WHELK, UNCLASSIFIED	1566	1347	35088	69454	79134	49059
WHELK, CHANNEL	5607	13136	61379	166505	87229	218505
WHELK, KNOBBED	1244	1244	870	793	83	76
OCTOPUS	3445	5289	3771	5667	2502	3410
OYSTERS	8883	24405	981	2686	994	2723
SCALLOPS, SEA	1206087	5292458	933486	4248003	587145	2629207
SQUID (LOLIGO)	494	343	2353	2064	1750	1453
SQUIDS (NS)	0	0	99	57	0	0
TOTAL SHELLFISH	4162281	6843618	2057034	4966881	1876773	4705467
FINFISH & SHELLFISH	6730758	7912703	3746497	6129619	3074560	5866706

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