UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act (NEPA), an environmental review has been performed on the following action.

TITLE: Environmental Assessment for the Issuance of 12 Scientific Research Permits for Research on Atlantic Sturgeon

LOCATION: U.S. Atlantic coastal rivers and near-shore marine environment

SUMMARY: The proposed action is issuance of 12 scientific research permits that would authorize research activities on Atlantic sturgeon. These activities would include capture, morphometric measurements, photography, collection of tissue, blood, and fin ray samples, use of external identification and passive integrated transponder tags, external tag telemetry attachment, internal telemetry tag implantation, anesthetizing, laproscopic and boroscopic procedures, gastric lavage, biopsy sample collection and the directed mortality of eggs and larvae. A limited number of unintentional mortalities would be authorized. This research would create a better understanding of sturgeon movements and habitat utilization, spawning, population demographics, genetic structure, foraging behavior, and threats posed by anthropogenic impacts. Specific objectives for each permit vary, but all would continue long-term research. Impacts from these activities would be short-term and minimal to individual animals and negligible to the species. A biological opinion concluded that the proposed action would not likely jeopardize the continued existence of the species and would not likely destroy or adversely modify designated critical habitat. The permits would be valid for five years.

RESPONSIBLE OFFICIAL:

Helen Golde
Acting Director, Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
1315 East-West Highway, Room 13821
Silver Spring, MD 20910
(301) 427-8400

The environmental review process led us to conclude that this action will not have a significant effect on the human environment. Therefore, an environmental impact statement will not be prepared. A copy of the finding of no significant impact (FONSI) including the supporting environmental assessment (EA) is enclosed for your information.

Although NOAA is not soliciting comments on this completed EA/FONSI we will consider any comments submitted that would assist us in preparing future NEPA documents. Please submit any written comments to the responsible official named above.

Sincerely,

Patricia A. Montanio
NOAA NEPA Coordinator

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

Environmental Assessment for the Issuance of 12 Scientific Research Permits for Research on Atlantic Sturgeon

April 2012

Lead Agency: USDC National Oceanic and Atmospheric Administration
National Marine Fisheries Service, Office of Protected Resources

Responsible Official: Helen Golde, Acting Director, Office of Protected Resources

For Further Information Contact: Office of Protected Resources
National Marine Fisheries Service
1315 East West Highway
Silver Spring, MD 20910
(301) 713-2289

Location: U.S. Atlantic Coastal Rivers and Near-shore Marine Environment

Abstract: The National Marine Fisheries Service (NMFS) proposes to issue 12 five-year scientific research permits for takes of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the wild, pursuant to listing in the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et seq.*). Permit Nos. 16526, 16323, 16422, 16436, 16431, 16507, 16438, 16547, 16375, 16442, 16482, and 16508 would authorize varying combinations of research activities directed at the species. Authorized activities would include capture of adult, sub-adult and juvenile, eggs and larvae, of Atlantic sturgeon while also handling, holding, measuring, weighing, video/ photographing, internal and external tagging, genetic tissue sampling, biopsy, anesthetizing, gastric lavaging, laparoscopy, sex identifying, age estimating, and salvaging of dead specimens. Other activities would include laboratory procedures requested by researchers on live and dead animals or parts of dead animals (e.g., blood analyses). Specific objectives for each permit vary between researchers, but all would continue similar long-term research for Atlantic sturgeon recovery.

Under NOAA Administrative Order 216-6, NMFS issuance of scientific research permits is generally categorically excluded from the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 et seq.) requirements to prepare an environmental assessment (EA) or environmental impact statement (EIS). However, in accordance with the NAO, a categorical exclusion would not be applied in this case due to a potential for adversely affecting a limited number of individual endangered sea turtles, shortnose sturgeon (*Acipenser brevirostrum*), and Atlantic salmon (*Salmo salar*) incidental to the proposed permit activities. In addition, this EA facilitates a more thorough assessment of potential impacts on Atlantic sturgeon.

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CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

1.1 DESCRIPTION OF ACTION

In response to receipt of requests from applicants, NMFS, Office of Protected Resources Permits, Conservation and Education Division, proposes to issue 12 scientific research permits authorizing "takes"[1] of Atlantic sturgeon by the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq*.), and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226). The applicants' respective file numbers and location for each permit action area are included in Table 1 below.

Table 1: List of principal investigators and locations of proposed Atlantic sturgeon research

Permit Holder & Responsible Party	File No.	Location of Action Area and Distinct Population Segment (DPS)
Maine Dept. of Marine Resources/ Gail Wippelhauser	16526	Gulf of Maine Rivers and Coastal Areas (**GOM DPS**)
CT Dept of Environmental Protection/ Thomas Savoy	16323	Connecticut Waters & Long Island Sound (**New York Bight DPS**)
SUNY-Stonybrook/ Keith Dunton	16422	Coastal Waters off Long Island Sound and New Jersey to Delaware River (**New York Bight DPS**)
NY State DEC Kathryn Hattala	16436	Hudson River Estuary: NY Harbor to Troy, NY (**New York Bight DPS**)
Dewayne Fox, Delaware State University	16507	Delaware River and Delaware Coastal Waters (**New York Bight DPS**)
Delaware DFW/ Stewart Michels	16431	Delaware River Estuary (**New York Bight DPS**)
ERC, Inc/ Hal Brundage	16438	Delaware River Estuary (**New York Bight DPS**)
USFWS/Albert Spells	16547	Chesapeake Bay and Rivers (MD & VA) (**Chesapeake DPS)**
North Carolina State Univ USGS/Joe Hightower	16375	North Carolina Albemarle Sound and Rivers and Cape Fear River (**Carolina DPS**)
SCDNR/ Bill Post	16442	South Carolina Rivers (**Carolina & South Atlantic DPS)**
UGA/Doug Peterson	16482	Georgia Rivers and Coastal Waters (**South Atlantic DPS**)
USGS/Ken Sulak	16508	Florida/Georgia Rivers (**South Atlantic DPS**)

[1] Under the MMPA, "take" is defined as to "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." [16 U.S.C. 1362(18)(A)] The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The term "harm" is further defined by regulations (50 CFR §222.102) as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering."

1.1.1 Purpose and Need

The purpose of the aforementioned scientific research would be to gather information used to help inform conservation management decisions to recover Atlantic sturgeon in the wild. Section 10(a)(1)(A) of the ESA allows NMFS to issue permits and permit modifications to take ESA-listed Atlantic sturgeon. Thus, the applicants require permits issued to conduct the proposed research.

The primary purpose of the permit is therefore to provide an exemption from the take prohibitions under the ESA allowing "takes" of Atlantic sturgeon for bona fide scientific research. The need for issuance of the permit is related to NMFS's mandates under the ESA. Specifically, NMFS has a responsibility to implement the ESA to protect, conserve, and recover threatened and endangered species under its jurisdiction. The ESA prohibits takes of threatened and endangered species, respectively, with only a few very specific exceptions, including for scientific research and enhancement purposes. Permit issuance criteria require research activities consistent with the purposes and policies of federal laws and not having a significant adverse impact on the species.

1.1.2 Need for Proposed Research and Research Objectives

Under the ESA, NMFS is responsible for the conservation and recovery of listed Atlantic sturgeon. Scientific research is an important means of gathering valuable information about this species and is necessary to conserve them and promote their recovery. The specific goals of research activities proposed by each of the applicants are summarized in the following Table 2.

Table 2: Proposed Atlantic sturgeon research including research objectives

Permit Holder/ Responsible Party	File No.	Research Objectives
Maine Dept. of Marine Resources/ Gail Wippelhauser	16526	Determine the degree of demographic connectivity (immigration and emigration) and correspondence (similarity or uniqueness of demographic parameters) among Atlantic sturgeon in the Gulf of Maine (GOM).
CT Dept of Environmental Protection/ Thomas Savoy	16323	Determine abundance and specific habitat utilization of Atlantic sturgeon in Connecticut waters and correlate movement within and in/out of key areas in Connecticut with environmental variables (temperature, river flow, and dissolved oxygen [DO]).
SUNY-Stony Brook/ Keith Dunton	16422	Develop a multi-State program identifying movements of Atlantic sturgeon among and within marine aggregation areas in the New York Bight DPS.
NY State Dept. Envir. Conservation/ Kathryn Hattala	16436	Development of annual juvenile abundance survey; comparison of diet preference of co-occurring Atlantic and shortnose sturgeon; and annual adult spawning stock survey for Hudson River Atlantic sturgeon.
Delaware DNREC/ Stewart Michels	16431	Define juvenile Atlantic sturgeon abundance and habitat selectivity through telemetry and mark-recapture methods in the Delaware River and Estuary.
ERC, Inc/ Hal Brundage	16438	Characterize habitat use, abundance, reproduction, juvenile recruitment, temporal and spatial distribution, and reproductive health of Atlantic sturgeon in the Delaware River and Estuary.
Dewayne Fox, Delaware State University	16507	Provide information on the location and periodicity of Atlantic sturgeon spawning in the Delaware River; provide a hydroacoustic assessment of habitat requirements of Atlantic sturgeon using side scan sonar; document habitat use, behaviour and diet of Atlantic sturgeon in a marine environment; and estimate a Delaware River Estuary vessel-strike carcass reporting rate for Atlantic sturgeon

US Fish & Wildlife Service/ Albert Spells	16547	Study life history requirements of Atlantic sturgeon in the Chesapeake Bay and tributaries, conducting stock and threat assessments, genetic identification, movement patterns, habitat preference, dredge and shipping/boating interactions
North Carolina StateUniversity-USGS/ Joe Hightower	16375	Investigation of population dynamics and migration of Atlantic sturgeon captured in North Carolina rivers and coastal waters through mark-recapture and telemetry techniques.
South Carolina DNR/ William Post	16442	Investigation of population dynamics and migration of Atlantic sturgeon captured in South Carolina rivers and coastal waters through mark-recapture and telemetry techniques.
University of Georgia/ Douglas Peterson	16482	Study of abundance, population dynamics, seasonal movement, diet, general ecology and environmental tolerance of Atlantic sturgeon captured in Georgia rivers and coastal waters.
USGS/ Ken Sulak	16508	Determine presence and population status of Atlantic sturgeon in Florida and Georgia coastal rivers, and through telemetry techniques, determine movement patterns and habitat use.

1.2 OTHER EAs/SEAs INFLUENCING THE SCOPE OF THIS EA

Although the environmental effects associated with authorizing scientific research on Atlantic sturgeon have been limited— currently three EAs have been prepared for Atlantic sturgeon research associated with ESA Section 6 grants to the states— a large number of other EAs and SEAs have previously been prepared on the effects of similar research techniques related to shortnose sturgeon.

Further, because shortnose and Atlantic sturgeon are comparable species sharing similar life history and habitat types, NMFS concludes current shortnose sturgeon scientific research affects the scope of proposed Atlantic sturgeon research analyzed in this EA. The majority of the above applicants have in the past or are currently participating in both shortnose and Atlantic sturgeon studies. Thus, Appendix 1 summarizes the currently issued NMFS permits issued for shortnose sturgeon, as well as the titles of Section 6 grants for Atlantic sturgeon research for which EAs or SEAs were prepared. Each of these NEPA documents resulted in a Finding of No Significant Impact (FONSI) determination and each action was not considered controversial.

1.3 SCOPING SUMMARY

The purpose of scoping is identifying the issues to be addressed and the significant issues related to the proposed action, as well as identifying and eliminating from detailed study of the issues not significant or those previously covered by prior environmental review. An additional purpose of the scoping process is identifying the concerns of the affected public and Federal agencies, states, and Indian tribes. CEQ regulations implementing the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) do not require a draft EA be made available for public comment as part of the scoping process.

A Notice of Receipt of the applications was published in the Federal Register (76 FR 58469, September 21,2011) announcing the availability of the application for permit and related documents for public comments (File Nos. 16526, 16323, 16422, 16436, 16431, 16507, 16438, 16547, 16375, 16442, 16482, and 16508). Comments received from the public regarding the applications were requests to review the applications. These requests were addressed by advising the individual where to search online for the applications. Comments from NMFS Southeast and Northeast Regional Offices were also solicited and appropriately addressed within the EA and decision memos with respect to how the permit would authorize standard, well-known and non-controversial research techniques.

1.4 APPLICABLE LAWS AND NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action, as well as who is responsible for obtaining them. Even when it is the applicant's responsibility to obtain such permissions, NMFS is obligated under NEPA to ascertain whether the applicant is seeking other federal, state, or local approvals for their action.

1.4.1 National Environmental Policy Act

The National Environmental Policy Act (NEPA) was enacted in 1969 and is applicable to all "major" federal actions significantly affecting the quality of the human environment. A major federal action is an activity that is fully or partially funded, regulated, conducted, or approved by a federal agency. NMFS issuance of permits for research represents approval and regulation of activities. While NEPA does not dictate substantive requirements for permits, licenses, etc., it requires consideration of environmental issues in federal agency planning and decision making. The procedural provisions outlining federal agency responsibilities under NEPA are provided in the Council on Environmental Quality's implementing regulations (40 CFR Parts 1500-1508).

Procedures for NMFS' compliance with NEPA and the implementing regulations issued by the CEQ are established in NOAA Administrative Order (NAO) 216-6.

Through NOAA Administrative Order (NAO) 216-6, NOAA established agency procedures for NMFS compliance with NEPA and the implementing regulations issued by the CEQ established in NOAA Administrative Order (NAO) 216-6. NAO 216-6 specifies that issuance of scientific research permits under the MMPA and ESA are categorically excluded from further environmental review, except under extraordinary circumstances.

While issuance of scientific research permits is typically subject to a categorical exclusion, due to the potential to adversely affect other ESA listed species incidental to the proposed permit activities, NMFS is preparing an EA for this action; and this EA additionally provides a more detailed analysis of effects on other ESA-listed species and Atlantic sturgeon, the intended target of the proposed research.

1.4.2 Endangered Species Act

Section 9 of the ESA, as amended, and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption such as by a permit. Permits to take ESA-listed species for scientific purposes, or for the purpose of enhancing the propagation or survival of the species, may be granted pursuant to Section 10(a)(1)(A) of the ESA.

NMFS has promulgated regulations to implement the permit provisions of the ESA (50 CFR Part 222) and has produced OMB-approved application instructions that prescribe the procedures necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the ESA.

Section 10(d) of the ESA stipulates that, for NMFS to issue permits under section 10(a)(1)(A) of the ESA, the Agency must find that the permit: was applied for in good faith; if granted and exercised will not operate to the disadvantage of the species; and will be consistent with the purposes and policy set forth in Section 2 of the ESA.

Section 2 of the ESA describes the purposes and policy of the Act. The purposes of the ESA are to provide a means whereby the ecosystems endangered and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in section 2(a) of the ESA. It is the policy of the ESA that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of the ESA. In consideration of the ESA's definition of conserve, which indicates an ultimate goal of bringing a species to the point where listing under the ESA is no longer necessary for its continued existence (i.e., the species is recovered), exemption permits issued pursuant to section 10 of the ESA are for activities that are likely to further the conservation of the affected species.

The ESA defines an endangered species as ‘‘any species which is in danger of extinction throughout all or a significant portion of its range’’ and a threatened species as one ‘‘which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.’’ As provided in section 4(a) of the ESA, the statute requires NMFS to determine whether any species is endangered or threatened because of any of the following five factors: (1) The present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; or (5) other natural or manmade factors affecting its continued existence (section 4(a)(1)(A)(E)).

Further, section 4 of the ESA, within the joint distinct population segment (DPS) policy, describes two criteria requiring they be considered when identifying DPSs: (1) the discreteness of the population segment in relation to the remainder of the species (or subspecies) to which it belongs; and (2) the significance of the population segment to the remainder of the species (or subspecies) to which it belongs. As further stated in the joint policy, if a population segment is discrete and significant (i.e., it meets the DPS policy criteria), its evaluation for endangered or threatened status will be based on the ESA's definition of those terms and a review of the five factors enumerated in section 4(a)(1) of the ESA. When a species is listed as ‘‘threatened’’ under the ESA, the Secretary has the authority to issue protective regulations under section 4(d) of the ESA. Such protective regulations are ones deemed ‘‘necessary and advisable for the conservation of the species’’ and may include any act prohibited for endangered species under section 9(a)(1) of the ESA.

Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that “may affect” a listed species or adversely modify critical habitat. NMFS issuance of a permit affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these Section 7 consultation requirements. Section 7 requires federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. NMFS is further required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of habitat for such species. Regulations specify the procedural requirements for these consultations (50 Part CFR 402)

1.4.3 Marine Mammal Protection Act

The MMPA prohibits takes of all marine mammals in the U.S. (including territorial seas) with a few exceptions. NMFS has sole jurisdiction for all species of cetacean, and for all pinnipeds except walrus. Permits for bona fide scientific research on marine mammals, or to enhance the survival or recovery of a species or stock, issued pursuant to section 104 of the MMP A are one such exception.

The proposed research is not eligible for a section 104 permit because it is not directed at marine mammals. However, the potential for incidental take of marine mammals was considered when analyzing the research (see Section *4.2.1.18*).

1.4.4 Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)

Under the MSFCMA Congress defined Essential Fish Habitat (EFH) as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 U.S.C. 1802(10)). The EFH provisions of the MSFCMA offer resource managers means to accomplish the goal of giving heightened consideration to fish habitat in resource management. NMFS Office of Protected Resources is required to consult with NMFS Office of Habitat Conservation for any action it authorizes (e.g., research permits), funds, or undertakes, or proposes to authorize, fund, or undertake that may adversely affect EFH. This includes renewals, reviews or substantial revisions of actions.

1.4.5 The Coastal Zone Management Act (CZMA)

The CZMA provides assistance to states, in cooperation with federal and local agencies for developing land and water use programs for their respective coastal zones. A state’s coastal zone extends seaward to 5.6 km (3 NM) (except for the Texas and Florida Gulf Coasts). Federal license or permit activities and federal financial assistance activities having reasonably foreseeable coastal effects must be fully consistent with the enforceable policies of state coastal management programs.

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated objective, as well as alternatives eliminated from detailed study. This chapter also summarizes the expected outputs and any related mitigation of each alternative. One alternative is the “No Action” alternative where the proposed permit would not be issued. The No Action alternative is the baseline for rest of the analyses. The Proposed Action alternative represents the research proposed in the submitted application for twelve permits, with standard permit terms and conditions specified by NMFS.

2.1 ALTERNATIVE 1 – NO ACTION

Under the No Action alternative, Permit Nos. 16526, 16323, 16436, 16422, 16438, 16431, 16507, 16547, 16375, 16442, 16482, and 16508 would not be issued. This alternative would eliminate any potential risk to the environment from the proposed research activities. However, the applicants would not receive an exemption from the ESA prohibitions against take. Without such exemption, the applicants would not be legally permitted to conduct research on the species. The opportunity would be lost to collect information contributing to a better understanding the species NMFS is responsible for conserving and recovering under the ESA.

This alternative would not affect any existing NMFS permits or future requests for permits or amendments. NMFS would continue to evaluate new permit requests as they are received, including requests from the applicants.

2.2 ALTERNATIVE 2 – PROPOSED ACTION (ISSUANCE OF PERMIT WITH STANDARD CONDITIONS)

Under the Proposed Action alternative, five-year research permits would be issued for activities as proposed by the applicants for File Nos. 16526, 16323, 16436, 16422, 16438, 16431, 16507, 16547, 16375, 16442, 16482, and 16508. All permits would include terms and conditions standard to such permits as issued by NMFS.

The Atlantic sturgeon research proposed by each applicant is summarized in Tables 1 and 2, whereas, general descriptions of Atlantic sturgeon research activities and the specifics of each permit request follow. The specific take numbers, action areas and activities for each application are summarized in tabular form in Appendix 2 (Tables 1-12).

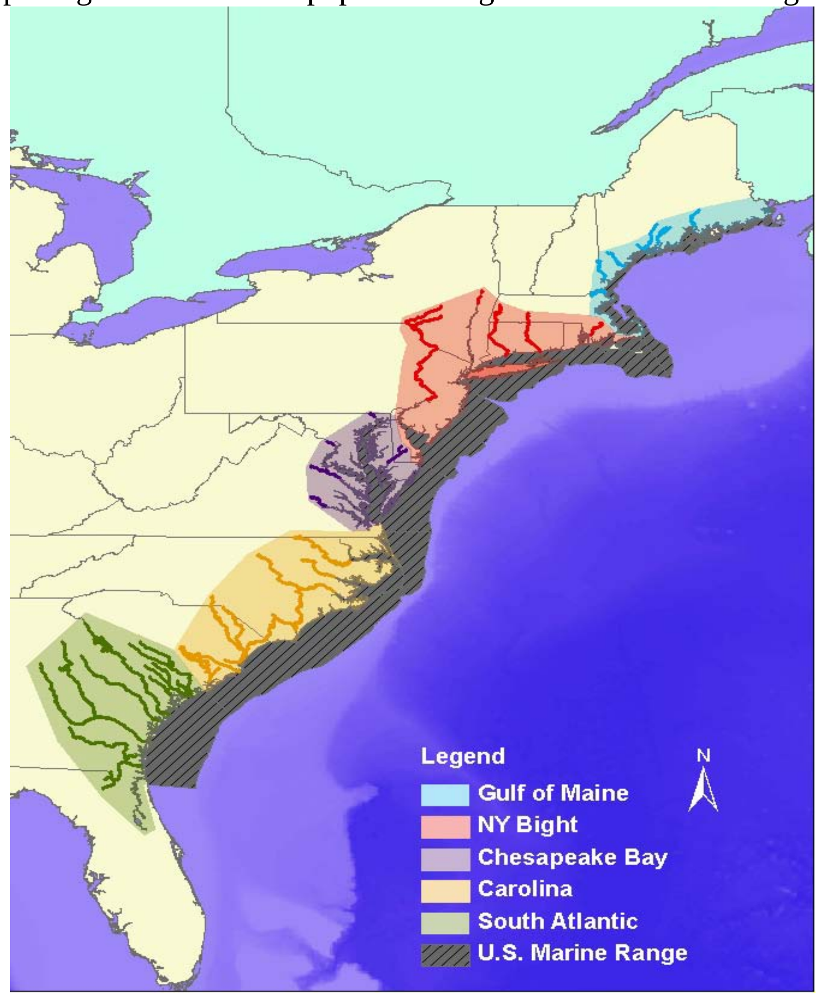
2.2.1 Description of Proposed Action Areas

Proposed research activities on Atlantic sturgeon would take place in river systems across the range of the species, extending from the coastal waters of Maine south down the Atlantic coast to the tidal rivers of northern Florida. More broadly, the action area includes: the Atlantic Ocean, the Gulf of Maine (including coastal river systems in Maine, New Hampshire, and Massachusetts), coastal rivers of Connecticut, Long Island Sound, the Hudson River estuary, the Delaware River, the Chesapeake Bay and its tributaries, North Carolina rivers, South Carolina Rivers, Georgia rivers, and the Nassau and St. Johns Rivers in Florida.

The Atlantic Sturgeon Review Team (ASSRT) determined the U.S. Atlantic sturgeon population warranted division into five distinct population segments (DPS) based on discreteness criteria such as separation based on physical, physiological, and genetic factors (ASSRT 2007). The five DPSs were designated 1) Gulf of Maine, 2) New York Bight DPS, 3) Chesapeake Bay DPS, 4) Carolina DPS, and 5) South Atlantic DPS (See Figure 1 below).

Detailed information on the findings of the ASSRT, including designation of Atlantic sturgeon DPS's, the status of the species and hydrological and similar unique characteristics of each watershed, may be found may be found online at: www.nmfs.noaa.gov/pr/pdfs/statusreviews/atlanticsturgeon2007.pdf. Details on where the proposed sampling would occur may be found in the individual applications for permits found online at: https://apps.nmfs.noaa.gov/ and also in the summary of project descriptions below. Maps of each proposed action area may also be found in Appendix 3.

Figure 1: Map depicting the five distinct population segments for Atlantic sturgeon.



For purposes of section 7 of the ESA, NMFS is required to make a determination whether the proposed research is likely to jeopardize the continued existence of any of the Atlantic sturgeon DPS potentially affected by the action. However, based on the most current genetic information available indicating an overlap of animals within the marine range of the five documented DPSs through coast-wide migrations of Atlantic sturgeon, (Wirgin, pers. comm.; ASSRT 2007), it is likely that individual researchers sampling in any particular action area would capture animals originating from an aggregation of each of the DPSs. Having no knowledge at the time of capture of genetic origins of captured animals, and limited resources and technology to conduct immediate genetic tests necessary for determining DPS origins, the numbers of animals captured from separate DPSs would not be known for some time afterwards.

Thus, determining the prior extent to which individual DPSs in mixed aggregations would be affected is estimated in the Biological Opinion prepared for this EA based on assumptions taken from recent mixed stock analyses of Atlantic sturgeon (Wirgin et al. *in press*) (see Section *4.2.1.17 Effects of Capture on Incidental Take of Atlantic Sturgeon from other DPS)* . Initially, however, this EA will totalize the anticipated take of Atlantic sturgeon from the Proposed Action as occurring from a single DPS. In turn, data from individual actions are summarized as total take occurring within the separate DPS boundaries with no overlap of stock possible (see Table 17). Based on the allocating assumptions from the biological opinion, we then report the potential of each individual researcher to capture animals originating from outside the DPS boundaries where individual studies would be conducted. The proposed takes and allocated takes of animals from other DPSs are summarized in Appendix 2

Beyond this effort, however, NMFS would immediately begin obtaining more complete information on the potential cumulative impacts of the research activities on individual DPSs for use in future analyses and when issuing future permits. Researchers' permits would be conditioned to take genetic tissue samples from all Atlantic sturgeon captured and forwarding samples to the genetics archive within six months of capture. After expedited genetic testing is conducted, NMFS would be further informed on the potential for cumulative impacts on Atlantic sturgeon by documenting temporal and spatial coast-wide movements of Atlantic sturgeon originating from each of the DPSs.

2.2.1.1 <u>General Activities:</u>

The proposed research projects would address gaps in understanding about Atlantic sturgeon ecology and life history. The following is a description of the general activities which would be employed to meet these research needs. More detailed information on each of the individual projects is contained below and within the corresponding permit application. All sampling and handling of sturgeon would be conducted following the guidelines established in "A Protocol for the Use of Shortnose and Atlantic Sturgeon" (Moser et al. 2000a), and as further amended by NMFS in "A Protocol for Use of Shortnose, Atlantic, Gulf, and Green Sturgeons" (Kahn and Mohead 2010).

2.2.1.2 <u>Capture Methods</u>:

Depending upon the targeted life stage, researchers propose to use a variety of capture techniques for Atlantic sturgeon. The location of the sampling (e.g., river, offshore coastal waters) and the bottom type (e.g., mud, sand, rocks) also play a role in the type of gear selected for use. By and large, gill nets are the most commonly used gear in fishing for adult and juvenile Atlantic sturgeon. Trammel nets are similar in appearance to gill nets, but are used less often in targeting adults and juveniles. Trawls are also useful in capturing these life stages, and can also be adapted to collect smaller, young of the year sturgeon. To target sturgeon eggs and early life stage (ELS) fish, researchers would use D nets or artificial substrate egg mats.

General descriptions follow of the capture methods requested by the applicants during the proposed research. For more detailed information on the specific proposed research objectives using each type of capture method, see Table 2. The applicants would be required to adhere to mitigation measures as highlighted in the standard conditions of their respective permits.

<u>Anchored Gill Nets</u>: Atlantic sturgeon would be captured with anchored gill nets sets fishing off the bottom (usually about 1.8m up from the substrate) and in a variety of depths (but a general range would be from 10-60 feet deep). Gill net mesh size would vary by project, but would commonly be 10-18cm (stretch measure), and would be appropriate for the size (i.e., life stage) of sturgeon targeted. A more detailed description of the nets used is included in the methods of each respective project application. To insure the safety of the sturgeon captured in gill nets, researchers would adhere to standard environmental conditions related to net set duration and DO concentration during sampling (Kahn and Mohead 2010) as summarized below in Table 3. Nets would be attended during daylight hours to avoid marine mammal and sea turtle interactions where documented, and in waters having minimum DO concentrations of 4.5 mg/L. Netting would typically cease above 28°C water temperature. However, in File 16442, 16482 and 16508 (South Carolina, Georgia and Florida waters) a controlled netting protocol would be authorized where soak times would be reduced to 30 minutes at water temperatures between 28 and 30°C and/or DO concentrations between 4.0 and 4.5 mg/L, subject to additional reporting requirements for documenting and avoiding harmful stress to animals (See also Section *4.2.1.1* on *Effects of Capture*).

Table 3: Summary of general anchored gill netting conditions[1]

	Water Temperature (°C)	Minimum DO (mg/L)	% D.O. Saturation	Net Set Duration (hr)
1	≤15	4.5	55	14[2]
2	≤15	4.5	55	10[3]
3	15 ≤ 20	4.5	55	4
4	20 ≤ 25	4.5	55	2
5	25 ≤ 28	4.5	55	1
6[4]	25 ≤ 28	4.0	55	1

1. Individual permits may authorize more conservative environmental tolerances depending on location.
2. Gillnets may be set unattended, overnight in freshwater (≤ 2.0 ppt), subject to individual permit conditions.
3. Gillnets must be attended during daylight, and nets must be checked subject to individual permit conditions
4. Environmental conditions apply to researchers in SC, GA and FL.

Drift Gill Nets: Drift gill nets would also be used, set on the bottom perpendicular to the prevailing flow and allowed to move with the prevailing flow for a short period of time, depending on the tides and currents present, generally between 30 minutes and 2.0 hours. Water quality conditions for drift nets would be similar to that conditioned for anchored gillnets; however, because all drift net sets would be continuously tended due to the risk of gear entanglement or loss of gear resulting in ghost nets, fishing gear would be pulled immediately if it were obvious a sturgeon or non-target listed animal were captured.

Trammel Nets: Trammel nets would typically consist of 2-4”mesh sizes for the inner panes, and 8-12” in the outer panels, although experimental trammel nets would vary depending on the targeted animal. Netting material would consist of heavy multifilament nylon mesh instead of monofilament or light twine. Trammel nets would be fished in water depths comparable to gill nets, anchored on the bottom. Therefore, the same standardized netting protocol (duration, temperature and D.O.) as described above for gill nets would be followed for trammel nets when fished on the bottom.

Trawls: Dovel and Berggren (1983) found small trawls effective while collecting multiple life stages of sturgeon in a variety of habitats of sand and mud bottoms, and flat stretches free of debris. Small skiff trawls (5.1 or 8cm mesh, 10m headrope) would be used by applicants in the main stems of rivers and at the mouths of rivers in Connecticut waters (File 16323). Trawling with such smaller trawling gear would be performed year round, subject to the same netting environmental conditions with respect to temperature and DO. They would typically be set and hauled by hand and towed at speeds up to 2.5 knots for 5-15 minutes using a boat equipped with an (e.g., 5.2 or 6.4hp) outboard engine.

Trawling for juvenile Atlantic sturgeon would similarly be performed in the tidal Delaware River from Artificial Island to Trenton (rkm 79-215) using a 4.9 m otter trawl and/or a 14.6 m Yankee trawl (File 16438). Likewise, smaller epibenthic trawls, referred to as “Missouri trawl”, would be authorized within the Merrimack River, Massachusetts in Maine Rivers and in South Carolina and Georgia Rivers. Although no trawling for young juvenile Atlantic sturgeon has been attempted in the Merrimack River thus far, the technique has proven successful for capturing juveniles (30.0 cm TL) and adults in the

Connecticut River (Savoy and Benway 2004) and YOY pallid and shovelnose sturgeon in the Mississippi River (Phelps et al. 2010). Additional modifications of the "Missouri" style bottom trawl to protect small, soft-bodied fish are described by Herzog et al. (2005). (Please see the applications for the respective files for more information on the locations and trawl specifications proposed for use; e.g., File Nos. 16526, 16323, 16438, 16442 and 16482).

Larger otter trawls would also be used in offshore environments, primarily on sand bottoms along the coastal areas off Long Island Sound, New Jersey and Delaware (File 16422). The same trawl would also be used in portions of the lower Hudson River. These nets would have a longer headrope than the skiff trawls (25m) and larger mesh (8 or 12cm) and would be equipped with steel doors (6'x4', 739lbs.). Trawl times would be similar (5-20 minutes), but due to the environment, tow speeds would be faster than in the rivers, between 2-3.5 knots. Because of their size, these otter trawls would be mechanically hauled.

Pound Nets, Fyke Nets, Hoop Nets or other Trapping Nets: Pound, fyke or hoop nets are proposed by researchers (File 16547) in Maryland and Virginia waters in the Chesapeake Bay. The gear would fished in accordance with state regulatory code and only in waters allowed seasonally or as otherwise mandated by the state agencies between December and April. In general, such trapping gear is stationary fishing gear beginning with a length of netting called the "leader," stretching out perpendicular from the shoreline. The leader does not actively capture fish; instead, it spans the depth of the water column, diverting fish away from shore and into the trap — or pound — located offshore. Fyke nets are bag-shaped nets fished well upstream which are held open by hoops. These are typically linked together in long chains and equipped with wings and leaders. However, where applicable, these gear types would only be fished when temperatures were below 15^{o}C between December and April. The maximum duration such nets could be fished without checking would be 14 hours when water temperature is less than 15^{o}C. However, with prior consultation from the researcher, NMFS would also authorize the holding of unstressed Atlantic sturgeon in specialized pound nets (without wings) for up to 24 hours when environmental conditions are favorable.

Beach Seine: Beach seines operated from the shore are proposed as a capture method for Atlantic sturgeon in the GOM (File 16526). This gear is proposed for targeting young of year or juvenile fish foraging along flat sandy areas of rivers and estuaries that are not able to out-swim the hauling action of the seine. The seine is lengthened by long ropes for towing when encircling fish and drawing them to the beach. The seine is therefore a barrier preventing the fish from escaping from the area enclosed by a centered bag portion of the net when surrounded. The headrope of the seine (~30 meters long) would be fitted with floats on the surface and the footrope would remain in permanent contact with the bottom weighted leaded line. When setting the seine, the first towing line is fastened ashore, and then the lead wing is set out in shallow water in a wide arc and brought back to the beach. The bottom and surface act as natural barriers preventing young sturgeon from escaping from the area enclosed by the net. The drag lines would be towed simultaneously from the beach and the fish would be herded in front of the bag. When the ground ropes reach the beach first, the catch would be gathered in the bag by bringing the gear underneath the fish. The bycatch would be sorted and returned to the water and all sturgeon would be then be measured and weighed and PIT tagged, if properly sized.

Egg Mats: To collect Atlantic sturgeon early life stages (ELS), artificial substrate samplers or egg mats would be deployed downstream of suspected spawning areas to verify spawning activity in spring or fall months. The egg mats would be circular polyester floor-buffing pads anchored to the bottom able to passively collect eggs adrift at the spawning site (McCabe and Beckman 1993). These would be checked and reset at least once every three days during deployment. Collected eggs would be removed from artificial substrates, and preserved for later laboratory analysis.

D-nets: The proposed D-nets are bottom-anchored drift nets 5 m long, with a D-shaped mouth 76 cm wide by 54 cm high (mouth opening, 0.41 m^2) used to collect floating sturgeon eggs and/or larvae. The net would be fitted with a knotless mesh and is designed to capture 3-4 mm diameter eggs, free embryos, and larvae while passing smaller particles. D-nets would be removed from the river once the water temperature exceeded 25°C or is less than 0^oC, or once the authorized number of Atlantic sturgeon eggs and/or larvae has been collected; whichever comes first. A modified version of a D-net is known as an epibenthic sled, equipped with a flow meter and the same netting as described in a D-net, but is towed to collect eggs. However, only one applicant proposes to use epibenthic sleds as a collection method for early life stage (ELS) sampling (See application for File No. 16438).

When using either D-nets or egg mats, no more than the authorized number of ELS would be collected for any research project; eggs or larvae would be preserved and returned to the lab for identification and aging. Any excess would be placed back into the river onto suitable substrate nearby in hopes of successful maturation.

Table 4: Proposed research projects, associated action area and proposed capture method(s).

File No.	Proposed Action Area	Proposed Capture Methods					
		Gill net	Trawl	Trammel Net	Egg Mat	D-Net	Other
16526	Gulf of Maine and coastal rivers; ME, NH, MA	X	X	X	X	X	X[1]
16323	Connecticut Waters, Long Island Sound; CT, NY	X	X				
16422	Atlantic Ocean; CT, NY, NJ, DE		X				
16436	Hudson River; NY	X	X				
16438	Delaware River; DE, NJ, PA	X	X	X	X	X	X[2]
16431	Delaware River; DE, NJ, PA	X					
16507	Delaware River, Atlantic Ocean; DE, NJ	X			X		
16547	Chesapeake Bay: James, York, Rappahannock, Potomac Rivers; MD, VA	X			X		X[3]
16375	North Carolina Rivers & Albemarle Sound	X					
16422	South Carolina Rivers;	X	X	X	X		
16482	Georgia Rivers	X		X	X	X	
16508	Florida, Georgia Rivers	X					

1. Applicant proposes to use beach seines in the Merrimack River; please see application for more details.
2. Applicant proposes to use an epibenthic sled to capture ELS Atlantic sturgeon; please see application for more details.
3. Applicant also proposes use of pound, fyke, hoop nets when turtles are not present (November to May).

2.2.1.3 *Summary of Research Activities*

Table 5 below outlines the applicants' proposed research activities. The applicants would be required to adhere to mitigation measures in their permits.

Table 5: Proposed activities for each Atlantic sturgeon application

Activity	Capture	Measure	Weigh	Photograph	PIT Tag	Genetic Tissue	Dart Tag	T-bar/Floy Tag	External Sonic Tag	Anesthesia	Internal Sonic Tag	PSAT	Laproscopy	Boroscopy	Gonad Biopsy	Blood Sample	Fin Ray Section	Gastric Lavage	Gill Biopsy	Hydroacoustic	ELS Sample
File No.																					
16526 MEDMR	X	X	X	X	X	X		X		X	X			X		X	X			X	X
16323 Savoy CT DEP	X	X	X	X	X	X		X		X	X						X				
16422 Dunton SUNY	X	X	X	X	X	X	X			X	X	X			X	X	X	X	X		
16436 Hattala NYSDEC	X	X	X	X	X	X	X		X	X								X			
16438 Brundage ERC	X	X	X	X	X	X		X		X	X		X			X		X		X	X
16507 Fox DELAWARE ST.	X	X	X	X	X	X		X		X	X	X			X		X			X	X
16431 Fisher DE DFW	X	X	X	X	X	X		X									X	X			
16547 USFWS VA & MD	X	X	X	X	X	X			X	X	X										X
16375 Hightower USGS/ NC STATE	X	X	X	X	X	X		X		X	X										
16442 Post SC DNR	X	X	X	X	X	X	X			X	X				X						X
16482 Peterson UGA	X	X	X	X	X	X	X			X	X		X	X		X	X	X			X
16508 Sulak USGS GA & FL	X	X	X	X	X	X		X	X											X	

<u>Holding</u>: Once captured, Atlantic sturgeon are removed from capture gear, if necessary for handling a larger number of animals, they would be recovered in a floating net pen (e.g., 2 ft x 4 ft x 3 ft) or otherwise in an onboard live well. Additional net pens would be available to hold excess sturgeon and/or bycatch. Once recovered, sturgeon would be transferred to a secondary processing station (e.g., a sling) onboard for weighing, measuring, and further processing. To minimize handling stress and preserve the fish's slime coat, researchers would wear latex gloves. When in onboard holding tanks, sturgeon would be immersed in a continuous stream of water supplied by a pump-hose assembly mounted over the side of the research vessel; in some situations, dissolved oxygen (DO) would be supplemented with compressed oxygen to ensure DO concentration does not fall below acceptable levels. The total time required to complete routine handling and tagging (e.g., PIT tagging, measuring, weighing) would be approximately one minute. Atlantic sturgeon undergoing other procedures would be returned to the net pen or live well until all other sturgeon are processed. The maximum amount of time an Atlantic sturgeon would be held after removal from capture gear is two hours. However, once Atlantic sturgeon are captured, they may also be held in specialized pound nets in the Chesapeake Bay, authorized for up to 24 hours, if unstressed and water quality is good. NMFS believes unstressed fish held in pound nets would not subject to additional injury or stress while being held (See Section *2.2.1.2* on *Pound Nets*; and Section 4.2.1 on *Effects of Capture*).

Measuring and Weighing: The actual method of weighing Atlantic sturgeon would vary based on the individual applicant's available equipment; however, weighing protocols would fall into two categories: spring scale or platform scale. Atlantic sturgeon weighed on a spring scale would be supported using a sling or net. Sturgeon would be weighed on a platform scale fitted with a small waterproof cushion attached to the surface of weighing platform to fully support the fish. Morphometric measurements (e.g., total length, fork length, interorbital width) would be taken using a measuring board, solid ruler, or calipers, as appropriate.

Tissue Sampling: In order to characterize the genetic make-up and level of diversity of Atlantic sturgeon within a population, a small sample (1 cm^2) of soft fin tissue would be collected from the trailing margin of the pelvic fin using a pair of sharp sterilized scissors. This procedure does not harm other sturgeon species and is common practice in fisheries science. Tissue samples would be preserved in individually labeled vials containing 95% ethanol. The Permit Holder would agree to supply genetic tissue samples collected from Atlantic sturgeon for archival with Julie Carter of the NOAA/NOS Laboratory, Charleston, South Carolina, or with other genetic specialists identified in the applicant's permit. Proper certification, identity, and chain of custody for the tissue samples would be maintained as samples are transferred.

PIT Tagging: All captured Atlantic sturgeon would be scanned with a PIT tag reader. All untagged fish (≥300mm TL) would be tagged with a PIT tag injected under the skin on the left side of the body, immediately anterior to the dorsal fin and posterior to the dorsal scutes with a hypodermic needle and syringe (e.g., 12 gauge). The most commonly used brand and size of PIT tag is a BioMark TX1411SST 134.2 kHz, 12.5x2.07mm. No juvenile fish >300 mm (TL) would be PIT tagged.

Floy/Dart Tagging: Other external tag types proposed for use are Floy or dart tags. These tags functionally are the same with similar reported retention. They would be inserted with an injecting needle at the dorsal fin base in the musculature just forward and slightly downward (from the left side to the right) locking into the dorsal pterygiophores of the dorsal fin. After removing the injecting needle, the tags would be spun between the fingers and gently tugged to be locked in place. To document tag retention of these tags, recapture data would be crossed referenced with PIT tag results reported to NMFS in annual reports. No juvenile fish >300 mm (TL) would be T-bar tagged.

External Telemetry Tagging: External telemetry tags would be used to track Atlantic sturgeon movement and behavior. NMFS recommends using external attachment of tags for smaller fish or pre-spawning fish in the fall or winter in order to document short-term telemetry objectives (10-12 months). External transmitters would be attached to Atlantic sturgeon using the 3-5 minute procedure outlined in Kahn and Mohead (2010, p.30)[2]. Following the outlined procedure, however, captured fish would not require anesthetization to attach external telemetry tags.

Pop-up Satellite Archival Tags (PSATs): File Nos. 16442, 16422, 16526 and 16507 propose using Pop-up Satellite Archival Tags (PSATs) pending availability of funding. PSATs are archival tags similar to external telemetry tags, attached externally without surgery by fastening the tag to the dorsal fin of the sturgeon by a monofilament (Erickson and Hightower 2007; Erickson et al. 2011). PSATs are somewhat more sophisticated than traditional telemetry tags because, in addition to recording location data of tagged animals, it can also record temperature and depth data, allowing a more comprehensive

2 http://www.cio.noaa.gov/Policy_Programs/prplans/ID150_KahnandMohead2010.pdf

understanding of the environment the fish occupies. At a pre-programmed time, the pin attaching the tether to the PSAT will corrode, releasing the tag, allowing it to float to the surface and transmit the archived data to a satellite for retrieval. In some models, the tag transmits data via satellite in real time during deployment. PSATs are especially suited for species spending time offshore, outside where it is practical or possible to maintain an acoustic receiver array required for traditional telemetry studies. As illustrated at the manufacturer's site online at http://www.wildlifecomputers.com/popup.aspx, PSAT tag features and capabilities vary by make and model. Specifications for two types of PSAT proposed to be used by applicants are included in Table 6 below.

Table 6: Specifications of PSATs manufactured by Wildlife Computers

PSAT Model	PAT Mk 10	Mini PAT
Length (mm)	175	115
Width (mm)	40	40
Weight in Air (g)	75	53

Anesthetizing: Two primary means of anesthetization would be used: chemical anesthetization (tricaine methanesulfonate, MS-222) and electronarcosis (also known as electroanesthesia or galvanonarcosis). Certain invasive procedures, such as internal tagging, laparoscopy, and fin ray sectioning, would require anesthetization to the prescribed stage as per Kahn and Mohead (2010) (See Table 7 below). Noticeably stressed Atlantic sturgeon would not be anesthetized (or undergo further invasive procedures). The majority of the applicants propose to use MS-222 as a means of anesthetizing sturgeon; those who propose to use electronarcosis are identified below.

Table 7. Stages of anesthesia (Summerfelt and Smith 1990).

Stage	Descriptor	Procedure	Behavioral Response of Fish
0	Normal	Boroscope;sonic tagging; Genetic fin clip; Blood sample; PIT tag; External tag (i.e., dart, Floy, external sonic tags, PSAT tags)	Reactive to external stimuli; opercular rate and muscle tone normal
I	Light sedation	Gastric lavage; Boroscope, External body biopsy	Slight loss of reactivity to external stimuli; opercular rate slightly decreased; equilibrium normal
II	Deep sedation	Fin ray clip	Total loss of reactivity to all but strong external stimuli; slight decrease in opercular rate; equilibrium normal
III	Partial loss of equilibrium	Internal telemetry tagging; Internal biopsy	Partial loss of muscle tone; swimming erratic; increased opercular rate; reactivity only to strong tactile and vibration stimuli
IV	Total loss of equilibrium	Laparoscopy	Total loss of muscle tone and equilibrium; slow but regular opercular rate; loss of spinal reflexes
V	Loss of reflex reactivity		Total loss of reactivity; opercular movements slow and irregular; heart rate very slow; loss of all reflexes
VI	Medullary collapse (asphyxia)		Opercular movements cease; cardiac arrest usually follows quickly

Chemical Anesthesia: MS-222: Each sturgeon prepared for surgery requiring anesthetization would be placed in a water bath solution containing buffered MS-222 for anesthetization (Summerfelt and Smith 1990). MS-222 concentrations of up to 150 mg/L would be used to sedate sturgeon to a proper state of anesthesia depending on the procedures being performed. The time required for anesthetization and recovery would vary depending on the prevailing water temperature and quality (Matsche 2011; Coyle et al. 2004). Once anesthesia is administered, sturgeon would be continuously monitored for signs of proper sedation by squeezing the tail to gauge the fish's movement and equilibrium, and checking for steady opercula movement. Just prior to performing the procedures, sturgeon would be removed from the anesthetic bath to a moist surgery rack. Respiration would be maintained by directing fresh ambient water pumped across the gills with tube inserted in the fish's mouth. After the procedures, sturgeon would be allowed to recover to normal swimming behavior in boat-side net pens or holding tanks.

Physical Anesthesia: Electronarcosis: Using the method described by (Henyey et al. 2002), the researchers would use (non-pulsed) DC voltage (0.3-0.5 V/cm, 0.01 A) prescribed to immobilize fish during surgery to implant or attach sonic transmitters. In this procedure, fish would be placed in a tank with a screen anode at one end of the tank and a cathode screen at the other end. As voltage is applied quickly to the anode (1-2 sec), the subject fish would lose equilibrium, relax, and sink to the bottom. Voltage would then be decreased until the fish became immobilized but still exhibiting strong opercula movement. Fish would be supported with a cradle so only their back or ventral surface emerged from the water while work would be conducted. Electronarcosis would be used as an alternative method for anesthetizing sturgeon in File No. 16526 and 16547.

Internal Telemetry Tags: To determine habitat utilization, seasonal migrations, and, in general, to track movements, Atlantic sturgeon would be fitted for internal implantation of sonic transmitter tags. There are multiple types of internal tags which would be used; VEMCO is a widely-used brand of telemetry equipment. Due to the long-distance (often coast-wide) migrations of anadromous Atlantic sturgeon, researchers desire to use compatible telemetry technology, so as to collaborate with researchers in other areas whose equipment may detect fish initially tagged elsewhere (for example, the Atlantic Coast Telemetry Network (Dewayne Fox, personal communication)). For details and specifications on the tags used in each proposed research project, please see the respective application. Table 8 contains a listing of commonly used VEMCO internal telemetry tags as a reference. Fish would be tracked passively with a VEMCO array of remote VR2W receivers positioned in the river to document movement within the river or actively tracked by field crews using mobile hydrophones. All transmitters would be limited in size to less than 2% of the fish's total weight. The 3-5 minute procedure for implanting internal transmitters would be as follows.

i. Captured fish when temperatures range between 8°C and 27°Cwould be anesthetized by either method authorized above;
ii. Anesthetized fish would be held on their backs (i.e., ventral side up) in the holding box while held motionless under narcosis. Water would cover the gills. The incision site, approximately 10cm posterior to the pectoral girdle and just lateral of the midline, would be disinfected with iodine. Sterile instruments would be used for each fish. A surgical opening of 4 cm would then be made in the belly of the fish;
iii. An inert, sterilized sonic tag would be pushed posterior into the surgical opening;
iv. The incision would be closed with non-absorbable suture in a cruciate pattern (Matsche and Bakal 2008) and swabbed with iodine; and
v. The fish would then be allowed to recover (to equilibrium) upright in a flow-through water system and released once active.

Table 8: Specifications on commonly-used Internal Telemetry Tags

Internal Telemetry Tag Type	Dimensions	Weight (in Water and Air)
VEMCO V7	22.5mm length/7mm diameter	1g in water/1.8g in air
VEMCO V9	21mm length/9mm diameter	1.6g in water/2.9g in air
VEMCO V13	36mm length/13mm diameter	6g in water/11g in air
VEMCO V16	95mm length/16mm diameter	16g in water/36g in air

Boroscopy: Boroscopy is a minimally invasive method in determining the sex and maturity of Atlantic sturgeon (Moser et al. 2000a). During the exam, the fish's head and most of the body would remain in water under a relaxed anesthetized condition, with the exam taking 1-2 minutes. The probe (typically 7" long x 0.16" wide) would be inserted through the genital opening and into genital tract (Kynard and Kieffer 2002). Eggs, if present, would be viewed through the wall of the genital tract and staged as early stage, late stage, or potential spawners. Overall, this sampling (including standard handling and measuring), should take less than 4 minutes.

Laparoscopy: Laparoscopic examinations have been used extensively in fisheries research and refined for sturgeon work (Hernandez-Divers et al. 2004); Matsche et al. 2011). Laparoscopy would be used to determine the sex and reproductive health of Atlantic sturgeon. Since it is a more invasive technique than boroscopy, laparoscopic procedures would only be carried out by researchers who have had proper training and experience.

Using sterile techniques and equipment, a small (~4 mm) incision would be made in the ventral body wall slightly off midline, midway between the pectoral and pelvic girdle through which a trocar would be inserted. A rigid laparoscope would then be inserted through the trocar to allow visualization of gonads. If necessary, the body cavity would be insufflated with ambient air by attaching a battery-powered air pump to the insufflation port of the trocar to increase the working space within the body cavity. Determination of sex and reproductive status would be recorded. In those instances where the sex of the fish is not readily apparent, a gonad biopsy would be taken.

Gonad Biopsy: In instances where the sex of the Atlantic sturgeon is not readily apparent following laparoscopy, gonad biopsies would be taken for histological evaluation and sex determination. A second small (~5mm) incision would be made midway between the first incision and the pectoral girdle on the lateral aspect of the body approximately 1cm dorsal to the ventral scutes. A second 5mm trocar would then be inserted through the new incision, followed by a laparoscopic biopsy instrument to biopsy the gonad material. The sample would be approximately 5mm in size (2-3g) and would be placed in a solution (e.g., 10% neutral, buffered formalin) for preservation. Upon completion of the biopsy, the body cavity and biopsy site would again be visually assessed to ensure that there was no obvious hemorrhaged or herniated tissue. The laparoscope and the two trocars would be removed from the body and the incisions would be closed with a single suture in a cruciate pattern using suture material.

Due to the increased risk of these procedures (laparoscopy and gonad biopsy), they would only be performed in a laboratory setting. However, gonad biopsies may be performed in the field if the researcher is also implanting an acoustic tag (Kahn and Mohead 2010).

Blood Collection: Blood collection in Atlantic sturgeon would be used for the purposes of finding evidence of endocrine disruption (e.g., presence of estrogenic compounds) or sex determination. Blood would be collected from the caudal veins by inserting a hypodermic needle perpendicular to the ventral midline at a point immediately caudal to the anal fin. The needle would be slowly advanced while applying gentle negative pressure with the syringe until blood freely flows into the syringe. Once a blood sample is collected, direct pressure would be applied to the site of to ensure clotting and prevent further blood loss (Stoskopf 1993). Blood volume, needle and syringe size would be dependent on fish weight, as presented below in Table 9. Each blood sample would be transferred directly or by common carrier to the CI or laboratory identified in the respective permit for diagnostic work.

Table 9. Needle and Syringe Sizes for Blood Collection Based on Fish Weight

Weight (g)	Sample Size (ml)	Needle Size (Gauge x Length)	Syringe Size (ml)
≤ 1000	2	22g x 5/8”	3
1000 - 2000	3	22g x 5/8”	3
> 2000	6	20g x 1”	6

Fin Ray Sectioning: Fin ray sections would typically be collected for age determination. A small section (~1 cm^2 notch), of the leading pectoral fin ray would be collected on an anesthetized fish. No other invasive procedure would be performed on fish undergoing fin ray sectioning. A sterilized hacksaw or bonesaw would be used to make two parallel cuts across the leading pectoral fin-ray, approximately 1cm deep and 1cm wide. The blade for the first cut is positioned no closer than 0.5cm from the point of articulation of the flexible pectoral base to avoid an artery at this location (Rien and Beamesderfer 1994, Rossiter et al. 1995, Collins 1995, Collins and Smith 1996). The second cut is made approximately 1cm distally (Everett et al. 2003, Fleming et al. 2003, Hurley et al. 2004, Hughes et al. 2005), where a pair of pliers is then used to remove the fin ray section. The sample is placed in an envelope and allowed to air-dry for several days or weeks and later it is cut into thin slices (usually about 0.5 to 2mm thickness) using a double bladed or jeweler’s saw (Collins et al. 2008). The sections are then mounted for reading using any number of materials including clear glue, fingernail polish, cytosel, or thermoplastic cement.

Scute/Apical Hook Sampling: Sampling would involve using an orthopedic bone cutter or small saw to collect 4-10 mm clips of the apical hooks. The scute samples would be preserved by drying in envelopes. Researchers have examined the wear patterns formed on the apical spines of sturgeon scutes in early life, so that they may determine juvenile sturgeon exposure to different water systems to determine the natal source. This proposal is based on sturgeon incorporating trace non-metabolizable rare elements into their hard tissues throughout development. The relative abundances of these elements are often unique to the geology of local watersheds (Kennedy et al. 1997). In some cases, hard tissues like vascular bone or keratinized structures continually resorb or shed during an individual’s life span. However, other hard structures, like otoliths (ear bones), teeth or some bone formed in the dermis, are not as metabolically active once formed and can serve as records of past elemental exposure (Campana and Thorrold 2001).

Gastric Lavage: Understanding foraging habits of Atlantic sturgeon can be accomplished by using gastric lavage to evacuate the stomach contents for analysis. Researchers would be using methods described by Haley (1998), Murie and Parkyn (2000), Savoy and Benway (2004), Collins et al. (2008), and Kahn and Mohead (2010). Other researchers have been previously authorized to conduct gastric lavage on shortnose sturgeon (e.g., File Nos. 1247, 15614, 1447, 1505) with no mortalities or apparent ill effects.

Atlantic sturgeon undergoing gastric lavage would be anesthetized with MS-222 or electronarcosis to relax the alimentary canal prior to the procedure. An appropriately sized flexible polyethylene tube would be passed through the sturgeon's alimentary canal (Table 10). Proper positioning of the tube in the stomach would be verified by feeling the tube from the fish's ventral surface. Stomach contents would then be removed by gently flooding the stomach cavity with water delivered from a low pressure hand pump. Food items dislodged from stomachs of sampled sturgeon would be collected with a sieve and preserved in 95% ethanol for later identification. Fish would recover within a floating net pen alongside the boat prior to release. The procedure, including anesthetizing, would take between seven to eleven minutes (Collins et al. 2008); no other invasive procedure would be performed on lavaged fish.

Table 10: Examples of appropriate size tubing for gastric lavage of Atlantic sturgeon

Atlantic Sturgeon Size Range (mm)	Outside Diameter (OD) of Tubing (mm)
250-350	1.90
350-1250	4.06
<1250	10.15

<u>Hydroacoustic Assessment/Sonar</u>: In recent years, remote imaging methods like side scan sonar, split beam sonar, and other similar technology have become useful tools for fisheries biologists. Dual frequency Identification Sonar (known as DIDSON), a high definition imaging sonar, was first developed for military uses, but has been applied in fisheries research (Burwen et al. 2010). The sonar can produce high quality images of fishes in dark or turbid water from echoes created as the fish pass through the beam. Fisheries biologists have used DIDSON to study fish behavior, monitor populations, and estimate fish size and abundance (Boswell et al. 2008). More recently researchers have applied DIDSON technology in sturgeon research; due to their distinct body shape, sturgeon can be distinguished from other fishes (Brundage 2006; Lori Brown, Delaware State Univ., pers. comm.). This imaging technique offers unique advantages to researchers, as it allows the opportunity to study sturgeon without capture.

2.2.1.3 <u>Summary of Specific Permit Requests</u>

In this section is discussed information specific to each permit application, providing more defined action areas, methodology and objectives. The applicants would be required to adhere to mitigation measures as highlighted in the standard conditions of their attached respective permits. The Take Tables for each application are located in Appendix 2 and maps for each of the Action Areas are included in Appendix 3.

<u>File No. 16526</u> (*Atlantic sturgeon of the Gulf of Maine):* Gail Wippelhauser, Ph.D. (PI) of the Maine Department of Marine Resources, in collaboration with scientists at other institutions, primarily the University of Maine, proposes to conduct studies on the Atlantic sturgeon population in the GOM DPS. The research would include determining movement patterns and rate of exchange between coastal river systems, characterizing the population structure (i.e., sex ratios, aging), and generating estimates of population abundance. The proposed action would involve several major river systems in Maine, including the Penobscot, Kennebec, Androscoggin, Merrimack and Sheepscot rivers. Smaller coastal rivers throughout Maine, New Hampshire, and Massachusetts would also be targeted. The applicant would use gill nets to capture juvenile and adult Atlantic sturgeon annually and D-nets to lethally sample

ELS annually. Atlantic sturgeon captured by gill nets, trammel nets, trawls, and beach seines would be measured, weighed, photographed, PIT tagged, Floy/T-bar tagged, tissue sampled; subsets of fish would additionally be boroscoped, apical spine sampled, blood sampled, anesthetized, fin ray sectioned, implanted with an internal telemetry tag, or fitted with an external telemetry tag. The applicant would use MS-222 as an anesthetic or on occasion, electronarcosis; see the application for further details. Not all Atlantic sturgeon would undergo all procedures. Annual incidental mortalities of Atlantic sturgeon over the life of the permit are being requested. This research would take place concurrently with authorized shortnose sturgeon research--Current Permit No. 1575-01 and 1595-04; issued. Please refer to Appendix 2, Table 1 for proposed take in the study area and allocated take in the DPS.

File No. 16323 **(***Atlantic sturgeon research in Connecticut waters and Long Island Sound):* Tom Savoy (PI) of the Connecticut Department of Environmental Protection proposes to monitor Atlantic sturgeon populations to determine behavior, movement and current status of the species in Connecticut waters (including the Connecticut, Thames, and Housatonic Rivers) and the waters of Long Island Sound. The applicant would use gill nets and trawls to collect juvenile and adult Atlantic sturgeon annually, and these would be measured, weighed, photographed, PIT and Floy/T-bar tagged, genetic tissue sampled, anesthetized and have a fin ray clipped for ageing analysis. Additionally, a subset of Atlantic sturgeon would be implanted with an internal sonic tag to assess movement patterns. This research would take place concurrently with authorized shortnose sturgeon research —Current Permit No. 15614; issued. Please refer to Appendix 2, Table 2 for proposed take in the study area and allocated take in the DPS.

File No. 16422 (*Determining the connectivity among fine-scale habitat-use within Atlantic sturgeon aggregation areas in the New York Bight DPS):* Keith Dunton (PI) of Stony Brook University School of Marine and Atmospheric Sciences proposes to examine movements of Atlantic sturgeon in oceanic habitat. The applicant would conduct an offshore bottom trawl survey off the coast of Long Island Sound and in the coastal waters of New York and New Jersey to the Delaware River in depths from 10-15m. Captured adult and sub-adult Atlantic sturgeon would be measured, weighed, Floy tagged, PIT tagged, anesthetized, and genetic tissue sampled. A subset of these would be implanted internally with acoustic tags; another sub-set would be fitted with external pop-up satellite tags. Additionally, some would be fin ray sampled and others would undergo gill biopsy, gastric lavage and blood sampling. Finally, some animals would have skin biopsies performed to sample a parasitic copepod. Atlantic sturgeon movement patterns in the marine environment are poorly understood, and by examining these movements, resource managers would be provided with valuable information. This research would not be anticipated to interact with shortnose sturgeon, and there is no existing shortnose sturgeon permit issued to the applicant. Please refer to Appendix 2, Table 3 for proposed take in the study area and allocated take in the DPS.

File No. 16436 (*Research and Monitoring of Atlantic sturgeon in the Hudson River Estuary):* Kathryn Hattala (PI) of the New York State Department of Environmental Conservation proposes to conduct research on Atlantic sturgeon within the Hudson River estuary. The applicant has divided the Hudson River into sections based on the proposed projects, and would perform different research activities in each section depending upon the research objectives and the life stage of sturgeon present there. The first project would be an abundance survey of juvenile Atlantic sturgeon in the Haverstraw Bay area of the Hudson River (mile 25-43). Juvenile fish would be captured by gill net, and measured, weighed, PIT tagged, dart tagged, and tissue sampled. A subset of these fish would also undergo gastric lavage to compare diet samples to those of shortnose sturgeon in the same area. To determine the characteristics of the adult Atlantic sturgeon stocks in the Hudson River, the second project would target adult fish further upriver (mile 60-115) where they would be taken annually by gill net, measured, weighed, PIT and dart tagged, and tissue sampled. Another subset would be annually fitted with an external telemetry tag. The third project would focus on generating a population estimate of age-1 Atlantic sturgeon using gill nets from mile 25 to 115. This project would take place for 3 years only. Juvenile Atlantic sturgeon per year would be measured, weighed, PIT and dart tagged, and tissue sampled. A subset of juveniles would also be fitted with an external telemetry tag. Generating population abundance estimates, characterizing feeding habits, and tracking movements of Atlantic sturgeon in the Hudson River would allow managers to make more informed decisions about the management of this species. Annual incidental mortalities of juvenile Atlantic sturgeon are being requested. This research would take place concurrently with authorized shortnose sturgeon research—Permit No. 16439. Please refer to Appendix 2, Table 4 for proposed take in the study area and allocated take in the DPS.

File No. 16438 (*Scientific research on Atlantic sturgeon in the Delaware River and Bay):*
Hal Brundage (PI) of Environmental Research and Consulting, Inc. proposes to study juvenile Atlantic sturgeon abundance, distribution, movement, habitat preferences and biology in the Delaware River and Bay. The applicant would capture juvenile Atlantic sturgeon using gill nets, trammel nets and trawls. Additionally, sturgeon eggs/larvae would be lethally collected using egg mats or epibenthic sleds in the upper portions of the Delaware River. Gill net, trammel net, and trawl sampling would occur in the tidal Delaware River from Artificial Island (rkm 79) to Trenton, NJ (rkm 215). Captured juvenile Atlantic sturgeon would be measured, weighed, photographed, genetic tissue sampled, PIT tagged, and Floy/T-bar tagged. A subset would additionally be anesthetized with MS-222 and internally implanted with a satellite tag. A sub-set of juvenile Atlantic sturgeon (not receiving satellite tags) would undergo laparoscopic procedures and be blood sampled. Another subset would be gastric lavaged. The applicant requests authorization for unintentional mortality of juvenile Atlantic sturgeon over the life of the permit. This research would take place concurrently with authorized shortnose sturgeon research — Current Permit No. 14604; issued. Please refer to Appendix 2, Table 5 for proposed take in the study area and allocated take in the DPS.

File No. 16507 (*Sturgeons in the Delaware Bay and coastal Delaware; identification of critical habitats, population assessment and migratory patterns):* Dewayne Fox, Ph.D., (PI) of Delaware State University proposes to collect adult and juvenile Atlantic sturgeon using gill nets in the waters of coastal Delaware. The research consists of three projects. Project 1 involves determining the location of Atlantic sturgeon spawning in the Delaware River; the applicant proposes to use egg mats to lethally collect early life stages, and also count and return a portion of those collected live to the river. Sampling for adults and sub-adults would also occur using gill nets in the waters off of coastal Delaware. These fish would be measured, weighed, PIT and T-bar tagged, genetic tissue sampled, anesthetized, and internally tagged with a sonic tag, and gonad biopsied. Project 2 would use side scan sonar (SSS) technology to provide estimates of relative density of sturgeon in the Delaware River. The applicant proposes to use SSS to count sturgeon species present, collect images of sturgeon species, and subsequently capture the fish to differentiate the species. Sturgeon would be measured, weighed, PIT and T-bar tagged, and genetic tissue sampled. Project 3 would establish a standardized fishery-independent sampling program in the Atlantic Ocean off of Delaware, targeting adult and juvenile Atlantic sturgeon using gill nets. Captured Atlantic sturgeon would be measured, weighed, photographed, PIT and T-bar tagged, and genetic tissue sampled; a subset would also be fin ray sampled and internally telemetry tagged. Pending funding, starting in Year Two, another subset would be tagged with pop-off satellite tags (PSATs). The applicant is also requesting shortnose sturgeon take, a request that is being processed separately. Please refer to Appendix 2, Table 6 for proposed take in the study area and allocated take in the DPS

File No. 16431 (*Delaware Division of Fish and Wildlife juvenile Atlantic sturgeon survey):* Matt Fisher (PI) of the Delaware Division of Fish and Wildlife proposes to capture juvenile Atlantic sturgeon annually via gill nets. Sampling would take place in the tidal Delaware River, primarily at Cherry Island Flats, Marcus Hook Bar and Marcus Hook Anchor (approximately river kilometer 119-122). All Atlantic sturgeon captured would be measured, weighed, photographed, PIT and Floy/T-bar tagged, genetic tissue sampled, and fin ray clipped. A subset would be implanted with an internal sonic tag, and a second subset would be gastric lavaged. The applicant requested unintentional sturgeon mortality over the life of the permit. The proposed research would focus on locating juvenile Atlantic sturgeon nursery habitat, characterizing feeding habits and age structure, and assessing movement patterns and habitat use in the Delaware River. This research would take place concurrently with authorized shortnose sturgeon research—Current Permit No. 14396, issued. Please refer to Appendix 2, Table 7 for proposed take in the study area and allocated take in the DPS.

File No. 16547 (*Atlantic sturgeon research in the Chesapeake Bay):* Albert Spells (RP) of U.S. Fish and Wildlife Service (USFWS, Virginia Fisheries Coordinator), in collaboration with researchers from USFWS, the Virginia Institute of Marine Science, the University of Maryland, and other regional sturgeon biologists, proposes to study Atlantic sturgeon in the Chesapeake Bay. The purpose of this research would be to evaluate the abundance of Atlantic sturgeon within the Chesapeake DPS; monitor the threats facing this DPS; establish population estimates, based on adult and juvenile mark recapture estimates as well as DNA assessments, within the primary tributaries within the DPS; monitor and evaluate sturgeon habitat within the Chesapeake Bay; and track movements of tagged sturgeon throughout the Bay, coordinating with researchers along the Atlantic Coast to share telemetry information. Sampling for adult and juvenile Atlantic sturgeon would take place in the Chesapeake Bay and major Maryland and Virginia tributaries — the James, York, Rappahannock, Potomac, Patuxent, Patapsco, Susquehanna, Choptank, Chester, and Nanticoke, Rivers. Atlantic sturgeon would be sampled using gillnets, trawls, trammel nets, fyke nets, trap nets, and pound nets. A sub-set of adults and juveniles would receive internal and external acoustic tags. The extent of the action area would be bounded at the mouth of the Chesapeake Bay by the Chesapeake Bay Bridge-Tunnel extending to the Susquehanna River. Research would be conducted in areas between the mouth and the uppermost impassible barriers, generally the fall line or dams. Annual incidents of Atlantic sturgeon mortality are anticipated. This research would potentially interact with shortnose sturgeon. Only one of the CIs possesses a shortnose sturgeon research permit (File No. 14176); however, this permit is issued only for research conducted in the Potomac River. Since File No. 16547 would be in effect over a larger geographic area, an incidental take provision would be necessary for potential takes of shortnose sturgeon when researching Atlantic sturgeon. Please refer to Appendix 2, Table 8 for proposed take in the study area and allocated take in the DPS.

File No. 16375 (*Presence, abundance, and distribution of Atlantic sturgeon in North Carolina rivers and estuaries):* Joe Hightower, Ph.D. (PI) of the North Carolina State University (Raleigh, NC) proposes to use telemetry to gain a better understanding of riverine and coastal movements of Atlantic sturgeon in the waters of North Carolina. Research would take place in two general regions: Albemarle Sound (including the Chowan and Roanoke Rivers and their tributaries) and the Cape Fear River basin (from Wilmington to rkm 97, including associated tributaries). The applicant would use gill nets to capture adult and juvenile Atlantic sturgeon, with take divided evenly between the two general sampling areas. Captured Atlantic sturgeon would be measured, weighed, photographed, PIT tagged, Floy/T-bar tagged, and tissue sampled. For the telemetry research Atlantic sturgeon would also be anesthetized and fitted with an internal telemetry tag. This research would take place concurrently with authorized shortnose sturgeon research—Current Permit No. 14759; issued. Please refer to Appendix 2, Table 9 for proposed take in the study area and allocated take in the DPS.

File No. 16442 (*Atlantic sturgeon scientific research in South Carolina rivers):* The South Carolina Department of Natural Resources (Bill Post, PI) proposes to assess Atlantic sturgeon presence, abundance, and distribution in South Carolina rivers. The proposed action area encompasses two distinct population segments (DPSs) (Carolina and South Atlantic), so the applicant requests takes for each DPS. The Carolina DPS would include the Santee-Cooper watershed (specifically the Santee and Cooper Rivers) and the Winyah Bay watershed (primarily the Great Pee Dee River, but also its tributaries: the Black, Waccamaw, Little Pee Dee, and Lynches rivers). Sampling in the South Atlantic DPS would occur in the Savannah River and the Ashepoo, Combahee, and Edisto rivers (collectively known as the ACE Basin watershed). The applicant would capture adult and juvenile Atlantic sturgeon using gill nets and trawls, and lethally capture early life stages using egg mats. Young of the year fish (<1 year old) would be captured using a trawl, and photographed, measured, and weighed. Adult and juvenile sturgeon would be measured, weighed, genetic tissue sampled, PIT tagged, and dart tagged. Selected juvenile and adult Atlantic sturgeon would also be gonad biopsied to determine sex and fitted with an internal acoustic tag. This research would take place concurrently with authorized shortnose sturgeon research—Current Permit No. 15677; issued. Please refer to Appendix 2, Table 10 for proposed take in the study area and allocated take in the DPS.

File No. 16482 (*Population dynamics and seasonal habitat use of Atlantic sturgeon in Georgia):* Doug Peterson, Ph.D., (PI) of the University of Georgia, proposes to quantify population dynamics and seasonal habitat use of Atlantic sturgeon in the rivers, estuaries and nearshore waters of Georgia. The proposed action area covers five main rivers: the Savannah, Ogeechee, Altamaha, Satilla and St. Marys. Sampling in the Savannah River would take place from the mouth to the Augusta diversion dam. Sampling in the Ogeechee River would occur from the mouth to river mile 150. The Canochee River, a tributary, would also be subjected to sampling, from its confluence with the Ogeechee to river mile 50. Sampling would occur in the entire length of Altamaha River (to river mile 215) and its tributaries, the Oconee River (from the confluence to the Sinclair Dam) and in the Ocmulgee River. The Satilla River would be sampled along its entire length, from the mouth upstream to river mile 150. Sampling would take place in the St Marys River from Kings Bay at the mouth, upstream to river mile 125. The applicant has divided the take activities between each of these five river systems. The applicant would sample for adult and juvenile Atlantic sturgeon using gill nets and trammel nets, as well as egg mats (or D-nets) to lethally collect eggs/larvae. In the coastal sections of rivers in early spring, drift gill nets would be fished. Anchored gill nets would be used from June to October, when not constrained by temperature condition limits, and fished up to 30 minutes. Captured Atlantic sturgeon would be measured, weighed, photographed, PIT and Floy tagged, tissue sampled; subsets would be anesthetized, fin ray sectioned, undergo laparoscopy, and implanted with an internal acoustic tag. Atlantic sturgeon incidental mortalities are being requested annually over the permit life. This research would take place concurrently with authorized shortnose sturgeon research—Current Permit Nos. 10037, 10115, and 14394; issued. Please refer to Appendix 2, Table 11 for proposed take in the study area and allocated take in the DPS.

File No. 16508 (*Identification and tracking of Acipenser oxyrinchus in the St. Marys Nassau, and St. Johns Rivers, Florida and Georgia):* Ken Sulak, Ph.D., (PI) of the U.S. Geological Survey, proposes to locate, characterize and track populations of Atlantic sturgeon in the Nassau, St. Marys and St. Johns rivers in Florida and Georgia. The applicant proposes to use side scan sonar (SSS) and gill nets to capture Atlantic sturgeon in each river. SSS would be employed to locate sturgeon in the river, and then drift or set gill nets would be deployed to capture the fish. Upon capture, Atlantic sturgeon would be measured, weighed, photographed, PIT and Floy/T-bar tagged, genetic tissue sampled, and fitted with an external telemetry tag. The applicant would then utilize a passive sonic array of receivers to collect data on Atlantic sturgeon movements. This research would potentially interact with shortnose sturgeon; however, because there is no existing shortnose sturgeon permit issued to the applicant, an incidental take provision would be necessary for potential takes of shortnose sturgeon when researching Atlantic sturgeon. Please refer to Appendix 2, Table 12 for proposed take in the study area and allocated take in the DPS.

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter presents baseline information necessary for consideration of the alternatives describing the resources affected by the alternatives, as well as environmental components affecting the alternatives if they were to be implemented. It is organized by biological environment, physical environment, and the social and economic environment. The Atlantic sturgeon, shortnose sturgeon, Atlantic salmon, and sea turtle descriptions are more detailed than other portions of the affected environment because the Proposed Action, capture and further research on Atlantic sturgeon, could result in takes of these protected species. Takes of marine mammals are not expected to take place in the Proposed Action. The effects of the alternatives on the environment are subsequently discussed in Chapter 4.

The proposed research activities would take place in state and federal waters across the East Coast of the United States, in multiple river systems estuaries and marine environments where Atlantic sturgeon are found. Where not specifically discussed in detail, much of the affected environment of Atlantic sturgeon and its life history information are incorporated by reference in this EA from the Status Review of Atlantic Sturgeon (ASSRT 2007) as well as other well documented sources to include the most up to date information on the species.

3.1 SOCIAL AND ECONOMIC ENVIRONMENT

Although economic and social factors are listed in the definition of effects in the NEPA regulations, the definition of human environment states that “economic and social effects are not intended by themselves to require preparation of an EIS.” However, an EIS or EA must include a discussion of a proposed action’s economic and social effects when these effects are related to effects on the natural or physical environment. The social and economic effects of the proposed actions mainly involve the effects on the people involved in the research, as well as any industries that support the research, such as suppliers of equipment needed to accomplish the research.

3.2 PHYSICAL ENVIRONMENT

3.2.1 Marine Protected Areas, Sanctuaries, Parks, or Historic Sites

Marine Protected Areas (MPA) are defined by Executive Order 13158 as: “any area of the marine environment that has been reserved by federal, state, tribal, territorial, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.” Examples of U.S.

MPAs occurring in the proposed action areas include, national parks and wildlife refuges, many state parks and conservation areas, and a variety of fishery management closure areas used to protect federal and state fisheries, including those established to recover over-fished stocks, protect by-catch species, or protect essential fish habitats (EFH). The actions described in this EA would not occur in a National Marine Sanctuary nor impact any National Marine Sanctuaries, so no consultation with the National Ocean Service (NOS) is required.

The following web site, http://www.mpa.gov/dataanalysis/mpainventory/mpaviewer/ provides detailed locations and descriptions of MPAs within each of the proposed action areas. As described, these areas have varying levels of access to recreational and commercial activities, seasonal protection levels and site specific management plans. However, most are managed for multiple uses, accessible year round, having few restrictions. In MPAs where there are clear restrictions on access, researchers would be required to be exempted by permits or letters of authorization from the local maintaining authority. Through this process, researchers would be made minimally aware of local restrictions established for the protected area; or else more formalized permits would be required having specific conditions in place guarding against adverse impacts to protected resources. In any circumstance, researchers would be responsible for obtaining permits, or complying with any other Federal, State, local, or international laws or regulations necessary when carrying out their actions. Because of the limited boating and netting activities proposed in these aquatic habitats by researchers, and the necessity to follow local MPA mandates and procedures, NMFS PR considers proposed studies would have very limited environmental impacts on these areas.

3.2.2 Essential Fish Habitat

Congress defined Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). The EFH provisions of the Magnuson-Stevens Fishery Conservation and Management Act offer resource managers means to accomplish the goal of giving heightened consideration to fish habitat in resource management.

EFH has been designated for federally managed fisheries existing at the mouths of rivers, estuaries and marine areas in each of the action areas. Details of the designations for federally managed species and each of their respective habitats in New England, Mid-Atlantic, or South Atlantic states can be found online at: http://www.nero.noaa.gov/hcd/list.htm and http://sharpfin.nmfs.noaa.gov/website/EFH_Mapper/map.aspx.

Methods in the applications for proposed Atlantic sturgeon research would include anchored gill and trammel nets, drift gill nets, pound nets, fyke nets, epibenthic trawls, larger otter trawls, beach seine nets, epibenthic sleds, D-nets, and egg collection mats. Activities potentially adversely affecting EFH identified by the NMFS Office of Habitat Conservation include: (1) disturbance or destruction of habitat from stationary fishing gear, (2) dredging and filling, agricultural and urban runoff, (3) direct discharge, and (4) the introduction of exotic species. Of these activities, it is the disturbance or destruction of habitat from fishing gear that is of most relevance to the proposed research. Substrates in the areas of proposed research generally consist of shallow mud bottoms, coarse textured sand substrates and some substrates consisting of rocks, oyster and marl, surfaces which would not likely be altered by the fishing gear described in the applications.

Therefore, NMFS considers potential for adverse impacts on EFH from proposed netting activities would be minimal, having no substantial impacts on the bottom substrate of rivers, coastal estuaries, and near-shore marine areas. Additionally, NMFS considers researcher's boats passing through and over the water column in rivers, estuaries and near shore coastal areas, would not adversely impact the physical environment, including any portion considered EFH. Thus, any impacts to EFH from such research netting activities would be short-term, resulting in minimal disturbances and no adverse effects. Nevertheless, of the gear types proposed, NMFS believes trawling would have moderately more impact on bottom structure and EFH than the other methods of sampling because of the potential drag by trawls on the substrate bottom. Therefore, the following information clarifies why NMFS does not anticipate significant impacts from trawling in near-shore marine areas.

Sampling using smaller epibenthic, otter and skiff trawls would take place in tidally influenced estuaries and up-river locations in research described in File Nos. 16526, 16323, 16438, 16547 and 16442. The trawl design proposed in File No. 16526 and 16442 is a 5.17m epibenthic trawl (referred to as a Missouri trawl); while the gear types proposed in the Connecticut River and estuary (File No. 16323) and in the Delaware River (File No. 16438) are 9.7m x 7.0m semi-balloon skiff trawl a 4.9 m otter trawl, respectively. These trawls would typically be operated while attached to typically a 20-ft johnboat equipped with a 25-40 hp outboard with 100 to 200 foot towlines, the length dependent on water depth (i.e., deeper water required longer towlines). The otter boards are 15-in high, 30-in long, and weigh 30 lbs each. A buoy is attached to a single 75–100-ft rope line fastened to the cod end of the trawl to assist in retrieval if the trawl became snagged. The trawling location and duration would be limited by water depths less than 0.5 m and bottom snags. The trawls would be manually deployed and retrieved, towed by powering boats in reverse (bow upstream) with continued movement downstream. A standard haul would be approximately 300 to 500 feet lasting approximately 10 to 15 minutes (Gutreuter et al., 1995). Trawling speed would vary between 2 to 3.5 knots, and the location of trawling would be monitored by using a Sounder/Global Positioning system to limit disturbance of the same substrate during a 24 hour period.

The riverine habitats in File Nos. 16526 (Maine Rivers) and 16323 (Connecticut Rivers) are characterized by highly dynamic systems with medium grain sands and mobile bedforms (sand dunes) moving downstream and greatly affected by freshets and other riverine flow fluctuations. Therefore, in these systems, trawling would have little long-term effect in such naturally changing habitat. In estuaries and other tidally influenced areas of these systems, sampling would take place in selected flat shallower areas, taking advantage of current movement and river bends. In other river systems, for example in File No. 16438 (Delaware River), File No. 16547 (Chesapeake Bay rivers) and in File No. 16442 (South Carolina Rivers), substrates for optimal trawling would be selected by carefully avoiding areas having snags and debris, along mudflats, submerged sand bars and sandy stretches, and locations at the mouths of small tributaries. Each area selected would be predetermined free of snags and debris so the disturbance of the bottom and the fish community would be minimized as much as possible.

Dovel and Berggren (1983) found such trawling was effective for collecting juvenile shortnose sturgeon with minimal impact to bottom substrate or EFH. The type of trawls described in the applications referred to above have been used by these applicants previously in their shortnose sturgeon research, and are now proposed for use in the same areas for Atlantic sturgeon research. When previously consulted about potential impacts of similar smaller types of trawling gear would have on EFH and bottom substrate, the NMFS Office of Habitat Conservation concurred with our opinion in each case that EFH would not be affected. In each of those previous permits, the effects of the small trawls on EFH was analyzed in the EA, and resulted in a finding of no significant impact (Permit Nos. 15614, 1549, 14604, and 15677). Similar results were experienced by researchers sampling shortnose sturgeon in the upper and lower Connecticut River, Housatonic River, Merrimack River, Delaware River, and in five South Carolina rivers (NMFS Permit Nos. 1549, Boyd Kynard PI; 1516, Tom Savoy PI; 1486; Hal Brundage PI; and 1505 William Post, PI; pers. comm.; May 2011).

With regard to impacts from trawling on EFH from sampling with larger otter trawls, sampling is proposed in File No. 16422 in the late fall and early spring in the near-shore marine and estuarine waters off Connecticut, New York, New Jersey, and Delaware. It is also proposed with identical gear in the lower Hudson River (File No. 16436). Trawling gear used would be a three to one two-seam trawl (headrope 25 m, footrope 30.5 m) with 12 cm forward netting stretch mesh tapering down to the 8cm rear netting. Trawl doors would be steel Thyboron Type II trawl door (6 ft. x 4 ft) and weighing approximately 739 lbs each; or wood doors with steel shoes (8 ft. x 4 ft.) weighing approximately 1000 lbs each.

This gear has been used for the last five years by Stony Brook University, New York, in coastal trawling off the New York and New Jersey coastlines with no apparent impact to bottom structure. The substrate type for this trawling is described by the USGS East-Coast Sediment Analysis (USGS 2000) as comprised of almost 100% sand. Since the impact of the mobile fishing gear on the sandy seabed would be related to both fishing intensity and frequency (Watling and Norse 1998; Auster and Langton 1999), both of these factors would be very low. Additionally, permit conditions would include: limiting tow duration (5 to 7 minutes, and up to 20 minutes), and limiting tow speed (2-3.5 knots). However, if a trawl net became snagged on bottom substrate or debris, it would be untangled immediately to reduce stress on the animals and bottom substrate. Also, to lessen benthic disturbances, trawl nets would not be towed over the same exact location more than once in a 24-hour period using a GPS system. Thus, NMFS PR expects long-term impacts to EFH from trawling methods to be negligible.

NMFS PR also considered what impacts sampling Atlantic sturgeon would have on bycatch of managed species, either as direct mortality from netting activities or indirectly by reducing a food source for another managed species. For example, the tidally mixed area of several river systems coinciding with the proposed netting activities have designated EFH for different life stages of potentially impacted species. Such species as winter flounder windowpane, summer flounder, juvenile and adult bluefish, and Atlantic sea herring, Atlantic butterfish, scup, and black sea bass and all life stages king mackerel, Spanish mackerel and cobia and others might potentially be affected by netting (http://www.nero.noaa.gov/hcd/nj2.html). Additionally, because anadromous fish (e.g., striped bass, American shad, alewife, blueback herring, etc.) use river sections for spawning, nursery, and migratory pathway, and because their resulting juvenile anadromous fish are an essential food source for managed species such as adult bluefish, any impact to these prey producing species would also be considered an adverse effect on EFH based upon the EFH rules.[3] However, as noted previously, nets would typically be checked at short intervals and it is believed most all bycatch would be released alive, producing minimal stress or mortality. Thus, direct or indirect impacts to EFH or managed species would be negligible.

3 The EFH final rule at 50 CFR Section 600.810 defines an adverse effect on EFH as "any impact which reduces the quality and/or quantity of EFH." The rule further states: “An adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.”

NMFS PR thus concludes from reviewing each research proposal that none of the sampling for Atlantic sturgeon would likely have adverse impacts on designated EFH, bottom substrate or prey species. The appropriate regional NMFS Offices of Habitat Conservation were contacted by email on September 2, 2011 requesting concurrence whether the proposed action, as it would be conditioned, would have minimal impacts or not on designated EFH in East Coast rivers or marine areas. Results of this informal consultation appear in Section 4.3.2.

3.2.3 Designated Critical Habitat

Critical habitat is defined in section 3(5)(A) of the ESA as (i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Affected critical habitat for the Proposed Action has been designated in marine and brackish waters for listed Atlantic salmon in the Gulf of Maine (GOM) (File No. 16526), and West Indian manatee (*Trichechus manatus*) in Florida marine, brackish and freshwater (File Nos. 16508 and 16482). Critical habitat for the North Atlantic right whale is also proximate to proposed research for File Nos. 16508 and 16482 in Florida/Georgia waters; no research activities are planned within right whale habitat. Instances where designated critical habitat overlaps with proposed action areas are described below.

3.2.3.1 Atlantic Salmon Critical Habitat:

Concurrent with a new June 19, 2009 endangered ESA listing designated for the Gulf of Maine DPS Atlantic salmon, NMFS and the USFWS defined critical habitat for Atlantic salmon (74 FR 29300). The critical habitat includes all anadromous Atlantic salmon streams whose freshwater range occurs in watersheds from the Androscoggin River northward along the Maine coast northeastward to the Dennys River, and wherever these fish occur in the estuarine and marine environment. For a full description of the Atlantic salmon critical habitat, see: http://www.nero.noaa.gov/prot_res/altsalmon/4%28b%29%282%29%20Report%20Final.pdf, which is hereby incorporated by reference.

The proposed Atlantic sturgeon research described in File No. 16526, including netting in the Penobscot River, and Kennebec complex, and in other rivers and estuaries, would occur in designated GOM Atlantic salmon critical habitat. Alternately, none of the planned netting and boating activities in File 16526 located south of the Kennebec complex (i.e., Saco, Merrimack and intervening coastal areas and rivers) would occur within the boundaries of Atlantic salmon GOM DPS or critical habitat. The potential impacts on designated GOM Atlantic salmon critical habitat and PCEs in the action area in File 16526 are discussed in Section *4.2.1.19* of this EA. Our conclusions were further analyzed by Atlantic salmon specialists at NMFS Northeast Regional Office of Protected Resources (Jeff Murphy and David Bean, Orono, Maine). Results of their analyses also appear in summation of Section *4.2.1.19*. (See also the biological opinion informing this EA (NMFS 2012)).

3.2.3.2 West Indian Manatee Critical Habitat

Research described in File Nos. 16508 and 16482 could occur in critical habitat designated for manatee existing in the St. Johns River and other Florida coastal waters. This critical habitat is described at:

http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A007 (41 FR 41914). The potential impacts of the proposed Atlantic sturgeon research on West Indian manatee critical habitat are discussed in Section *4.2.1.19* of this EA. Our conclusions were further analyzed by biologists at the USFWS North Florida Ecological Service Office (Nicole Adimey; Jacksonville, FL). Results of their analysis appear in summation of Section *4.2.1.19.* (See also the effects of the Proposed Action on manatee critical habitat in biological opinion informing this EA.)

3.3 BIOLOGICAL ENVIRONMENT

The affected biological environment contains state and Federal biological resources in U.S. East Coast rivers and coastal waters included in the Atlantic sturgeon's range (please refer to map in "Action Area"). In addition to the discussion below, please refer to the biological opinion prepared for the Proposed Action.

3.3.1 Proposed ESA Target Species Under NMFS Jurisdiction:

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) ESA Endangered and Threatened

NMFS PR considers the description of the Atlantic sturgeon population structuring and the recommended listing provided by the Biological Opinion informing this EA, the Atlantic sturgeon status review (ASSRT 2007), and the listing rules prepared by NMFS Northeast Regional Office (75 FR 61872) and by NMFS Southeast Regional Office (75 FR 61904) to contain the most complete information regarding the biological environment of Atlantic sturgeon. These sources outline each of the five distinct population segments (DPSs), characterizing them in terms of listing status, significant and discreet boundaries, taxonomy and life history, distribution and abundance, and threats to the species throughout its range.

These DPS designations are described as: (1) the Gulf of Maine (GOM) DPS (*Threatened* in freshwater ranges, and *Endangered* in saline ranges)[4]; (2) the New York Bight DPS (NYB) DPS (*Endangered*, including Atlantic sturgeon originating from the Hudson and Delaware Rivers); (3) the Chesapeake Bay (CB) DPS (*Endangered*, including Atlantic sturgeon originating from the James and York Rivers); (4) the Carolina DPS (*Endangered*, including all Atlantic sturgeon spawning in the watersheds from the Roanoke River, Virginia, southward along the southern Virginia, North Carolina, and South Carolina coastal areas to the Cooper River); and (5) the South Atlantic DPS (*Endangered*, including all Atlantic sturgeon spawning in the watersheds of the ACE Basin in South Carolina to the St. Johns River, Florida). Further, the marine range of Atlantic sturgeon was found to contain individuals mixed from each of the defined DPS's extending from the Bay of Fundy, Canada, to the Saint Johns River, Florida.

For more information on the status of the species in each DPS, see: http://www.nmfs.noaa.gov/pr/pdfs/fr/fr75-61904.pdf; http://www.nmfs.noaa.gov/pr/pdfs/fr/fr76-34023.pdf ; and http://www.nmfs.noaa.gov/pr/pdfs/statusreviews/atlanticsturgeon2007.pdf, and the Biological Opinion prepared for this EA.

3.3.2 Non-Target ESA Protected Species in the Action Areas:

In addition to the target species, other non-target protected species, with either threatened or endangered status, or species otherwise protected under the MMPA, can be found within the proposed action areas for Atlantic sturgeon research, including marine mammals, sea turtles, invertebrates, fish, and birds.

4 Proposed protective regulations for the GOM DPS of Atlantic sturgeon (Endangered and Threatened species status) can be found online at: http://www.nero.noaa.gov/nero/regs/frdoc/11/11GOMAtlanticSturgeonPR.pdf

However, merely being present within the action area does not necessarily mean an organism will be affected by the proposed action. The following summary in Table 11 and subsequent sections focuses on those listed species potentially affected by the proposed research activities.

Table 11. Non-Target ESA Protected Species in the Action Areas

Common Name	*Scientific Name*	*Listing*	*Agency*	*Listed Animals in Action Areas*
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	NMFS	All
Atlantic salmon	*Salmo salar*	Endangered	NMFS/FWS	16526
Smalltooth sawfish	*Pristis pectinata*	Endangered	NMFS	16-482 & 508
Green sea turtle	*Chelonia mydas*[1]	Endangered	NMFS/FWS	All
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	NMFS/FWS	All
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	NMFS/FWS	All
Loggerhead sea turtle	*Caretta Caretta*	Threatened[2]	NMFS/FWS	All
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	NMFS/FWS	All
North Atlantic right whale	*Eubalaena glacialis*	Endangered	NMFS	All
Finback whale	*Balaenoptera physalus*	Endangered	NMFS	All
Humpback whale	*Megaptera novaeangliae*	Endangered	NMFS	All
Blue whale	*Balaenoptera musculus*	Endangered	NMFS	All
Sei whale	*Balaenoptera borealis*	Endangered	NMFS	All
West Indian manatee	*Trichechus manatus*	Endangered	FWS	16-482,508,442&375
Wood stork	*Mycteria americana*	Endangered	FWS	16-482,508,442&375
Roanoke log perch	*Percina rex*	Endangered	FWS	16375
Dwarf wedgemussel	*Alasmidonta heterodon*	Endangered	FWS	16-323, 438 & 547

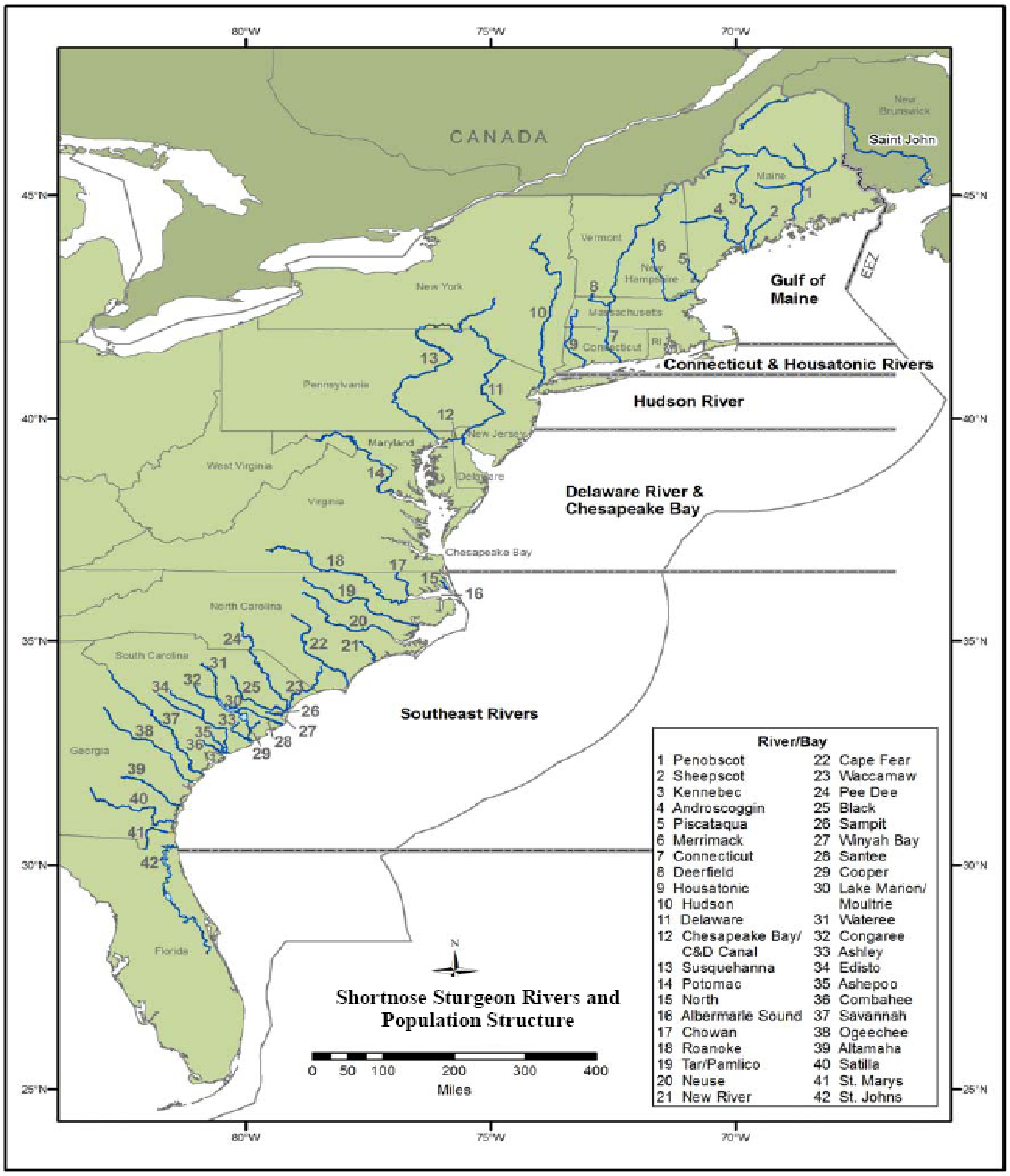
1. *Green turtles— in U.S. waters are listed as endangered wherever they occur due to the inability to distinguish between populations away from their nesting beach.*
2. *Loggerhead sea turtle— we note the distinction between the current listing for all DPSs (i.e. listed as threatened or endangered) from the Northwest Atlantic Ocean DPS (i.e. threatened). NMFS assumes loggerhead sea turtles affected within the action area would be expected to be members making up the threatened Northwest Atlantic DPS.*

3.3.2.1 Shortnose Sturgeon in the Proposed Action:

The shortnose sturgeon is anadromous, living mainly in rivers or nearshore marine waters, and migrating periodically into fresh water areas to spawn. The species was listed as endangered throughout its range in 1974 under the ESA (38 FR 41370). Critical habitat has not been established for shortnose sturgeon.

Species Description, Range-wide Distribution, and Population Structure. Shortnose sturgeon occur along the Atlantic Coast of North America, from the St. John River in Canada to the St. Johns River in Florida. The Shortnose Sturgeon Recovery Plan describes 20 shortnose sturgeon population segments that exist in the wild. Two additional geographically distinct populations occur behind dams in the Connecticut River (above the Holyoke Dam) and in Lake Marion on the Santee-Cooper River system in South Carolina (above the Wilson and Pinopolis Dams). Figure 2 below illustrates the rivers where shortnose sturgeon have historically been found.

Figure 2. Shortnose sturgeon rivers and population structure.

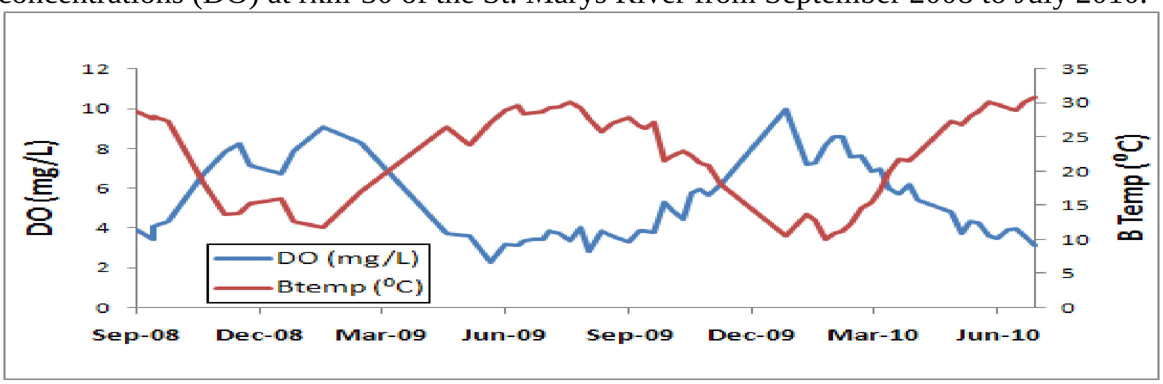


Although these populations are geographically isolated, genetic analyses suggest individual shortnose sturgeon move between some of these populations each generation (Quattro et al. 2002, Wirgin et al. 2005). At the northern end of the species' distribution, the highest rate of gene flow (which suggests migration) occurs between the Kennebec and Androscoggin Rivers. The Hudson River and Kennebec-Androscoggin River systems have the healthiest populations; however, each system continues to face significant threats.

According to Wirgin et al. (2005), at the southern end of the species' distribution, populations south of the Pee Dee River appear to exchange between 1 and 10 individuals per generation. Wirgin et al. (2005) also concluded the genetic components of sturgeon in rivers separated by more than 400km were connected by very little migration while rivers separated by no more than 20km (such as the rivers flowing into coastal South Carolina) would experience high migration rates. Other authors have suggested shortnose sturgeon populations in the extreme southern end of the species geographic range are extirpated. Rogers and Weber (1994), Kahnle et al. (1998), and Collins et al. (2000) concluded that shortnose sturgeon are extinct from the St. Johns River in Florida and the St. Marys River along the Florida and Georgia border. Rogers and Weber (1995b) also concluded that shortnose sturgeon have become extirpated in Georgia's Satilla River.

However, in recent surveys conducted on the Satilla and St. Marys Rivers between 2008 and 2010, researchers from the University of Georgia (Fritts and Peterson 2011) documented a small number of shortnose sturgeon in these rivers. In the Satilla, a total of 11 individuals were captured, tagged, and released after 683 nettings (134,100 net-meter-hrs). None of these fish were recaptured during the study. In the St. Marys River after 612 nets were set (150,400 net-meter- hrs), only one adult shortnose sturgeon (933 mm TL, 4000 g) was captured near rkm 39. Water quality data for the St. Marys River indicated that habitat for juvenile sturgeon was sub-optimal. Water temperatures in the St. Marys River remained above 30°C, while DO concentrations remain below 3.0 mg/l during much of the summer (Figure 3).

Figure 3. Mean monthly benthic water temperature (BTemp) and dissolved oxygen concentrations (DO) at rkm-30 of the St. Marys River from September 2008 to July 2010.



Fritts and Peterson (2011) concluded that growth and survival of juvenile shortnose sturgeon were likely hindered during summer months by hypoxic conditions in critical nursery habitats in these southernmost rivers, suggesting shortnose sturgeon populations are currently at, or near extirpation in the Satilla and St. Marys River systems. NMFS does acknowledge a severely depleted shortnose sturgeon population due to habitat degradation, the riverine habitat is still exists for both species and both species have been found in these rivers. Following in Table 12, the latest range-wide population estimates for the shortnose sturgeon is presented.

Currently, the distribution of shortnose sturgeon across their range is disjunct, with northern populations separated from southern populations by a distance of about 400 km near their geographic center in Virginia. Because of the large geographic separation distance, there may be no interchange of adults between these areas (Kynard 1997). However, shortnose sturgeon are known to occur in the Chesapeake Bay, and may be transients from the Delaware River via the Chesapeake and Delaware

(C&D) Canal (Skjeveland et al. 2000, Welsh et al. 2002) or remnants of a population in the Potomac River. Welsh et al. (2002) captured and tagged 13 shortnose sturgeon in the Chesapeake Bay and 26 in the Delaware River. A fish tagged in the Chesapeake Bay was subsequently detected in both the C&D Canal and the Delaware River, and two other individuals were detected in the C&D Canal. Lastly, one individual tagged in Chesapeake Bay was later detected in the Delaware River (Welsh et al. 2002).

Table 12 below outlines NMFS historical estimates for shortnose sturgeon populations across their U.S. Coast range.

Table 12. Estimated shortnose sturgeon population densities.

Population/ Subpopulation	Distribution	Datum	Estimate	Confidence Interval	Authority
Saint John River	New Brunswick ,CA	1973/1977	18,000	30%	Dadswell 1979
Kennebecasis River	Canada	1998 – 2005	2,068	801 - 11,277	COSEWIC 2005
Penobscot River	ME	2006 - 2007	1,049	673 – 6,939	Univ. Maine, 2008 SJ Fernandes - 2008
Kennebec River	ME	1977/1981	7,200	5,046 - 10,765	Squiers et al. 1982
		2003	9,500	6,942 - 13,358	Squiers 2003
Androscoggin River	ME		7,200	5000 -10,800	Squiers et al. 1993
Merrimack River	MA	1989 – 1990	33	18 - 89	NMFS 1998
Connecticut River	MA, CT	2003	-	1,500 - 1,800	Connecticut DEP 2003
		1998-2002	-	1,042 - 1,580	Savoy 2004
Above Holyoke Dam		1976 – 1977	515	317 - 898	Taubert 1980, NMFS 1998
		1977 – 1978	370	235 - 623	Taubert 1980, NMFS 1998
		1976 – 1978	714	280 – 2,856	Taubert 1980,NMFS 1998
		1976 – 1978	297	267 - 618	Taubert 1980,NMFS 1998
Below Holyoke Dam		1988 – 1993	895	799 – 1,018	Savoy and Shake 1992,
Hudson River	NY	1980	30,311		Dovel 1979, NMFS 1998
		1995	38,000	26,427 - 55,072	Bain et al. 1995, NMFS 1998
		1997	61,000	52,898 - 72,191	Bain et al. 2000
Delaware River	NJ, DE, PA	1981/1984	12,796	10,288 - 16,367	Hastings et al. 1987
		1999/2003	12,047	10,757 - 13,589	Brundage and O'Herron 2003
Chesapeake Bay	MD, VA	no data	-	-	
Potomac River	MD, VA	no data	-	-	
Neuse River	NC	2001-2002	extirpated		Oakley 2003, Oakley and Hightower 2007
Cape Fear River	NC	1997	>100		Kynard 1997,NMFS 1998

Winyah Bay	NC, SC	no data	-	-	
Waccamaw - Pee Dee River	SC	no data	-	-	
Santee River	SC	no data	-	-	
Lake Marion (dam-locked)	SC	no data	-	-	
Cooper River	SC	no data	-	-	
ACE Basin	SC	no data	-	-	
Savannah River	SC, GA		1-3,000		Bill Post, SCDNR 2003
Ogeechee River	GA	1990s	266		Bryce et al. 2002
		1993	266	236 - 300	Kirk et al. 2005
		1993	361	326 - 400	Rogers and Weber 1994
		1999/2000	195	-	Bryce et al. 2002
		2000	147	105 - 249	Kirk et al. 2005
		2004	174	97 - 874	Kirk et al. 2005
		2008	368	244-745	Kirk 2008 NMFS Ann. Report
Altamaha River	GA	1988	2,862	1,069 - 4,226	NMFS 1998
		1990	798	645 – 1,045	NMFS 1998
		1993	468	315 - 903	NMFS 1998
		2003-2005	6,320	4,387-9,249	DeVries 2006
Satilla River	GA		unknown	-	Kahnle et al. 1998
	GA	2008-2010	11captured		Fritts and Peterson 2011
Saint Marys River	GA/FL		unknown	-	Kahnle et al. 1998, Rogers and Weber 1994
	GA/FL	2008-2010	1 captured		Fritts and Peterson 2011
Saint Johns River	FL	2002	1 captured	-	FFWCC 2007

Captive Animals: In addition to these wild populations there are several captive populations of shortnose sturgeon contributing to the status of the species. One captive population is maintained at the Conte Anadromous Fish Research Center in Massachusetts operated by the USGS. These sturgeon were taken from the Connecticut River population and are currently held by Dr. Boyd Kynard under Permit No. 1549. The remainder of a captive population of shortnose sturgeon derived from the Savannah River population is held at Orangeburg National Fish Hatchery (South Carolina). The University of Florida (Gainesville, FL) has also shortnose sturgeon from the Savannah River for research purposes.

Life History Information: Shortnose sturgeon benthic omnivores, feeding on crustaceans, insect larvae, worms, and mollusks (Moser and Ross 1995, NMFS 1998), but they have also been observed feeding on plant surfaces and live bait (Dadswell et al. 1984). During summer and winter, adult sturgeon inhabit freshwater reaches of rivers reaches influenced by tides; as a result, they often occupy only short reaches of a river's entire length (Buckley and Kynard 1985). During summer, at the southern end of its range, shortnose sturgeon congregate in cool, deep, areas of rivers taking refuge from high temperatures (Flournoy et al. 1992, Rogers and Weber 1994, Rogers and Weber 1995b, Weber 1996). Juvenile shortnose generally move upstream during spring and summer and downstream for fall and winter; however, these movements usually occur above the salt- and freshwater interface (Dadswell et al. 1984, Hall et al. 1991). Adult shortnose sturgeon prefer deep, downstream areas with soft substrate and vegetated bottoms, if present. Because they rarely leave their natal rivers, Kieffer and Kynard (1993) considered shortnose sturgeon to be freshwater amphidromous (i.e. adults spawn in freshwater but regularly enter saltwater habitats during their life). Shortnose sturgeon in the northern portion of its range live longer than individuals in the southern portion its range (Gilbert 1989). The maximum age reported in the St. John River in New Brunswick is 67 years (for a female), 40 years for the Kennebec River, 37 years for the Hudson River, 34 years in the Connecticut River, 20 years in the Pee Dee River, and 10 years in the Delaware River (Gilbert 1989 using data presented in Dadswell et al. 1984). Males appear to have shorter life spans than females (Gilbert 1989).

Status and Trends of Shortnose Sturgeon Populations: Despite the life span of adult sturgeon, the viability of sturgeon populations is highly sensitive to juvenile mortality resulting in lower numbers of sub-adults recruiting into the adult breeding population (Anders et al. 2002, Gross et al. 2002, Secor et al. 2002). This relationship caused Secor et al. (2002) to conclude sturgeon populations can be grouped into two demographic categories: populations having reliable (albeit periodic) natural recruitment and those that do not. The shortnose sturgeon populations without reliable natural recruitment are at more risk. Several authors have also demonstrated that sturgeon populations generally, and shortnose sturgeon populations in particular, are much more sensitive to adult mortality than other species of fish (Boreman 1997, Gross et al. 2002, Secor et al. 2002). These authors concluded sturgeon populations cannot survive fishing related mortalities exceeding five percent of an adult spawning run and they are vulnerable to declines and local extinction if juveniles die from fishing related mortalities.

<u>Summary</u>: Based on the information available, most shortnose sturgeon populations in the northern portion of its range, from Delaware River north to the St. John River in Canada, appear to have sufficient juvenile survival to provide at least periodic recruitment into the adult age classes. Combined with relatively low adult mortality rates sufficient to maintain the viability of most of these populations, these populations appear to be relatively large and stable. The southern population, however, is characterized by meta-populations with its center in the Altamaha River system (Tim King; pers. comm., 2011), however, there are genetic differences expressed between river basins. The middle-range, between North Carolina and the Delaware River, is characterized sparse numbers of the species.

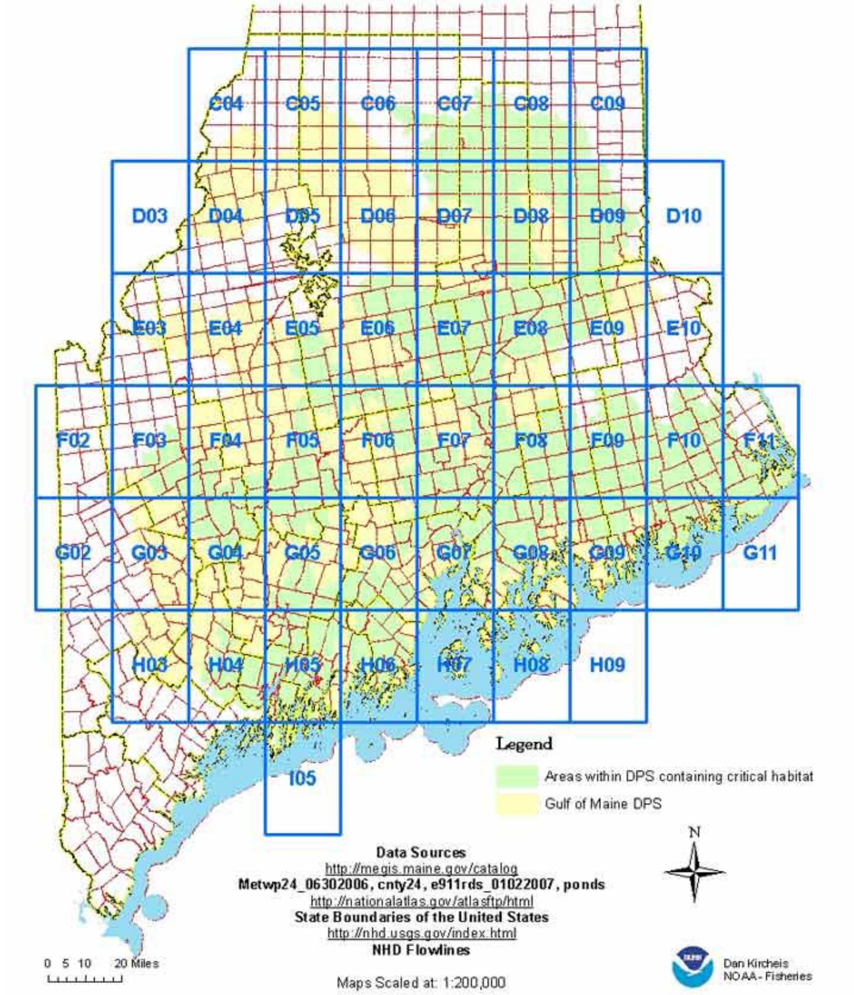
3.3.2.2 <u>Atlantic Salmon in the Proposed Action</u>:

The only one of the proposed Atlantic sturgeon research projects which would occur in areas where it might impact Atlantic salmon is File No. 16526, which would take place in brackish and estuarine waters of the Gulf of Maine (GOM). Although historically occurring over a wider geographic area, now only the Atlantic salmon GOM DPS is considered extant.

The Atlantic salmon GOM DPS was first listed as endangered by the USFWS and NMFS (collectively, the Services) on November 17, 2000 (65 FR 69459). More recently, the listing was refined by the Services (74 FR 29344; June 19, 2009) to include all anadromous Atlantic salmon whose freshwater range occurrs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, and wherever these fish occur in the estuarine and marine environment.

Based on overlapping ranges of habitat shared by Atlantic salmon and Atlantic sturgeon within GOM rivers and estuaries, NMFS PR concludes Atlantic sturgeon research methods proposed in File No. 16526 would likely have impacts on Atlantic salmon. Discussion of the effects of research in the GOM on Atlantic salmon and its critical habitat is included in Sections 4.2.1.18 and 4.2.1.19 of this EA and also in the Biological Opinion informing this EA. Figure 4 below depicts the GOM DPS for Atlantic salmon and the area containing critical habitat for the species.

Figure 4. Map depicting the boundaries and critical habitat for Atlantic salmon in the GOM DPS.



For more information about the status of Atlantic salmon in the GOM DPS, including distribution, habitat, population trends, and threats, please see http://www.nmfs.noaa.gov/pr/species/fish/atlanticsalmon.htm.

3.3.2.3 Smalltooth Sawfish in the Action Area:

The smalltooth sawfish U.S. DPS was listed as endangered under the ESA on April 1, 2003 (68 FR 15674). Critical habitat was designated in September 2009, composed of two units in south and southwestern Florida. These units are the Charlotte Harbor Estuary Unit, which comprises approximately 221,459 acres of habitat; and the Ten Thousand Islands/ Everglades Unit, which comprises approximately 619,013 acres of habitat. Smalltooth sawfish could occur in the action areas described for File No. 16482 and 16508 in the St. Marys River (Georgia/Florida) and the Nassau and St. Johns River (Florida).

Historic capture records of smalltooth sawfish within the U.S. ranged from Texas to New York, although peninsular Florida has historically been the U.S. region with the largest number of recorded captures and likely represents the core of the range (NMFS 2010). There is a resident reproductive population in south and southwest Florida from Charlotte Harbor through the Dry Tortugas which also serves as the last U.S. stronghold for the species (Seitz and Poulakis 2002; Poulakis and Seitz 2004; Simpfendorfer and Wiley 2005).

According to recent records, this species rarely occurs above northern Florida, the region encompassing the action area for File Nos. 16482 and 16508. The few sightings of sawfish that have occurred in those areas have been during spring and summer (May to August), when inshore waters reach higher temperatures. These individuals were typically large adults (over 10 feet), likely seasonal migrants, wanderers, or colonizers from the Florida core population to the south rather than being members of a continuous, even-density population (Bigelow and Schroeder 1953). Further, sub-optimal water temperatures and the lack of appropriate coastal habitat serve as the major environmental constraints that limit movements of smalltooth sawfish further north.

Given the species' effective range and reported limited distribution in northwest Florida, and given the measures incorporated into the researchers' methodology, NMFS believes that these factors are significant enough to reduce adverse affects to the smalltooth sawfish to the level that they are discountable. Therefore this species is not considered further in this EA.

For more information about smalltooth sawfish, including status, species description, habitat, population trends, threats, and the boundaries of its US DPS, please access http://www.nmfs.noaa.gov/pr/species/fish/smalltoothsawfish.htm.

3.3.2.4 Sea Turtles:

***Life History and Distribution of Sea Turtles*:**
The following information briefly summarizes the life histories and distributions of Green, Kemp's ridley, loggerhead, hawksbill, and leatherback sea turtles, species which could occur in action areas for the proposed Atlantic sturgeon research.

Green sea turtle: Green sea turtles are distributed around the world, mainly in waters between the northern and southern 20° C isotherms (Hirth 1997). The complete nesting range of the green sea turtle within the southeastern U.S. includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina and at the U.S. Virgin Islands (USVI) and Puerto Rico (NMFS and USFWS 1991). Principal U.S. nesting areas for green turtles are in eastern Florida, predominantly Brevard through Broward counties. Regular green sea turtle nesting also occurs on the U.S. Virgin Islands and Puerto Rico.

The green sea turtle was listed as threatened in 1978, except for the Florida and Pacific coast of Mexico breeding populations, listed as endangered. Critical habitat for the green sea turtle has been designated for the waters surrounding Isla Culebra, Puerto Rico, and its associated keys from the mean high water line seaward to three nautical miles (5.6 km). Key physical or biological features essential for the conservation of the green sea turtle found in this designated critical habitat include important food resources and developmental habitat, water quality, and shelter.

Kemp's ridley sea turtle: The Kemp's ridley has declined to its lowest population level since listing in 1970. As of yet, there is no designated critical habitat established. This species has a very restricted range relative to other sea turtle species. Kemp's ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico. Most of the population of adult females nests in this single locality (Pritchard 1969). 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). By the early 1970s, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The growing trend in total number of nests suggests that the adult nesting female population is about 7,400 individuals.

Although it appears that adult Kemp‘s ridley sea turtles are restricted somewhat to the Gulf of Mexico in shallow near shore waters, adult-sized individuals sometimes are found on the eastern seaboard of the United States and in North Carolina waters. Atlantic juveniles and subadults of this species travel northward with vernal warming to feed in the productive, coastal waters from Georgia to New England, returning southward with the onset of winter to escape the cold (Lutcavage and Musick 1985; Henwood and Ogren 1987; Ogren 1989). The Kemp’s ridley was listed as endangered on December 2, 1970. There is no designated critical habitat for the Kemp’s ridley sea turtle.

Loggerhead sea turtle: Loggerheads occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and inhabit continental shelves and estuarine environments. Developmental habitat for small juveniles includes the pelagic waters of the North Atlantic Ocean and the Mediterranean Sea. Adults have been reported throughout the range of this species in the U.S. and throughout the Caribbean Sea. Non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea; however, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season. Aerial surveys (TEWG 1998) suggest that loggerheads (benthic immature and adults) in U.S. waters are distributed in the following proportions:

54% in the southeast U.S. Atlantic
29% in the northeast U.S. Atlantic
12% in the eastern Gulf of Mexico
5% in the western Gulf of Mexico

The loggerhead was listed as a threatened species in 1978. Critical habitat has not been designated for the loggerhead. The recent loggerhead status review (Conant et al. 2009) concluded there are 9 loggerhead distinct population segments (DPSs). These include the North Pacific Ocean DPS; the South Pacific DPS; the North Indian Ocean DPS; the Southeast Indo-Pacific Ocean DPS; the Southwest Indian Ocean DPS; the Northwest Atlantic Ocean DPS; the Northeast Atlantic Ocean DPS; the Mediterranean Sea DPS; and the South Atlantic Ocean DPS. The information provided represents the most recent and available information relative to the status of this species. On September 22, 2011 NMFS formally designated the loggerhead with these nine DPS worldwide (FR 76 58868). Of these DPS, five are listed as endangered: Northeast Atlantic Ocean DPS, Mediterranean Sea DPS, North Indian Ocean DPS, North Pacific Ocean DPS and South Pacific Ocean DPS.

Leatherback sea turtle: Leatherbacks utilize both coastal and pelagic waters. In the western Atlantic, adults routinely migrate between boreal, temperate and tropical waters, presumably to optimize both foraging and nesting opportunities (Bleakney 1965; Lazell 1980). Leatherbacks are deep divers, with recorded dives to depths in excess of 1000 m (Eckert et al. 1989), but they may come into shallow waters if there is an abundance of jellyfish nearshore. Time and depth data recorded by Eckert et al. (1989) indicate that leatherbacks are night feeders.

The leatherback ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS 1995). Leatherbacks are distributed throughout the oceans of the world, found throughout the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972). Adult leatherbacks forage in temperate and subpolar regions in all oceans and undergo extensive migrations between 90 degrees N and 20 degrees S, to and from the tropical nesting beaches. In the Atlantic Ocean, leatherbacks have been recorded as far north as Newfoundland, Canada, and Norway, and as far south as Uruguay, Argentina, and South Africa (NMFS SEFSC 2001).

The leatherback was listed as endangered on June 2, 1970. Critical habitat includes waters adjacent to Sandy Point, St. Croix, U.S. Virgin Islands, up to and inclusive of the waters from the hundred fathom curve shoreward to the level of the mean high tide with boundaries at 17° 42'12" N and 65°50'00" W. Key physical or biological features essential for the conservation of the leatherback sea turtle found in this designated critical habitat include elements important for reproduction.

Hawksbill sea turtle: The hawksbill sea turtle occurs in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean, with representatives of at least some life history stages regularly occurring in southern Florida and the northern Gulf of Mexico (especially Texas); in the Greater and Lesser Antilles; and along the Central American mainland south to Brazil.

Within the United States, hawksbills are most common in Puerto Rico and its associated islands, and in the U.S. Virgin Islands. In the continental U.S., hawksbill sea turtles have been recorded from all the Gulf States and from along the eastern seaboard as far north as Massachusetts, with the exception of Connecticut, but sightings north of Florida are rare (Meylan and Donnelly 1999). They are closely associated with coral reefs and other hard-bottom habitats, but they are also found in other habitats including inlets, bays, and coastal lagoons. At least some life history stages regularly occur in southern Florida and the northern Gulf of Mexico (especially Texas); in the Greater and Lesser Antilles; and along the Central American mainland south to Brazil.

In Florida, hawksbills are observed with some regularity on the reefs off Palm Beach County, where the warm Gulf Stream current passes close to shore, and in the Florida Keys. Texas is the only other state where hawksbills are sighted with any regularity. Most sightings involve posthatchlings and juveniles. These small turtles are believed to originate from nesting beaches in Mexico.

The hawksbill sea turtle was listed as endangered under the ESA in 1970, and is considered Critically Endangered by the International Union for the Conservation of Nature (IUCN) based on global population declines of over 80% during the last three generations (105 years) (Meylan and Donnelly 1999). Critical habitat for the hawksbill sea turtle includes the waters surrounding the islands of Mona and Monito, Puerto Rico from the mean high water line seaward to 3 nautical miles (5.6 km). Key physical or biological features essential for the conservation of the hawksbill sea turtle found in this designated critical habitat include important foraging habitat, water quality, and shelter.

Sea Turtle Distribution in the Action Areas:

- ***Gulf of Maine DPS (File No. 16526):***

File No. 16526 (GOM including Maine Rivers, extending to Merrimack River, Massachusetts): Sea turtles in northeastern nearshore waters of the GOM are typically small juveniles with the more abundant species being the leatherback followed by the loggerhead and Kemp's ridley. Green sea turtles are not known to occur in Maine waters (NMFS 2007). Loggerhead turtles have also been found to be relatively abundant off the Northeast coast (from near Nova Scotia, Canada to Cape Hatteras, North Carolina) (NMFS 2007). Loggerheads and Kemp's ridleys have been documented in waters as cold as

11°C, but generally occur in warmer waters. These species are typically present in New England waters from June to October and are most common south of Cape Cod Bay. Leatherbacks are located in New England waters during the warmer months as well, but have been sighted off-shore in colder waters. Thus, while leatherback, loggerhead, and Kemp's ridley sea turtles may be seasonally present in the GOM, these species are not known to occur in the estuaries and rivers of the GOM where the planned research would occur. A large majority of fishing activities for Atlantic sturgeon in the GOM will be in upriver locations having little potential for turtle interaction. Although sea turtles could potentially be harmed by boating activities, researchers would follow established boating guidelines in the permit to avoid harming turtles. As such, NMFS PR concludes sea turtles in the action area of File No. 16526 may be affected; however, they are not likely to be adversely affected. As such, the applicant would be instructed in the permit to adhere to any standard or additional measures conditioned to avoid impacts to sea turtles (See Section *4.2.1.18 Effects on Sea Turtles*).

- ***New York Bight DPS (File No. 16323, 16422, 16436, 16431, 16507 and 16438)*:**

File No. 16323 (Connecticut Rivers and Long Island Sound (LIS): As in the GOM, sea turtles are not known to occur in upstream areas where the applicant would net for Atlantic sturgeon. However, in parts of Long Island Sound where the applicant has proposed trawling to sample Atlantic sturgeon, Kemp's ridley, loggerhead, and green sea turtles have been observed (Morreale et al. 1992). According to stranding data from Connecticut and Rhode Island from 1987-2001, leatherback sea turtles made up the majority (82.2%) of strandings, followed by loggerheads (15.8%), green (1.4%), and Kemp's ridley (0.7%) (Nawojchik and Aubin 2003). However, the topographical constriction to the entrance off Long Island Sound has led to relatively fewer sea turtle strandings in Connecticut waters in the Sound rather than Rhode Island (Nawojchik and Aubin 2003). According to the applicant, no sea turtles have been captured in more than 20 years of sturgeon sampling within the action area.

Although there is some limited potential for interactions during boating activities, there is overall a low probability of sea turtle interaction based on available information of sea turtle stranding, sightings within the action area, and the applicant's experience. Thus, combined with the mitigation conditions set forth in the permit in File No. 16323, whereby researchers would be instructed to adhere to any standard or additional measures for avoiding impacts to sea turtles, NMFS believes sea turtles may be affected, but would not be adversely affected by the proposed sampling (See Section *4.2.1.18Effects on Sea Turtles*).

File No. 16422 (Marine Waters of CT, NY, NJ and DE): Four species of listed sea turtles may be found seasonally in coastal waters of Connecticut, New York, New Jersey and Delaware (Morreale et al. 1992). Sea turtles are expected to be in the action area in warmer months, typically when water temperatures are greater than 18°C (Morreale et al. 1992 and Mansfield 2009). The highest concentrations of sea turtles would be present from June to October. Sea turtles in these nearshore waters would likely be small juveniles, and the most abundant loggerheads followed by the Kemp's ridley. Additionally, green and leatherback sea turtles may also be found in these waters during the summer.

Several studies have examined seasonal distributions of sea turtles in northern Atlantic coastal waters documenting seasonal movements of sea turtles between northern and southern habitats. The southward migration in the fall is thought to be triggered by abrupt water temperature change occurring in October causing turtles to depart northern inshore habitats and begin a southern migration. In 2002 and 2003, Morreale (2003) conducted a study of loggerhead, Kemp's ridley and green sea turtles captured in October, finding sea turtles scarce after the last week in October; and in the first week in November turtles were found located south of the Virginia border. Similar migratory patterns are expected for green and leatherback sea turtles (Shoop and Kenney 1992; Morreale 1999). As water temperatures warm in the spring, sea turtles begin to move northward by May in Virginia waters and by late June some have been documented in New York.

Previous trawl surveys conducted by the applicant off of Long Island, NY (512 bottom trawls) using the same proposed vessel and gear, resulted in no captures or other interactions with sea turtles. The median temperature of this trawling activity was 14.0°C recorded for the fall season (October 10 - November 15) and 9.4°C (May 1 - June 15) for the spring. However the New Jersey Department of Environmental Protection, while conducting 21 years of ocean trawl sampling since 1988 with similar (and same) vessel and trawling gear type, captured nine sea turtles (8 loggerheads and 1 leatherback) in approximately 3,612 bottom trawls. However, these animals were captured in multiple trawls conducted during the summer and warmer months when sea turtle interactions in the action area were more common (K. Dunton; pers. comm., 2011). As described in the permit application for File No. 16422, sampling would occur in the fall between October 10 and November 15 and in the spring between May 1 and June 15 of each year when turtles would be less commonly present due to temperature intolerances.

Based on the available information regarding sea turtle distribution in these waters during spring and fall, and the applicant's record of avoiding sea turtle interaction using the same gear over the last five years, NMFS believes sea turtles would not be adversely affected by the proposed sampling in File No. 16422. The applicant would be instructed to adhere to any permit conditions for avoiding impacts to sea turtles (See Section *4.2.1.18Effects on Sea Turtles*).

File No. 16436: (Hudson River Estuary: New York Harbor to Troy, NY): Kemp's ridley, loggerhead, and green sea turtles have been observed in Long Island Sound located to the north of the Hudson River mouth. However, all five species of ocean-going turtles may be found in New York coastal waters from time to time (Morreale et al. 1992). Until recently, however, there have been very few occurrences of any sea turtles venturing into the lower Hudson estuary (NYSDEC 2010; and K. Hattala, NYSDEC; pers. comm.; 2011).

The Riverhead Foundation, the marine mammal and turtle stranding network for the lower Hudson, received a report of a stranded Kemp's ridley sea turtle on the beach at Verplanck (Hudson River Mile 45). The carapace was marked by the strike of a propeller that went through the full thickness of the carapace and was most likely the cause of death. However, this is the only the second record of a sea turtle recovered in the lower Hudson (NYSDEC 2010). In this same area, the applicant would conduct only limited dispersed sampling for Atlantic sturgeon and boating activities. Also, according to the applicant, while sampling shortnose and Atlantic sturgeon in the action area of Hudson River during the last thirty years, no sea turtles have been observed or captured in netting (K. Hattala, pers. comm., 2011).

Thus, sea turtles are not likely to be taken in the proposed research for Atlantic sturgeon in the Hudson River. Although sea turtles could potentially be harmed by boating activities of researchers while in transit to sonic receiver stations at coastal locations when turtles are present, researchers would follow established boating guidelines in the permit to avoid harming turtles. Therefore, based on the history of limited sea turtle interaction while netting in the lower Hudson, NMFS PR concludes sea turtles may be affected, but are not likely to be adversely affected. The applicant in File No. 16436 would be instructed in the permit to adhere to any standard or additional measures conditioned to avoid adverse impacts to sea turtles (See Section *4.2.1.18 Effects on Sea Turtles*).

File Nos. 16431 & 16438 (Delaware River Estuary): Four species of sea turtles have been reliably documented within Delaware waters from early June to late October in the form of strandings, sightings, incidental capture, and targeted capture (Stetzar 2002). Loggerhead sea turtles are the most commonly encountered, followed by juvenile Kemp's ridley and more rarely, juvenile green turtles. There have been no verified reports of hawksbill within Delaware waters. Closest to the proposed netting proposed in Delaware Bay in File Nos. 16431 and 16438 (Artificial Island at rkm 79), Kemp's ridley, loggerhead, and green sea turtles were recorded taken during the summer on the trash racks of the Salem and Hope Creek Nuclear Generating Stations (Stetzar 2002). A total of 2 green, 23 Kemp's ridley and 60 loggerhead sea turtles were captured at the intakes. Additionally, the applicants pointed out that during extensive gill netting and trawling over 30 years, they had not captured or interacted with sea turtles, nor had they heard of any other fishery researchers working in the river collecting one (H. Brundage; *pers. comm*., M. Fisher; *pers. comm*.). Likewise, interviews with other local researchers confirmed the lack of interaction during fisheries sampling within the applicant's action area (D. Fox; *pers. comm*.).

As described previously, the applicant in File No. 16431would focus on a narrow range in the Delaware River gill netting juvenile Atlantic sturgeon above the salt wedge, at Cherry Island flats (rkm 119) to Marcus Hook Bar (rkm 122). This area is outside the confirmed range of sea turtles. With respect to activities in File No. 16438, the applicant proposes to sample for juvenile Atlantic sturgeon using small otter trawls in the tidal Delaware River from rkm 79-215, in the area upstream of sea turtle sightings. However, based on the historical record of turtle interaction suggesting sea turtle interaction is not likely in locations proposed in both File Nos. 16431 and 16438, NMFS PR believes the probability of affecting a sea turtle in these action areas would be minor but possible, but also would be not likely to cause adverse affects. The applicants would be instructed in respective permits to adhere to any standard or additional measures conditioned to avoid impacts to sea turtles (See Section *4.2.1.18 Effects on Sea Turtles*).

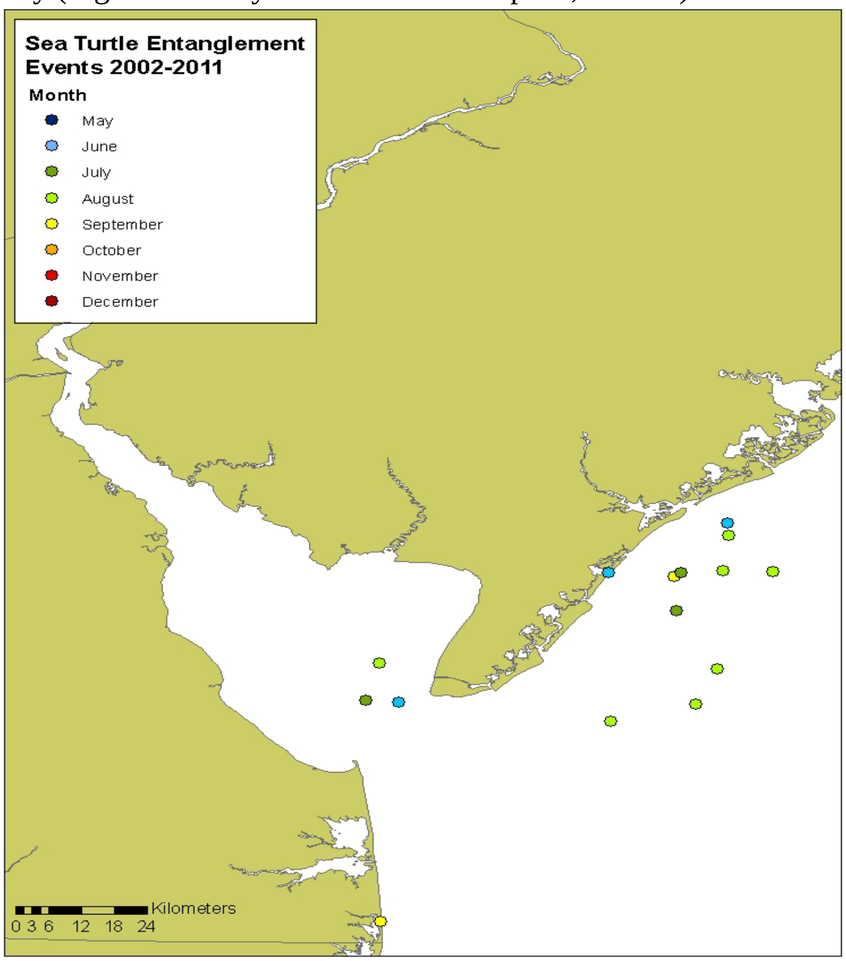
File No. 16507 (Delaware River Estuary and Coastal Waters): The four species of sea turtles reported most often from these areas include loggerhead, leatherback, Kemp's ridley, and green sea turtles. These sea turtles have been reliably documented in the coastal marine and estuarine waters off New Jersey and Delaware from early June to late October by strandings, sightings, incidental capture, entanglements, and targeted capture (Stetzar 2002).

The vast majority of the strandings in New Jersey have occurred between June and October, coincident with the seasonal movements of juveniles and subadult sea turtles along the Atlantic coast. Loggerheads were the most commonly stranded turtle, comprising about two-thirds of the strandings in New Jersey between 1977 and 2004. Kemp's ridleys and leatherbacks were less common (5.4 and 26%, respectively). Less than 2% of the reported strandings were green sea turtles (Schoelkopf 1994). These numbers are similar to the trends observed at other locations along the Atlantic Coast (TEWG 2000; Boettcher 2000; STSSN 2004).

As described in File No. 16507, the applicant would collect adult and large juvenile Atlantic sturgeon with gill nets within the Delaware Estuary and in Delaware coastal waters beginning in late March and concluding by early May. The applicant would also initiate coastal sampling again starting no earlier than October 15 and concluding by December 15.

As illustrated in Figure 5 below, sea turtle entanglement reported from 2002 to 2011 in waters off the Delaware Bay supports our conclusion that sea turtles would less likely be present when netting would occur due to lower water temperatures. Additionally, fewer turtle entanglements are recorded at points further up the river, thus researchers would be less likely to encounter sea turtles there.

Figure 5. NMFS sea turtle disentanglement network record near the Chesapeake Bay (Figure courtesy of Kate Sardi Sampson, NOAA)



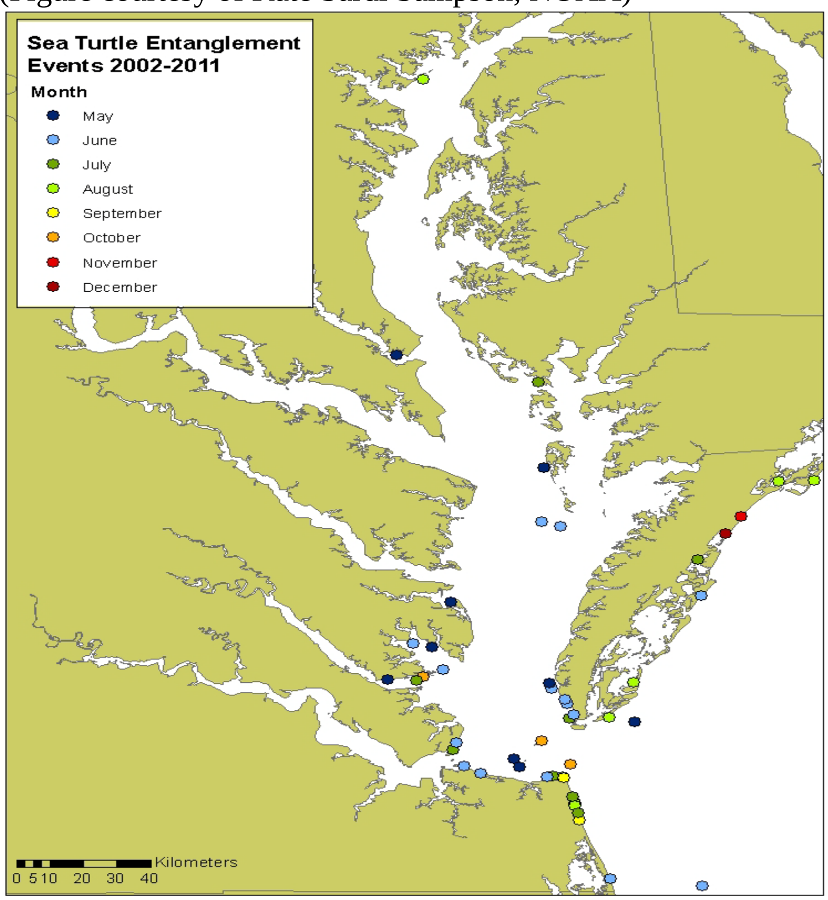
During early spring and late fall, File No. 16507 also proposes netting in the Delaware River (rkm 79-128) upstream of where turtles have been reported. NMFS PR believes encounters with sea turtles in for this portion of the project to be rare, but in the event that it did occur, would not likely cause adverse affects. The applicant would be attending nets and would be instructed in the permit to adhere to any standard or additional measures conditioned to avoid adverse impacts to sea turtles (See Section *4.2.1.18 Effects on Sea Turtles*).

***Chesapeake Bay DPS (File No. 16547)*:**

File No. 16547 (Chesapeake Bay and Tributaries): The sea turtle population has declined substantially in the Chesapeake Bay over the last twenty years. Aerial surveys conducted in the 1980s estimated 6,500-9,000 sea turtles in the lower Chesapeake Bay alone. More recent estimates from 2001-2004 indicate a 65%-75% decline in sea turtle populations in the Chesapeake Bay (between 2,500-5,500 turtles) (Mansfield 2006).

Stranding and aerial survey data indicate yearly migrations north into the Chesapeake Bay are strongly associated with vernal warming with the greatest concentrations of sea turtles found south of the 18°C isotherm (Mansfield 2009). The Maryland Department of Natural Resources has documented loggerhead, Kemp's Ridley, leatherback, and green sea turtle use of the Chesapeake Bay during summer months (Kimmel et al. 2008). In the Chesapeake Bay, the area of highest density of sea turtles occurs within the mouths of tributaries (Mansfield et. al. 2009). When water temperature cools in the early fall (September to October), turtles begin an abrupt migration southward (Lutcavage and Musick 1985; Byles 1988; Keinath 1993). Thus, sea turtles have a limited residency in the spring and summer (typically May through October) in the Chesapeake Bay, followed by a non-residency in the fall and winter (November to May). Communications with sea turtle specialists at NMFS Northeast Regional Offices and NMFS HQ revealed that sea turtles are more common in the lower portions of the rivers and near the mouth of the Chesapeake Bay during the summer where water is still at a higher salinity, and occur less often farther up the rivers and northward in the Bay (See Figure 6 below).

Figure 6. NMFS sea turtle disentanglement network record in the Chesapeake Bay (Figure courtesy of Kate Sardi Sampson, NOAA)



In File No. 16547, the applicant requested multiple types of sampling methods for different locations across the action area, each of which with the potential to impact turtles differently. One proposed project in the James River would target sub-adult and adult Atlantic sturgeon in upriver locations between April-September. These nets would be fished at or above the head of tide in maximum salinity of 15 ppt between river kilometers 25 and 60. Adults would also be targeted in the freshwater spawning areas to document spawning. Because this portion of the action area would be outside the range of sea turtles which may be arriving from the Chesapeake Bay, sea turtles would not likely be encountered in this project.

Elsewhere, trap nets —pound nets, hoop nets and fyke nets— would be used in the Bay and tributaries where legalized by the states of Maryland and Virginia, but would only be deployed in accordance with state guidelines designed to avoid interaction with sea turtles. Specifically, gear would only be used between December and April, when temperatures are expected to be well below 15°C; thus, these gears would not likely interact with sea turtles.

Another aspect of the proposed research having the potential to impact sea turtles would include the year-round sampling for juvenile Atlantic sturgeon using anchored and drift gillnets in coastal tributaries within 20 km of the Chesapeake Bay and within sounds of the Bay. During the summer months, NMFS believes this activity would likely encounter sea turtles. Captured animals, including sea turtles, would easily be detected when using drift nets because captured animals would either surface or their swimming would sink part of the net. If this occurred, the researchers would immediately retrieve the "sunken" section of the net, removing the entangled animal. Researchers would also be directed by permit conditions to watch for sea turtles on the surface and quickly remove nets if any were observed. Though sea turtles may be taken with drift nets, NMFS does not anticipate incidental mortality.

Use of anchored gill nets is also proposed between June and September of each year in downstream (≤ 20 rkm) Chesapeake Bay tributary locations. To mitigate serious harm or mortality to sea turtles when fishing below rkm 20 of Bay tributaries at water temperatures >15°C, anchored gill nets will be attended and checked in 30 minute intervals.

In light of the above information on turtle distribution in the Chesapeake Bay system, and the spatial and temporal schedule of sampling, NMFS believes sea turtles may be affected by portions of the proposed activities. As indicated by the biological opinion produced for the Proposed Action, NMFS anticipates up to 2 total incidental takes of sea turtles annually, including: 2 loggerheads, or 1 loggerhead PLUS 1 green, OR 1 leatherback, OR 1 hawksbill, OR 1 Kemp's ridley, over the course of the proposed permit in File No. 16547. However, incidental takes would be expected to include only capture responses ranging from very mild short-term stress to short term minimal injury from net gear. No mortality or severe harm would be anticipated or authorized in the sampling. The applicant would also be instructed in the permit to adhere to any standard or additional measures conditioned for avoiding adverse impacts to sea turtles (See Section *4.2.1.18 Effects on Sea Turtles,* and also the biological opinion informing this EA).

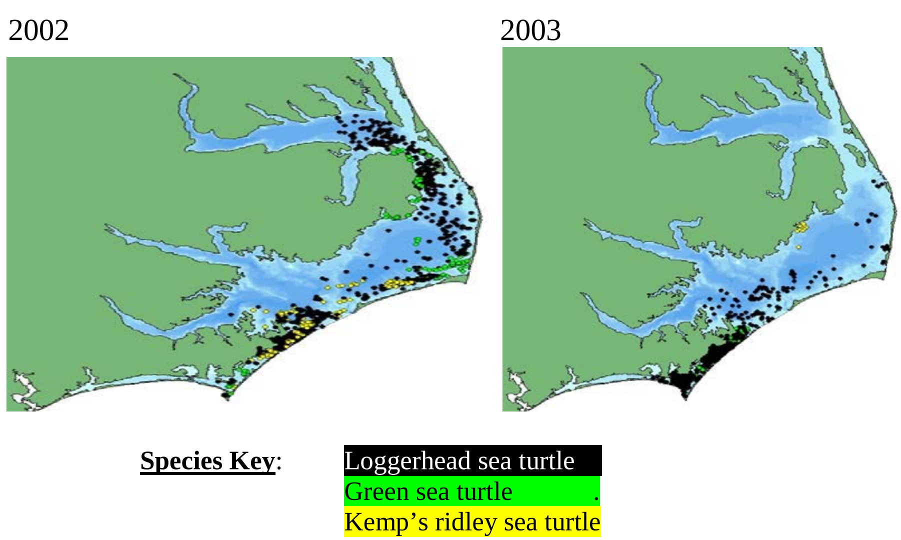
- ***Carolina DPS (File Nos. 16375 and 16442)***

***File No. 16375 (Albemarle Sound and its tributa**ries and Cape Fear River)**:*
The boundary for proposed action area in North Carolina waters can be found at: http://maps.google.com/maps/ms?ie=UTF8&hl=en&oe=UTF8&msa=0&msid=110136104058063386946.00048164b43be6240e008.

Five species of sea turtles under NMFS jurisdiction have been documented in North Carolina waters. However, occurrences of the hawksbill sea turtle are very rare within the action area of the Albemarle Sound or Cape Fear River due to their preferred feeding habits on sponges and corals (not abundant in North Carolina waters). Also, leatherback sea turtles have been documented in the lower Cape Fear River, though they prefer more off shore waters (J. McNeill, *pers. comm*. email 5/21/10). Because green, Kemp's ridley and loggerhead sea turtles graze on sea grasses and algae, they are more abundant in the both the sounds and in the lower Cape Fear River where those food sources can be found. Due to their abundance in the area, loggerhead, green and Kemp's ridley sea turtles are considered as more likely to be impacted by the proposed research in the Albemarle Sound and the Cape Fear River (Epperly et al. 1995, McClellan 2009).

Results of turtle tracking in North Carolina: While mark-recapture programs and sightings data offer indirect evidence of the movements of sea turtles, satellite telemetry on turtles in North Carolina waters has provided more detailed information of turtle movement (NCDMF 2006, Snoddy 2009). Beginning in 2002, satellite telemetry was employed to track the movements of loggerhead, green, and Kemp's ridley sea turtles to examine their interactions with fishing nets in Pamlico Sound, (NCDMF 2006). Figure 7 below depicts seasonal cumulative location data for satellite tagged sea turtles between 2002 and 2003. Subsequent studies yielded similar results (McClellan 2009).

Figure 7. Map of estuarine locations of sea turtles displaying cumulative satellite tracking data of three species of sea turtles in the North Carolina Sounds seasonally between 2002 and 2003 (NCDMF 2006; McClellan 2009).



Results of turtle telemetry studies in Albemarle Sound indicate sea turtles extend their range westward (typically during the summer) approximately to the mouth of Alligator River — the eastern most range of proposed sampling— and leave the area beginning in late summer and early fall as temperature declines (15°C). Most turtles moving into the sounds concentrate in the northern and southern Pamlico, and also found in high concentrations in Bogue and Core Sounds (Carteret County). Turtles migrate out of the sounds between September and December, most leaving in November (McClellan 2009). Based on five years of tracking, Dr. McClellan (*pers. comm*., email 4/24/2010) suggested it would be rare for turtles to venture far into the Alligator River, or further west in Albemarle Sound.

In the Cape Fear River system, juvenile loggerhead sea turtles use the estuary as seasonal foraging habitat in the summer (Joanne McNeil (NMFS SEFSC; pers. comm.). Snoddy (2009) documented seasonal movements of green and Kemps ridley sea turtles in the Cape Fear River estuary with satellite telemetry. Turtle movement was limited to the lower river area (32 – 39ppt) at rkm 25 (downstream of Wilmington, North Carolina at rkm 45).

Proposed netting and seasonal sampling in North Carolina waters: To avoid impacts with sea turtles in Albemarle Sound, researchers would follow similar seasonal netting practices by the North Carolina Department of Marine Fisheries (NCDMF, M. Loeffler, *pers. comm*., email April 2010) since 1995. These measures were adopted in annual striped bass survey to avoid sea turtles, and since then, no turtles have been captured. These practices would be incorporated into the permit and amended to include two seasonal sampling periods in the Albemarle Sound. Spring sampling would be permitted in the western Albemarle (Mar-May) when water temperatures are 12°C - 25°C. Western boundaries would include an area 6 km downstream of the mouth of the Roanoke River (including Bachelor Bay) and 6 km downstream of the mouth of the Chowan River (below Hwy 17 Bridge). Fall/Winter sampling (Nov to Feb) would take place in the eastern areas of Albemarle Sound when water temperatures are 0-18°C. The eastern boundary for netting extends westward from a north-south line crossing the Albemarle Sound at Point Harbor, NC (Currituck County) to Mashoes, NC (Dare County), near the mouth of the Alligator River, to the previously described western boundary.

Areas of netting proposed in the Cape Fear River, would begin at Wilmington (rkm 45) extending upstream to freshwater areas. In previous studies by the NCDMF and UNCW over the past eleven years, no turtle interactions have taken place in this area of the Cape Fear River (NCDMF, M. Loeffler, pers. comm., email 4/2010).

In light of the applicant having no record of sea turtle interactions in the Albemarle Sound, or in freshwater areas of the Cape Fear River using similar sampling methods since 1995, NMFS PR believes interaction with sea turtles in File No. 16375 would be possible but very minimal. Any encounters may affect, but would not likely cause adverse effects to sea turtles. The permit would instruct the applicant to adhere to standard or additional measures for avoiding adverse impacts to sea turtles (See Section *4.2.1.18 Effects on Sea Turtles*).

File No. 16442 (Santee, Cooper and Winyah Bay System, South Carolina): File No. 16442 is divided between proposed research in the Carolina DPS (Santee, Cooper and Winyah Bay system), and the South Atlantic DPS (ACE Basin and Savannah River). A map of the action area can be found at: http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=113286167511014551758.00048f4724bacf8629924&ll=32.852678,-80.19702&spn=1.68432,2.469177&t=h&z=9.

Five species of sea turtles have been documented in South Carolina near shore waters including loggerhead, Kemp's ridley, leatherback, green and, rarely, hawksbill sea turtles. These species graze on sea grasses and algae in coastal environments (estuaries, bays and inter-coastal waterways), away from proposed research areas in upriver locations. To avoid interactions during boating activities, researchers would be instructed to follow boating guidelines to prevent harming turtles. Because netting and trawling activities are proposed in upstream river locations where few sea turtles have been documented, NMFS PR believes sea turtles, although they may be affected, they would not be adversely affected by research activities. Further, the applicant would be instructed in the permit to adhere to any standard or additional measures conditioned to avoid adverse impacts to sea turtles (See Section *4.2.1.18 Effects on Sea Turtles*).

- ***South Atlantic DPS (File Nos. 16442, 16482, and 16508)*:**

File No. 16442 (ACE Basin Watershed, and Savannah River): The South Carolina waters located in the South Atlantic DPS include the ACE Basin watershed and the Savannah River. Proposed netting activities in these river systems would occur upstream of areas where sea turtles have been documented. To avoid interactions during boating activities, researchers would be instructed to follow boating guidelines to prevent harming turtles. Because netting and trawling activities are proposed in upstream river locations where few sea turtles have been documented, NMFS PR believes sea turtles, although they may be affected, they would not be adversely affected by research activities. Further, the applicant would be instructed in the permit to adhere to standard or additional measures conditioned to avoid adverse impacts to sea turtles (See Section *4.2.1.18 Effects on Sea Turtles*).

File No. 16482 (Savannah, Ogeechee, Altamaha, Satilla Rivers, Georgia and St. Marys River, Georgia/Florida): A map of the Atlantic sturgeon research proposed in Georgia and Florida waters can be found at:
http://maps.google.com/maps/ms?msid=201813649479523504220.0004aae071af72e848a5e&msa=0&ll=31.476695,-81.24115&spn=0.872544,1.234589

Sea turtles in Georgia coastal waters have a residency period in the spring and summer and early fall (May through October), followed by a non-residency in the fall and winter (November through April). Sea turtles generally start foraging in Georgia's coastal waters at 15°C. During winter months sea turtles dwell in warm tropical waters to the south and southeast of Georgia, but during late spring, through early autumn, loggerhead, leatherback, green, Kemp's ridley sea turtles are known to inhabit or traverse Georgia's coastal waters, with hawksbills rarely reported. Since official records were initiated in 1964, all of Georgia's coastal counties have reported nesting and/or standings of one or more of these species (Gardiner 2008).

Three types of netting activities are proposed in Georgia waters. The first method has potential to capture sea turtles and uses large mesh (10-16" stretch) drift gill nets fished in the last two kilometers of the rivers and extending approximately 1 km out into the sound (if no barrier islands are present). This type of sampling would be conducted only during April and May when adult sturgeon congregate in the sounds and river mouths. Nets are deployed ~20 minutes before the slack/ebb tide and allowed to soak until ~20 min into the start of the flood tide. As discussed previously, when fishing with drifted gill nets, any captured animals, including sea turtles, would easily be detected because they would either surface or their swimming would sink part of the net. If this occurred, the researchers would immediately retrieve the "sunken" section of the net, removing the entangled animal. The researchers would also be instructed in permits watch for sea turtles and quickly remove nets if any were observed. Thus, although animals would be at risk of capture with drift nets, mortality or serious harm would be unlikely.

The second type of sampling using anchored and drift gillnets would occur in lower portions of Georgia rivers in coastal estuary areas of tributaries within 20 km of the sounds where sea turtles could potentially be taken. However, when using anchored gill nets in this location, net soaks would be conditioned in permits to last no longer than 30 minutes before checking nets.

The remaining sampling method would target juvenile Atlantic sturgeon in upriver locations between April-September. These nets would be fished at the head of tide in a maximum salinity of approximately 15 ppt between river kilometers 20 and 40, and outside of the typical range of sea turtles in Georgia or Florida waters, and thus, sea turtles would not likely be encountered. Additionally, far upriver sampling would occur with D-nets to collect early life stage sturgeon, but this activity would not affect sea turtles.

Thus, while conditions in the permit would limit sea turtle interactions by authorizing netting when turtles are not present— typically below 15°C between November and May— netting in the late spring through early fall (>15°C) in the Bay or in downstream tributary locations, could potentially capture sea turtles.

In light of the above information on turtle distribution in Georgia and Florida waters, and the timeframe in which sampling would occur, NMFS PR believes sea turtles may be affected by parts of the proposed activities. Therefore, as indicated by the Biological Opinion written for the Proposed Action, NMFS PR anticipates up to 2 total incidental takes of sea turtles annually, including: 2 loggerheads, or 1 loggerhead PLUS 1 green, OR 1 leatherback, OR 1 hawksbill, OR 1 Kemp's ridley, over the course of the proposed permit in File No. 16482. However, incidental takes of sea turtles would include only capture responses, ranging from very mild short-term stress to short term minimal injury from net gear. No mortality or severe harm would be anticipated or authorized in the sampling. The applicant would also be instructed in the permit to adhere to any standard or additional measures conditioned for avoiding adverse impacts to sea turtles while fishing in Georgia or Florida waters (See Section *4.2.1.18 Effects on Sea Turtles* and also the Biological Opinion informing this EA).

File No. 16508 (St. Marys, Nassau River and St. Johns River, Florida): Netting activities for Atlantic sturgeon in the St. Marys, Nassau and St. Johns Rivers, Florida would not expose turtles to significant risk because sea turtles are seldom documented in upstream river locations. According to the application, the research would primarily take place on the St. Marys River (RM 25-100). The use of side scan sonar would assist him in locating target fish for netting in these rivers if fish are found.

Few sea turtles have been documented in the netting area. To avoid interactions during boating activities, researchers would be instructed to follow boating guidelines to prevent harming turtles. NMFS PR therefore believes sea turtles, although they may be affected, they would not be adversely affected by the proposed research activities. Further, the applicant would be instructed in the permit to adhere to any standard or additional measures conditioned to avoid adverse impacts to sea turtles (See Section *4.2.1.18 Effects on Sea Turtles*).

3.3.2.5 ESA Non-target Species under USFWS Jurisdiction:

This section summarizes the species occurring in the action areas of the Proposed Action under USFWS jurisdiction.

Roanoke logperch*:*

The Roanoke logperch, a rare member of the Percidae family, can grow up to 14 cm long. Its primary and reproductive habitat is in the upper watershed pools and riffles of the Nottoway and Meherrin River, Virginia. The species was listed as an endangered species on August 18, 1989 (54 FR 34468 34472) and information on the species is online at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E01G.

Because the species is also reported seasonally in downstream habitats within the Chowan River watershed in the Meherrin River (Burkhead 1983), part of its life cycle does occur in the action area described by File No. 16375. However, because the researcher is proposing using five to twelve inch gill netting gear, this minimizes the risk to logperch. NMFS PR does not anticipate any adverse interaction with logperch in the action area and concludes that Atlantic sturgeon research is not likely to adversely affect Roanoke logperch.

Wood stork**:** Wood storks have been on the Endangered Species List since 1984 (49 FR 7332). The U.S. population of wood stork, with confirmed breeding colonies in Florida, Georgia, South Carolina, and North Carolina has experienced significant increases in annual nest counts, measuring just over 11,000 nesting pairs in 2006 (USFWS 2007). The wood stork population center has effectively spread northward during the last fifty years, expanding primarily as a result of wandering juveniles after fledging, colonizing from populations further south. On September 21, 2010, the USFWS announced a 90-day finding on a petition to reclassify the United States breeding population of the wood storks from endangered to threatened under the ESA (71 FR 56545). Based on the review, the USFWS initiated a status review of the species to determine if reclassification is warranted.

The wood stork is a highly colonial species, usually nesting and feeding in flocks. Its habitat overlaps the four southeastern states where Atlantic sturgeon studies would take place: Florida (File No. 16508); Georgia (File No. 16482); South Carolina (File No. 16422); and North Carolina (File No. 16375), including freshwater and brackish wetlands where birds nest in bald cypress or red mangrove (*Rhizophora mangle*) swamps. At freshwater sites, nests are often constructed in bald cypress (*Taxodium distchum*) and swamp tupelo (*Nyssa biflora*). Wood storks in Georgia and South Carolina lay eggs from March to late May, with fledging occurring in July and August (USFWS 2011a). Wood storks thus have the potential to occur in the project areas. Further, researchers engaged in past sturgeon studies have indicated incidentally sighting wood storks, primarily those birds resting or on foraging flights. However, based on the nature of the research and statements from researchers indicating they would agree to avoid wood storks upon encountering them, NMFS PR concludes that the sturgeon research is not likely to adversely affect wood storks.

West Indian manatee:

The West Indian Manatee is listed as endangered under the ESA under the USFWS's jurisdiction and is also protected under the MMPA. It inhabits both marine and fresh water of sufficient depth (1.5-6m) throughout its range in southeastern coastal states including Florida (File No. 16508), Georgia (File No. 16482), South Carolina (File No. 16442) and North Carolina (File No. 16375). In Georgia, South Carolina and North Carolina, manatee inhabit waters commonly as intermittent, seasonal occupants due to cold intolerance in winter months; however, sightings and numbers of this species in these waters has been increasing over the past several years (Nicole Adimey; USFWS; pers. comm. 2011). Manatee have critical habitat (41 FR 41914) in Florida waters extending to the St Marys River where research is proposed in the St. Johns River (from the river mouth to Lake George), Nassau River (from the estuary upriver), St. Marys River (from the estuary to the North/ South Prong Junction), and in the intervening waterways and intercoastal canals while in transit and tracking. The applicants do not expect adverse interaction with individuals of this species or critical habitat to have a high probability of occurrence. Further, given the measures offered by the USFWS for avoiding capture or harm of manatee incorporated into the researchers' methodology, (See Section *4.2.1.18*: *Effects on West Indian Manatee*), NMFS considers them sufficient to minimize risks for interaction or harm to the species or its critical habitat.

***Dwarf wedge mussel*:**
The dwarf wedge mussel is an ESA-listed species of freshwater mussel (55 FR 9447 9451), with populations occurring in the proposed research areas in tributaries of the Potomac River, Maryland (File No. 16547), the Connecticut and Housatonic Rivers, Connecticut (File No. 16323) and in the Roanoke River, North Carolina (File No. 16375) (USFWS 2011b). However, although the species is present in upstream freshwater habitats of rivers in these action areas, NMFS PR does not expect adverse impacts to dwarf wedge mussels from the proposed research because the species either occurs in freshwater river and creek locations where gill-netting for Atlantic sturgeon is not proposed. The current range of the species can be found below.
http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=F029#status

***Nesting sea turtles*:**
NMFS PR concludes nesting hawksbill, green, Kemp's ridley, leatherback, and loggerhead sea turtles would not be targeted by methods contained in the proposed Atlantic sturgeon research and thus would not pose a risk to these species managed on land by the USFWS.

Summary: NMFS PR concludes risks to these non-targeted listed species managed by the USFWS from the proposed Atlantic sturgeon research would either be discountable or would not adversely affect the listed species. Informal consultations were therefore conducted by email with the USFWS (sent October 4, 2011) asking for concurrence that the proposed research would not adversely impact them. Results of this consultation follow in Section 4.3.1 of this EA.

3.3.2.6 ESA Listed Marine Mammals under NMFS Jurisdiction:

***Whale Species*:**
Endangered blue, fin, humpback, North Atlantic right, sei, and sperm whales could potentially occur within each of the action areas subject to harassment and/or harm from boat strikes or entanglement in netting gear as a result of the proposed activities. Critical habitat has also been designated for the endangered North Atlantic right whale off the states of Georgia and Florida (59 FR 28793) (File Nos. 16482 & 16508). However, because each of these whale species are typically located further offshore in deeper waters than the action areas for the proposed research, it would be highly unlikely these species would be encountered during sampling activities performed by the research applicants. Consequently, NMFS PR concludes these species are unlikely to be exposed to the effects of the proposed actions and thus any potential threats are discountable. Even still, all permit holders would be required to adhere to standard mitigation conditions within the permit to avoid interaction with all marine mammals. Therefore, the proposed actions are not likely to adversely affect any of these listed cetaceans and these species will not be considered further in this EA.

Other Protected Pinnipeds and Cetaceans under the MMPA: The table below contains a list of marine mammals, protected under the MMPA which have been documented in the proposed action areas.

Common Name	*Scientific Name*	*Areas of Potential Interaction*	*Notes*
Harp seal,	*Phoca groenlandica*	(16-526, 323, 422)	(Rare south of GOM)
Hooded seal	*Cystophora cristata*	(16-526, 323, 422)	(Rare south of GOM)
Harbor porpoise	*Phocoena phocoena*	(16-526, 323, 422)	(Rare south of NJ, DE)
Harbor seal	*Phoca vitulina*	(16-526, 323,422)	(Rare south of NJ, DE)
Gray seal	*Halichoerus grypus*	(16-526, 323, 422, 507)	(Rare south of NJ, DE)
Bottlenose dolphin	*Tursiops truncatus*	(All areas)	(Rare north of Long Island)

Harp seal and hooded seals: The normal range of these seals extends to Newfoundland, well north of the research area proposed by File No. 16526 in the Gulf of Maine. From January to May, the Western North Atlantic stocks of these seals is at the most southern point of their range (harp seals: http://www.nmfs.noaa.gov/pr/pdfs/rangemaps/harpseal.pdf; hooded seals: http://www.nmfs.noaa.gov/pr/pdfs/rangemaps/hoodedseal.pdf). In recent years (2004-2008), the numbers of sightings and strandings of harp seals have increased off the east coast of the United States, mostly occurring in the northeast sink gillnet fishery (primarily NH and MA; NMFS Harp seal Stock Assessment Report 2010 http://www.nmfs.noaa.gov/pr/pdfs/sars/ao2010sehp-wn.pdf). Interactions between the proposed Atlantic sturgeon research and harp and hooded seals would likely be an uncommon occurrence given the researchers' inshore action areas and the relative scarcity of these species in those areas.

Harbor seals: Harbor seals are generally non-migratory, occurring on the U.S. east coast from the Canadian Arctic to New Jersey and occasionally ending up in the Carolinas on ocean currents (http://www.nmfs.noaa.gov/pr/species/mammals/pinnipeds/harborseal.htm). Confirmed haul outs for harbor seals have also been identified on the Atlantic coast as far south as Great Bay, NJ, approximately 17 kilometers north of Atlantic City. This species might be affected by research proposed in File No. 16526 in the GOM, File No. 16323 along Long Island Sound and File No. 16422 along the New York and New Jersey coast to the Delaware Bay.

Gray seals: Gray seals are found in marine U.S. coastal waters, typically off the Maine coast to New Jersey. Gray seals have been seen hauling out and also pupping in increasing numbers on isolated islands off the Maine coast, Nantucket-Vineyard Sound, outer Cape Cod, and on Muskeget Island (http://www.nmfs.noaa.gov/pr/species/mammals/pinnipeds/grayseal.htm). This species might be affected by research proposed in File No. 16526 in the GOM, File No. 16323 along Long Island Sound and File No. 16422 along the New York and New Jersey coast to the Delaware Bay.

Harbor porpoise: The harbor porpoise is one of the smallest cetaceans in the North Atlantic. Based on commercial fisheries bycatch and stranding reports, they are most widely distributed in Canadian waters. The largest population on the U.S. east coast is in the GOM, where an estimated 89,000 harbor porpoises in the Bay of Fundy/Gulf of Maine region. They can also be found south to Cape Hatteras, N.C. (http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/harborporpoise.htm). This species could potentially be affected by several of the proposed research projects.

Bottlenose dolphins: bottlenose dolphins are a common species and widespread in tropical and temporal climates world-wide. Along the U.S. Atlantic coast, bottlenose dolphins are typically found between Long Island, NY to Florida (http://www.nmfs.noaa.gov/pr/pdfs/rangemaps/bottlenosedolphin.pdf). Occasionally, the species has also been documented in the GOM. As a result, bottlenose dolphins could be affected by each of the proposed Atlantic sturgeon studies.

Summary: Each individual permit would contain mitigation developed for avoiding adverse impacts to marine mammals and based on informal consultations with NOAA marine mammal specialists, specific measures were developed. Based on consultations with regional experts and the mitigation conditions contained in the permits, NMFS PR concludes risks to these marine mammals would either be discountable or would not adversely affect the listed species. See *Section 4.2.1.18* for discussion on effects on marine mammals.

3.3.2.7 Non-Listed By-catch Species:

Based on past experience, researchers would expect some non-target species to be captured in fishing gear. The applicants supplied results of bycatch netting on the individual rivers and coastal regions in the action areas (See Appendix 4). See *Section 4.2.1.7* for conclusions on effects on non-listed by-catch species.

3.3.2.8 Aquatic Nuisance Species:

The U.S. Geological Survey (USGS 2011) has identified aquatic nuisance species occurring in the coastal watersheds and near shore environments which could potentially spread and threaten native biodiversity. The USGS Nonindigenous Aquatic Species (NAS) website (http://nas.er.usgs.gov) provides up-to-date information on new and existing occurrences of NAS. Because the netting and boating activities of researchers conducting Atlantic sturgeon research could be vectors in spreading NAS, precautionary measures proposed by NMFS would be standard research protocol in permits (See Section *4.2.1.19* of this EA).

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter represents the scientific and analytic basis for comparing direct, indirect, and cumulative effects of the alternatives. Regulations implementing provisions of NEPA require consideration of both the context and intensity of a proposed action (40 CFR Parts 1500-1508).

4.1 EFFECTS OF ALTERNATIVE 1: (No Action)

An alternative to the proposed action is no action, i.e., denial of the permit requests. This alternative would eliminate any potential risk to all aspects of the environment from the proposed research activities. However, it also would prohibit researchers from gathering information that could help endangered and protected Atlantic sturgeon. As Atlantic sturgeon are a newly-listed species, the No Action Alternative would represent a considerable loss in research vital to providing managers with information for protecting this species.

4.2 EFFECTS OF ALTERNATIVE 2: (Issue Permit with Standard Conditions)

Any impacts of the proposed action would be limited primarily to the biological environment, specifically the animals studied or affected by the research. The type of action proposed in the permit request would minimally affect the physical environment and would be unlikely to affect the socioeconomic environment or pose a risk to public health and safety.

The following discussion on effects of the proposed research activities on target species, Atlantic sturgeon, draws primarily from scientific research performed on shortnose sturgeon co-occurring in comparable riverine and estuarine habitats. The permit conditions, adhered to by all applicants, were developed following the research protocols developed for several sturgeon species, including Atlantic, shortnose, green and Gulf sturgeon (Kahn and Mohead, NMFS 2010). Due to the similarity of the species, NMFS expects the impacts of research activities on Atlantic sturgeon would be similar to the research effects experienced by shortnose sturgeon.

4.2.1 *Effects of Capture Gear*

4.2.1.1. <u>Gill and Trammel Nets:</u>

The applicants propose to use gill nets and trammel nets to capture Atlantic sturgeon. Entanglement in gill nets can result in elevated stress, injury, mortality, reduced fecundity, and delayed or aborted spawning migrations of sturgeon (Moser and Ross 1995, Collins et al. 2000a, Moser et al. 2000 and Kahn and Mohead 2010). However, the majority of sturgeon mortality during scientific investigations has been directly related to netting mortality and as a function of numerous factors including water temperature, low dissolved oxygen concentration, soak time, mesh size, net composition, and researcher netting experience.

To illustrate, records illustrating shortnose sturgeon mortality resulting from six similar scientific research permits utilizing gillnetting is summarized in Table 13 below. Mortality rates due to the netting activities ranged from 0 to 1.22%. Of the total 5,911 shortnose sturgeon captured by gill nets or trammel nets, only 23 died, yielding an average incidental mortality rate of 0.39%. However, all of the mortalities associated with these permits were due to high water temperature and low dissolved oxygen (DO) concentrations. Moser and Ross (1995) reported gill net mortalities approached 25% when water temperatures exceeded 28ºC.

Table 13. Number and percentage of shortnose sturgeon killed by gill or trammel nets associated with existing scientific research permits.

	Permit Number						
	1051	1174	1189	1226	1239	1247	TOTALS
Time Interval	1997, 1999 – 2004	1999 – 2004	1999, 2001 – 2004	2003 – 2004	2000 – 2004	1988 – 2004	1988-2004
No. sturgeon captured	126	3262	113	134	1206	1068	5909
No. sturgeon died in gill nets	1	7	0	0	5	13	26
Percentage	0.79	0.22	0	0	0.41	1.22	0.44

Under Permit No. 1247, between 4 and 7% of the shortnose sturgeon captured died in nets prior to 1999, whereas between 1999 and 2005, none of the more than 600 shortnose sturgeon died as a result of their capture. Also, in five years, under Permit No. 1189, none of the sturgeon captured died. In Permit No. 1174, all seven of the reported shortnose sturgeon mortalities occurred during one sampling event. The low mortality rates of more recent research are due to mitigation measures implemented in permits by NMFS and researchers (Kahn and Mohead 2010) including reduced soak times at warmer temperatures or lower DO concentrations, minimal holding or handling time, handling sturgeon with smooth rubber gloves, and treating with an electrolyte bath prior to release. Based on the mitigation measures recently implemented by researchers, the effects of capture on sturgeon have been reduced.

Table 14 below is included to document the level of incidental mortality of shortnose sturgeon in directed research using very similar research methods as in the Proposed Action.

<u>Records of Shortnose Sturgeon Takes</u>: In reviewing permits issued by NMFS since 2005, where researchers used similar mitigation methods to those in the current Proposed Action, there have been two shortnose sturgeon deaths, each reportedly caused by gill nets constricting gill opercula. Thus, the percentage mortality from all direct impacts of similar research efforts resulted in less than one-half percent.

Table 14. Number of shortnose sturgeon captures and mortalities during recent research.

Permit Number	Location	Total No Shortnose Sturgeon Captured	Total No. Shortnose Sturgeon Mortalities
1420 (2005-2009)	Altamaha River	1472	0
10037 (2007-2010)	Ogeechee River, Georgia	235	0
10115 (2008-2010)	Satilla & St. Marys Rivers, GA	12	0
14394 (2010)	Altamaha River, Georgia	383	0
1447 (2006-2010)	South Carolina Rivers	107	0
1505 (2006-2010)	South Carolina Rivers	369	0
14759 (2010)	North Carolina Rivers	0	0
1444 (2005-2009)	Potomac River (Chesapeake Bay)	3	0
1486 (2006-2009)	Delaware River	416	0
14604 (2010)	Delaware River	34	1
1547-02 (2005-2010)	Hudson River	191	0
1575 (2007-2010)	Hudson River	14	0
1580 (2007-2010)	Hudson River	112	0
1449 (2007-2009)	Upper Connecticut River	50	0
1549 (2006-2010)	Upper Connecticut River	522	0
1516 (2007-2010)	Lower Connecticut River	531	0
1595 (2007-2010)	Penobscot River GOM	893	1
Totals		5,344	2

***<u>Summary</u>*:** All researchers agreed to adhere to standard netting protocols provided by NMFS PR. Due to the similarity of the gear, gill nets and trammel nets would be subject to the same conditions. These measures would include: (1) constantly monitoring nets, with one exception (see condition 2); (2) gill nets may be set unattended overnight for 14 hours, if in freshwater (< 2.0 ppt) and ≤ 15°C; (3) gill nets may be set for 10 hours in water ≤15°C, but must be attended during daylight and checked at regular intervals; (5) when water temperatures are between 15≤20°C, nets may be set for four hours; (4) when water temperatures are between 20-25°C, nets may be set for two hours; and (5) when water temperatures are between 25- 28°C, researchers would check them at one hour intervals. Netting activities would cease at water temperatures higher than 28°C and would not occur in waters with D.O. levels lower than 4.0 mg/l, subject to individual permit conditions.

<u>Drift Nets</u>: When drift gill netting for Atlantic sturgeon, measures to lessen impacts to listed and unlisted animals would include: (1) drift nets may be used drifting on the rising tide or in slack tide until just after high tide for 30 minutes and up to two hours, depending on the location and swiftness of the tide; (2) drift nets must be pulled immediately if an obvious capture has been made or the gear has become snagged on substrate or bottom debris; and (3) all drift net sets must be tended continuously due to the risk associated with gear entanglement, interaction with other protected species and/or the potential for loss of gear resulting in “ghost” nets.

<u>Trawls</u>: Sampling with smaller epibenthic, otter or skiff trawls would take place in tidally influenced estuaries or up-river locations (File Nos. 16526, 16323, 16438, 16547 and 16442). The trawl to be used in File Nos. 16526 and 16442 is a 5.17m epibenthic trawl (referred to as a Missouri trawl); while the gear types proposed in the Connecticut River and estuary (File No. 16323) and in the Delaware River (File No. 16438) are 9.7m x 7.0m semi-balloon skiff trawl a 4.9m otter trawl, respectively. To eliminate impacts, trawls would be operated slowly, typically attached to a 20ft johnboat equipped with a 25-40hp outboard with 100-200ft towlines. The length of the tow lines would be dependent on depth (i.e., deeper water requires longer towlines). A buoy would be attached to a single 75–100ft rope fastened to the cod end of the trawl to assist in retrieval if the trawl became snagged. Trawling would not occur in water depths less than 0.5m and where bottom snags were present. The trawls would be deployed and retrieved by hand and towed by powering boats in reverse (bow upstream) with continued movement downstream. A standard haul would be approximately 300-500ft lasting 10-15 minutes (Gutreuter et al., 1995); though trawl tow times would often be shorter. Trawling speed would vary between 2-3.5 knots, and locations trawled would be monitored by using a Sounder/Global Positioning System to limit disturbance of the same substrate during a 24 hour period. Bycatch would be identified, enumerated and released unharmed.

In estuaries and other tidally influenced areas of these systems, sampling with trawls would take place in flat, shallow areas, so as to take advantage of currents and river bends. In other river systems, for example in File No. 16438 (Delaware River), File No. 16547 (Chesapeake Bay and rivers) and File No. 16442 (South Carolina Rivers), substrates selected for optimal trawling would be free of snags and debris so the disturbance of the bottom and the fish community would be minimized as much as possible. Dovel and Berggren (1983) found such trawling was effective for collecting juvenile shortnose sturgeon with minimal impact to bottom substrate or EFH.

With regard to impacts from trawling with larger otter trawls in marine areas towed behind larger vessels, sampling is proposed in File No. 16422 in the late fall and early spring in the near-shore marine and estuarine waters off Connecticut, New York, New Jersey, and Delaware. It is also proposed in the lower Hudson River (File No. 16436). This trawling gear has been used for the last five years by Stony Brook University, New York, in coastal trawling off the New York and New Jersey coastlines with no apparent impact to bottom structure. The substrate type where this trawling has taken place is described by the USGS East-Coast Sediment Analysis (USGS 2000) as comprised of almost 100% sand bottoms. Because the impact of the mobile fishing gear on the sandy seabed would be related to both fishing intensity and frequency of trawling (Watling and Norse 1998; Auster and Langton 1999), NMFS considers impacts to the bottom substrate would be very low.

<u>Summary</u>**:** Conditions added to the permit in File No. 16422 would lessen the impacts of trawling with this gear on the targeted and not-targeted species. These conditions would include: (1) trawling tows would be conducted for durations averaging 5-7 minutes, and rarely up to 20 minutes, (2) the towing speeds would range between 2-3.5 knots during daylight hours only; (3) should a trawl net become snagged on bottom substrate or debris, it would be untangled immediately to reduce stress on captured animals, as well on bottom substrate; (4) to lessen benthic disturbances, trawl nets would not be towed over the same location more than once in a 24-hour period, with paths tracked using a GPS system. Using similar conditions in previous sampling of Atlantic sturgeon with identical equipment, the applicant in File No. 16422 has not killed or harmed an Atlantic sturgeon.

<u>Pound Nets, Fyke Nets/Hoop Net in the Chesapeake Bay</u>: Pound nets, fyke/hoop nets and other trap nets would be authorized in File No. 16547 in the Chesapeake Bay and tributaries, and as otherwise regulated (time and place) by applicable state regulations of Virginia or Maryland. Also, because of potential for turtle interaction, these gear types would only be used by researchers when sea turtles are not anticipated in the action area (December through April).

Since fish are trapped, not hooked or gilled, in pound and fyke/hoop nets, NMFS believes captured sturgeon are less likely to be injured or stressed by these methods. Although there have been no mortalities of Atlantic sturgeon documented with pound nets or fyke nets in the Maryland or Virginia Reward Programs, these gear would be fished and tended as all other authorized gear in the Proposed Action. Further, all other conditions used to protect sturgeon during research activities, including environmental conditions outlined in Table 3, would govern how Atlantic sturgeon are taken and how often these gear would be checked. Upon consultation with the research and a review of the environmental conditions, NMFS PR may authorize additional holding of an unstressed captured Atlantic sturgeon for up to 24 hours in a pound net functioning as a holding facility for further research.

Because Atlantic sturgeon would be trapped and not gilled in pound nets, the capture of migrating sturgeon is not expected to result in excessive stress that would result in pre-spawning adults abandoning their spawning runs. If captured, and fish are handled correctly, NMFS expects the level of stress would be low enough to result in no long-term behavioral change. Likewise, the nets would be fished when the prospects of turtle interaction in the Chesapeake Bay or tributaries are low, between December and April.

Beach Seines: Beach seines would be authorized for proposed research taking place under File No. 16523 in the GOM. Typically, use of beach seines for sampling larval and young of year fish has been a practice of fishery managers sampling shorelines to indicate recruitment health. Beach seines used to sample young sturgeon would be small mesh nylon nets approximately 30m in length with a centered enlarged bag area for gathering the catch. Sampling would occur as described previously by encircling sandy foraging areas of sturgeon. Efforts to minimize impacts would include conditions such as: (1) when drawing the seine's lead line close to shore, animals would not be crowded, and would be pooled in clear waters with minimal turbidity or mud bottoms; (2) all animals would be handled and released within 15 minutes after pooled along the shore (3) bycatch would be released unharmed and minimally handled; (4) areas sampled would not be seined more than once in a 24 hour period; and (5) habitats seined would be characterized by sandy bottoms free of bottom snags.

Summary: Based on the past history and experience of researchers using the using the types of gear described in this EA, NMFS does not anticipate long-term adverse effects to Atlantic sturgeon or to other non-target animals over their use.

4.2.1.2. Effects of General Handling (e.g., short-term holding, measure/weighing)

Sturgeon are a hardy species, but sensitive to handling stress when water temperatures are high or dissolved oxygen is low. Additionally, sturgeon tend to inflate their swim bladder when stressed and when handled in air (Moser et al. 2000). If they are not returned to neutral buoyancy prior to release, they tend to float and would be susceptible to sunburn and bird attacks. In some cases, if pre-spawning adults are captured and handled, it is possible that they would interrupt or abandon their spawning migrations after being handled (Moser and Ross 1995).

To minimize capture and handling stress, all researchers plan to hold Atlantic sturgeon in net pens or in onboard live wells until they are processed. During processing, each fish would be immersed in a continuous stream of water supplied by a pump/hose assembly mounted to over the side of the research vessel. For most procedures, the total time required to complete routine handling and tagging would be no more than 20 minutes. Moreover, if needed after processing, sturgeon would be returned to the net pen for observation to ensure full recovery prior to release. They would also be checked for buoyancy problems and treated with a slimecoat restorant prior to releasing. Total holding time would be no longer than 60 minutes from the time of capture until release. However, typical holding times by most researchers range far less than one hour— some less than five minutes depending on procedures and environmental conditions fish are processed.

With regard to holding Atlantic sturgeon in pound nets for up to 24 hours, NMFS believes because these fish are trapped, not hooked or gilled, they would be subject to minimal stress or injury while being held in pound nets. Therefore NMFS PR, after discussion with the researcher, may authorize holding an unstressed Atlantic sturgeon in a pound net used as a holding facility for up to 24 hours, if environmental conditions were favorable.

***Summary*:** Although some risk is associated with handling and holding stresses, the proposed methods described in the applications, and as analyzed in this EA, are consistent with the best management practices endorsed by NMFS, and, as such, should minimize the direct and indirect effects resulting handling and holding.

4.2.1.3. Effects of PIT Tags

All applicants propose using PIT tags on fish above a minimum size to insure unique identification upon recapture for population and growth estimates. To avoid duplicate tagging, all sturgeon would be scanned with a PIT tag reader prior to the insertion of a PIT tag. Tagging procedures would mainly cause stress during restraint and minor wounds from insertion. The use and retention of PIT tags is not known to have any other direct or indirect effects on sturgeon if done correctly. As such, the tagging of Atlantic sturgeon with PIT tags is unlikely to have significant impact on the reproduction, numbers, or distribution in proposed action areas.

However, if PIT tags are used improperly, there is a chance of adverse effects. There is reported one instance of juvenile fish mortality within the first 24-48 hours of PIT tag insertion as a result of larger PIT tags being inserted too deeply. Henne et al. (2009) found that 14mm tags inserted into shortnose sturgeon less than a size of 330 mm total length (TL) caused 40% mortality after 48 hours; however, no additional mortalities occurred after 28 days. The researchers also showed that no mortality to sturgeon between 250-330 mm occurred after 28 days when 11.5mm PIT tags were used. Therefore, to address these concerns, the applicants would not PIT tag Atlantic sturgeon less than 300 mm TL, with one exception.

In order to address specific research objectives, the applicant in File No. 16431 has requested the authority to PIT tag Atlantic sturgeon 250 mm and larger, a minimum size range corresponding to many of the previously sampled juveniles. To minimize concerns about PIT tagging sturgeon smaller than typically authorized, the applicant would use smaller (11.5mm) PIT tags on these fish. No sturgeon less than 250 mm (10 in TL) would be PIT tagged or have other surgical procedures performed. This applicant was authorized to PIT tag shortnose sturgeon of the same size range subject to the same requirements under Permit No. 14396, and to date, the applicant has witnessed no apparent ill effects using this methodology.

4.2.1.4. *Effects of External Identifying Tags (Dart tags, Floy/T-bar tags)*

Some applicants also propose using external identifying tags on Atlantic sturgeon captured (over a certain size range, described below) to assist other researchers or commercial fishermen in identifying recaptures. The use of these tags will also assist researchers to measure the retention rates of PIT tags upon recapture. NMFS has authorized a variety of external-identifier tags and placement sites on shortnose sturgeon over the past 10 years including the proposed T-bar tags. Placing an external T-bar tag in the dorsal musculature has shown promise for tag retention with minor impacts to shortnose sturgeon (Moser et al. 2000). Smith et al. (1990) compared the effectiveness of dart tags with nylon T-bars, and anchor tags in shortnose and Atlantic sturgeon. Carlin tags applied to scutes had low retention rates as did dart tags in some attachment locations; however, it was noted that the dart tags caused some minor tissue damage. T-bar anchor tags had the highest retention rate. Collins et al. (1994) found no significant difference in healing between fish tagged in fresh and brackish water. Clugston (1996) also looked at T-bar anchor tags placed at the base of the pectoral fins, finding beyond two years, retention rates were about 60%. Collins et al. (1994) compared T-bar tags inserted near the dorsal fin, T-anchor tags abdominally, dart tags near the dorsal fin, and disk anchor tags abdominally. He found, in the long-term, T-bar anchor tags attached dorsally were most effective (92%), but also noted that all of the insertion points healed slowly or not at all, and, in many cases, small lesions developed.

Although there is evidence of small lesions appearing where external dart or anchor tags exit the dorsal fin causing some minor damage to Atlantic sturgeon, NMFS recommends the use of these external tags to assist with the identification of migratory sturgeon. Due to the reports of low retention rates, NMFS does not recommend use of Carlin tags; instead, researchers would opt for Floy/T-bar tags. Researchers would be monitoring the healing and retention rates of these tags in recaptured sturgeon and reporting the results annually to NMFS. Should the monitoring reveal more than minor damage at the insertion points, the practice would be reevaluated by NMFS and permits potentially modified removing the further use of the tags.

4.2.1.5. *Effects of External Telemetry Tags*

Six of the applicants (see File Nos. 16526, 16436, 16431, 16547, 16482 and 16508) have proposed attaching external telemetry tags for tracking Atlantic sturgeon in research activities. Historically, larger external tags were easily shed. Collins et al. (2002) showed hatchery shortnose sturgeon were able to shed 100% of their larger external transmitters (9 cm long, 1.7 cm diameter) when attached with a wire through the dorsal fin. Further, tag size appeared to influence swimming, caused buoyancy problems and irritation to animals. More recently, researchers have documented higher retention rates with the advent of newer, smaller external tags and improved methods of attachment. Such external tags range in size between 18 and 46 mm long and only 7 to 9 mm in diameter. Using 70 to 100 lb test monofilament line, Mike Randall and Ken Sulak (Kahn and Mohead 2010) described a method for attaching such tags bound externally to the dorsal fin using lightweight heat shrink electrical splice tubing and five minute, two-part epoxy. These researchers documented over 96% retention rates from 2005 to 2008 using their methods on Gulf sturgeon.

A key advantage for using external telemetry tags is that a wide size range of animals (down to YOY and Year 1 sturgeon to 250 mm TL) can be easily fitted with smaller tags, increasing tag retention with no apparent impacts on swimming behavior. Although applicants stated the need for lighter weight external tags on juvenile sturgeon, two of them also proposed using external tags on adults and sub-adult sturgeon. Additionally, anesthesia is not necessary for attachment, which is important in terms of eliminating added stress or mortality for sturgeon. Although NMFS recommends both internal and external acoustic telemetry tags for tracking the movements of sturgeon, NMFS suggests tagging sturgeon externally because the leader on external tags is designed to corrode freeing the external tag from the fish. Thus, negative impacts from external telemetry tags are not expected.

4.2.1.6. Effects of Pop-up Satellite Archival Tags (PSATs)

Pop-up satellite archival tags (PSATs) are used to track movements of migratory large marine animals such as sturgeon. The applicants in Files Nos. 16422, 16526, and 16507 are proposing to use PSATs on adult animals. A PSAT is equipped as an archival tag (or data logger) with a means to transmit the data via satellite. In a lab study conducted by Oregon Division of Fish and Wildlife on green sturgeon, a PSAT remained attached to a green sturgeon with no apparent ill-effects for over eight months (Erickson and Hightower 2007). Seven green sturgeon were tagged with PSATs in the field component of this research; with the exception of one tag with a faulty pin, all PSATs operated as anticipated and transmitted large datasets. The movement data from these fish indicated they behaved in ways similar to tagged sturgeon in other studies (Erickson and Hightower 2007). PSATs have been also used to examine the oceanic movements of Atlantic sturgeon (Erickson et al. 2011). Twenty-three adults were tagged with PSATs and released; data from eight of the tags were not transmitted, likely due to malfunction. All other tagged Atlantic sturgeon were relocated and the PSATs transmitted data (Erickson et al. 2011).

Though the data are physically stored on the PSAT, its major advantage is that it does not have to be physically retrieved like an archival tag for the data to be available. Additionally, fitting PSAT tags does not require an anesthetic. Location, depth, and temperature data are used to answer questions about migratory patterns, seasonal feeding movements, daily habits, and survival after catch and release, for examples. PSATs bear a strong resemblance to other external satellite tags in function. Part of the PSAT is designed to fall off, leaving a smaller portion of the tag loosely attached to the fish; and those attachments would eventually corrode and the rest of the tag would fall away.

Although there have been some problems reported with tag technology malfunctioning, their similarity to traditional external telemetry tags and the results of studies indicate the use of PSATs would have no significant effects to the Atlantic sturgeon.

4.2.1.7. Effects of Anesthetizing

Anesthetizing using MS-222: All researchers request using MS-222 for anesthetizing Atlantic sturgeon in procedures where required. The concentration of up to 150 mg/L MS-222 is commonly used by sturgeon researchers inducing light to deep anesthesia for internal acoustic tagging (D. Peterson, D. Fox, M. Collins, T. Savoy, *pers. comm*. Nov. 2009), and is currently the only chemical anesthetic recommended by NMFS (Kahn and Mohead 2010). The induction varies with dosage, water temperature and water chemistry; however, typical induction times last from five to eight minutes. Because telemetry tags can be inserted into the coelom in less than a minute with little reaction to the external stimuli (muscle spasm, contraction) when incised, there is little risk of internal trauma in this regard (Matsche 2011).

Risks associated with anesthetizing with MS-222 would include hypoxia from overexposure (possibly caused by inexperience at recognizing the proper level of narcosis) (Coyle et al. 2004), anesthetizing fish in poor health or stressed conditions, and injury from thrashing during the excited phase of anesthetic induction. To reduce such risks, researchers would be required to have prior experience in using MS-222. Only non-stressed animals in good health would be anesthetized. Fish would be monitored closely during induction to reach the proper level of anesthesia prior to surgery, and would be watched to ensure proper recovery from anesthetic narcosis prior to release. To avoid injury while being anesthetized, sturgeon would be restrained with netting to prevent animals from jumping or falling out the anesthetic bath. Also, because MS-222 is an acidifying solution, potentially extending the induction time for narcosis, bath solutions would be buffered to a neutral pH with sodium bicarbonate and oxygenated prior to use.

MS-222 has been found to be excreted in fish urine within 24 hours and tissue levels decline to near zero in the same amount of time (Coyle et al. 2004). Although the FDA permits the use of MS-222, it also requires a 21 day withdrawal period before an anesthetized fish can be consumed. This poses concerns for humans when non-listed fish are released into the wild where they may be consumed. However, a 21 day withdrawal is not a consideration for threatened or endangered sturgeon, as taking or possessing them is prohibited by the ESA. Therefore, no external marks or tags are required for following anesthetization with MS-222. Consequently, a sturgeon released after treatment with MS-222 would not present a sizable risk to the environment.

<u>Anesthetizing with Electronarcosis (EN)</u>: Evaluations comparing anesthesia induced with MS-222 or EN have yielded similar results of muscle relaxation and immobility (Kynard and Lonsdale 1975; Henyey et al. 2002). However, a marked decrease in induction and recovery times were exhibited using EN. Induction and recovery times with EN require less than a minute. Further, as soon as animals are placed in, or are removed from the electrical current, several researchers have reported immediate narcosis or recovery (Gunstrom and Bethers 1985; Summerfelt and Smith 1990; Henyey et al. 2002). Henyey et al. (2002) state electronarcosis is ideal for non-invasive research, but more research is needed to determine how EN works. Hartley (1967) states using constant DC provides no anesthetic effect, but rather acts to block cerebral messages to the longitudinal efferent nerves preventing sensations of pain. Coyle et al. (2004) also note EN immobilizes fish but is not a true anesthetic. Proper EN, as suggested by Henyey et al. (2002), elicits narcosis, not tetany. Kynard (pers comm., December 2008) states the fish's nerve pathway is blocked at the medulla oblongata.

Since Henyey et al. (2002) published their methods other shortnose sturgeon permit holders (Mike Mangold, File No. 14176) began using similar EN techniques (since 2004) on the Potomac River and Chesapeake Bay anesthetizing shortnose and Atlantic sturgeon. Internal transmitter tags were surgically implanted under EN with no adverse affects reported (Mike Mangold, pers. comm., January 2009). In another study South America researchers followed similar methods and reported similar results (Alves et al. 2007). Henyey et al. (2002) also used this method in the lab, monitoring sturgeon for 6 weeks following EN measuring no adverse effects in that time. There were no changes in swimming or feeding behavior, no burns, no bruising, and no mortality. Furthermore, Kynard (NMFS application for Permit No. 1549) reported several years of data showing no adverse impacts following anesthetization with EN.

The applicants proposing to use EN as a means for anesthetizing Atlantic sturgeon are those in File 16526 (GOM) and File 16547 (Chesapeake Bay). Each group of researchers has several years of experience and training in the use of EN. The risk associated with the procedure is over-applying the constant direct current causing cessation of opercula movement and involuntary respiration. However, NMFS believes that with proper training this method is extremely safe for inducing anesthesia and, if used carefully Atlantic sturgeon, there is very little chance of mortality or harmful injury.

4.2.1.8. Effects of Implanting Internal Sonic Tags

The issuance of these permits would annually authorize implanting under anesthesia an average of 750 internal sonic transmitters. The researchers applying for Atlantic sturgeon research permits have recorded in annual reports to NMFS surgically implanting several thousand acoustic tags in adult and juvenile shortnose sturgeon with few directly attributable mortalities or adverse effects due to such implanting. Nevertheless, this activity could potentially cause related stress and mortality during capture and restraint with minor wounds from surgical procedures under anesthesia. The methods would also cause discomfort to fish under recovery, as well as risk of infection. To address these possibilities, researchers propose to use the best management practices as endorsed by Kahn and Mohead (2010). These precautions would include sterile surgical techniques, implanting transmitters only in non-stressed fish of excellent condition, and not attempting the procedure with pre-spawning fish in spring, or when the water temperature is outside the range of 8 to 27 °C. To verify normal mobility and swimming behavior of sturgeon after surgery, the total weight of all transmitters and tags would not exceed 2% of the weight of the fish.

Although more invasive surgical procedures are required for internal implantation than external attachment of acoustic tags, the internal tagging procedure does provide greater retention rates than an external attachment. In general, direct effects of the proposed tagging procedure could include pain, handling discomfort, hemorrhage at the site of incision, risk of infection from surgery, affected swimming ability, and/or abandonment of spawning runs. However, use of proper anesthesia, sterilized conditions, and the surgical techniques described above, would minimize potential short-term direct effects from tagging and reduce the long-term risks of injury and mortality. NMFS therefore expects the direct effects of tagging would result in primarily short-term stress to the animals.

However, with respect to unaccountable indirect or delayed effects from internally tagging sturgeon, Devries (2006) reports movements of 8 male and 4 female (≥ 768 mm TL) shortnose sturgeon internally radio-tagged between November 14, 2004 and January 14, 2005, in the Altamaha River, Georgia. Nine of these fish were tracked until the end of 2005. Although no mortality or serious harm was directly documented for these fish, the remaining five individuals were not accounted for and were censored after movement was not detected, or they were not relocated, after a period of four months. Other researchers have also reported censoring part of their tagged fish from their results after losing acoustic signals (Collins, Brundage, Peterson, Fox, Wippelhauser, pers. comm., 2011).

Because there are few accurate methods for analyzing indirect effects of internal tagging, NMFS will continue to assess the impacts by requiring researchers to regularly document tag adaptation by manually and passively tracking individual fish (using boats and passive receiver arrays), recording swimming behavior, logging the number of times and the periods between detections, and noting the number of unrelocated individuals. Addtionally, previously tagged sturgeon when recaptured, would be carefully examined to document the overall condition of the animal.

Lastly, many fish have sensitivity to sound energy from 200 Hz up to 800 Hz, and some species are capable of detecting lower frequency sounds (Popper 2005). However, the potential for internal sonic transmitters to audibly affect Atlantic sturgeon would be small because the sonic frequency of acoustic tags used would be approximately 69 kHz, well above the audible threshold of most fish. However, NMFS also considered unverified potential for predation on tagged sturgeon by seals or sea lions having hearing capability reported in the range of the acoustic tags (B. Southall, pers. comm., November 2009). However, based on the implantation and subsequent successful tracking of acoustic tags in shortnose sturgeon, NMFS does not believe such predation is an extensive risk for internally tagged sturgeon.

4.2.1.9 Effects of Genetic Tissue Sample

The applicants propose taking a small (1 cm^2), non-deleterious tissue sample, clipped with surgical scissors from the pectoral fin of sturgeon. Tissue sampling does not appear to impair the sturgeon's ability to swim and is not thought to have any long-term adverse impact (Kahn and Mohead 2010). Many researchers have removed tissue samples according to this same protocol with no adverse effects; therefore, we do not anticipate any long-term adverse effects (Wydoski and Emery 1983).

4.2.1.10 Effects of Scute/Apical Hook Sampling

Apical hook sampling in sturgeon is a relatively new procedure. NMFS has previously examined the effects of this technique proposed by shortnose sturgeon researchers in the Gulf of Maine (Permit No. 1578-01) (NMFS 2011). NMFS believes the removal of the apical hooks of Atlantic sturgeon scutes would likely not have any effect on Atlantic sturgeon other than short-term discomfort because the scute material is poorly vascularized and non-innervated, and that the removal of a single apical spine would not likely harm the fish.

4.2.1.11 Effects of Fin Ray Clip

Applicants in File 16526, 16422, 16431, 16507 and 16482 are proposing to sample small sections (~1 cm^2) of the pectoral fin rays collected from Atlantic sturgeon captured for age-determination (Kahn and Mohead 2010). The samples would be collected using sterilized designed snipping pliers or bone saws and scalpels from a section of the pectoral fin ray while fish are under anesthesia. The procedure is a common and accepted practice in shortnose sturgeon research and has shown not to impair the sturgeon's ability to swim or have long-term impacts (Collins and Smith 1996; Moser et al. 2000; D. Peterson, pers. comm.; 2011).

4.2.1.12 Effects of Blood Sampling:

Applicants in File 16526, 16422, and 16438 are proposing to take blood samples from Atlantic sturgeon. Effects of drawing blood could include pain, handling discomfort, possible hemorrhage at the site, or risk of infection. To mitigate these effects, the needle would be slowly advanced while applying gentle negative pressure to the syringe until blood freely flows into the syringe. Once blood is collected, direct pressure would be applied to the site to ensure clotting and prevent subsequent blood hemorrhaging (Stoskopf 1993). The site would then be disinfected and checked again after recovery prior to release. Additionally, the project staff responsible for obtaining these samples would have received extensive experience in the procedure. Drawing blood in the manner described appears to have little probability of killing Atlantic sturgeon or producing sub-lethal effects.

4.2.1.13 Effects of Gastric Lavage:

Applicants in File Nos. 16526, 16422, 16436, 16438, 16431, and 16482 are proposing to sample stomach contents from Atlantic sturgeon by taking gastric lavage samples under anesthesia. Information on diets and how they relate to seasonal foraging and habitat use has recently benefited from the gastric lavage procedure (Foster 1977; Haley 1998; Moser et al. 2000a). Due to the morphology of the gut tract and position of the swim bladder in sturgeon, care must be taken not to injure sturgeon while inserting the lavage tube into the esophagus while positioning it within the gut. Potential injury to sturgeon could include abrasion of the gut wall near the pyloric caecum, trauma associated with not seating the tubing properly, and potential negative growth responses of sturgeon (going off-feed) after lavaging. To mitigate these concerns, the applicant would use the practice of lightly anesthetizing sturgeon with MS-222 prior to gastric lavage which relaxes the gut wall, allowing easy penetration of the tubing to the proper position in the gut (Kahn and Mohead 2010).

Savoy and Benway (2004) reported results from 246 shortnose sturgeon collected on the Connecticut River between 2000 and 2003. All of the fish tolerated the procedure well, recovered rapidly and were released unharmed after the procedure. The lavage technique was successful in evacuating stomach contents effectively of shortnose sturgeon of all sizes without internal injury; in some cases, recently ingested prey items were still alive after retrieval (Savoy and Benway 2004). Between 2004 and 2006 Collins et al (2008) captured and lavaged 256 Atlantic and 47 shortnose sturgeon. All fish recovered rapidly and were released unharmed after the procedure. The lavage technique was successful in evacuating stomach contents effectively of both Atlantic and shortnose sturgeon of all sizes without internal injury. In the same study, researchers also demonstrated no damage to internal linings of stomachs of three sacrificed Atlantic sturgeon (Collins et al. 2008). Based on reports documenting use of this procedure, NMFS believes gastric lavage as proposed would cause handling discomfort to Atlantic sturgeon, but would only cause minimal short-term risks.

4.2.1.14 Effects of Hydroacoustic Assessments/Sonar

The use of hydroacoustic assessment has several advantages, mostly stemming from its non-invasive method. Researchers use it to collect information without physically capturing fish. In File Nos. 16526, 16507, 16438, 16375, and 16508, side scan and/or DIDSON sonar gear would be used for locating sturgeon before setting gill nets for capture. Used in conjunction with netting specific target animals, hydroacoustic assessment could potentially lead to less impact on the target, as well as bycatch, while reducing the length of time an animal would be ensnared in a net, and thus minimizing potential for harm.

4.2.1.15 Effects of Lethal Take of ELS with D-nets and Egg Mats

D-nets or egg mats proposed in File Nos. 16526, 16438, 16507, 16547, 16442, and 16482 would authorize capture of 975 ELS annually in rivers where spawning activity may take place. Drifting or dislodged ELS would be captured in the gear, identified, and preserved, and the excess of the authorized take would immediately be returned to the river. However, for purposes of evaluating the impact of research activity, all ELS taken would be characterized as non-viable, and thus be accounted for as intentional lethal takes of the directed research. Because researchers would check D-net sets at 3 hour intervals and egg mat twice a week, there would be minimal mortality of eggs or larvae, as well as by-catch. However, no adverse impacts to the physical environment would be anticipated. Due to their relatively small size, D-nets or egg mats would not disrupt the water flow or habitat, and the gear would be removed from the rivers once the authorized numbers of Atlantic sturgeon ELS was collected; whichever would come first.

The fecundity of Atlantic sturgeon has been correlated with age and body size (ranging from 400,000 to 8 million eggs (Smith et al. 1982, Van Eenennaam and Doroshov 1998, Dadswell 2006). However, Atlantic sturgeon likely do not spawn every year, as evidenced by multiple studies showing spawning intervals ranges from 1-5 years for males (Smith 1985, Collins et al. 2000b, and Caron et al. 2002) and 2-5 years for females (Vladykov and Greeley 1963, Van Eenennaam et al. 1996, Stevenson and Secor 1999).

The populations (if any) and sex ratio of Atlantic sturgeon in spawning rivers within the Proposed Action are largely unknown; therefore, it is important to be conservative when analyzing the impacts of removing eggs and larvae from the river systems. For that reason, if only 1 female sturgeon reproduces each year in a river, producing a minimal number of eggs (400,000), these proposed projects cumulatively would collect approximately 0.02% of the eggs produced in a year. As such, the request by the researchers to annually collect 975 Atlantic sturgeon eggs for documenting spawning activity is not expected to impact the biological environment and the ability of Atlantic sturgeon to survive.

4.2.1.16 *Effects of Proposed Capture and Incidental Mortality (or Serious Harm) to Adult and Juvenile Atlantic Sturgeon*

This section first summarizes total takes of Atlantic sturgeon occurring within the separate DPS boundaries assuming no overlap of stock is possible. Later, based on assumptions from mixed stock analyses taken from the Biological Opinion, we report on the potential impacts on individual DPSs of Atlantic sturgeon when animals are captured outside their natal DPS boundaries.

Records of Recent Past Atlantic Sturgeon Takes: The historical reported captures and incidental mortality of Atlantic sturgeon due to research activities was received from applicants and appears in Table 15 below. Some of these figures are expressed as estimates from recent years due to the unlisted status of Atlantic sturgeon and less accurate reporting. Further, as current applicants conducting Atlantic sturgeon research in the past have noted, the lack of standardized methods used when netting, such as no consistent constraints on gillnet soak time, or water temperature and dissolved oxygen concentration, likely led to higher mortalities than was experienced by other shortnose sturgeon studies when fishing under more conservative protocols.

Table 15. Recent historical catch and mortality of Atlantic sturgeon (juvenile and/or adults) reported by researchers prior to listing by the designated DPS.

File No.	Associated DPS Location	Total Prior Estimated Catch Annually	Recent Reported Incidental Mortality
16526	**GOM** (Merrimack River, Kennebec Complex, Penobscot and other coastal rivers)	~120	4 Juv and sub-adults (Over 5 years)
16323	**New York Bight DPS** (LI Sound & CT River)	~200	0
16422	**New York Bight DPS** (LIS, NY & NJ Coast)	~300 (In 2010)	0
16436	**New York Bight DPS** (Hudson River)	~200	1 Adult (Over 5 Years)
16438	**New York Bight DPS** Delaware River	~60	3 Juv (Over 5Years)
16507	**New York Bight DPS** (Delaware Bay & Coastal)	~175 (In 2010)	3 Sub-adults (In 2009)
16431	**New York Bight** (Delaware River)	~100	3 Juv (Over 5 Years)
16547	**Chesapeake Bay DPS** (Bay and Tributaries)	~250	10 Sub-adults (Over 5 Years)
16375	**Carolina DPS** (North Carolina Rivers)	~28	0
16442	**Carolina DPS** (South Carolina Rivers)	~30	0
16442	**South Atlantic DPS** (South Carolina Rivers)	~50	0
16482	**South Atlantic DPS** (Georgia Rivers & Coastal)	~2,400	~25 Juv (Over 5 Years)
16508	**South Atlantic DPS** (Florida/Georgia Rivers)	N.A.	N.A.
	Total	~3,593	~49 Over 5 Years

Summary of Proposed Takes of Atlantic Sturgeon By DPS: As depicted in Table 16 below, the Proposed Action requests authorization for capturing and performing further research on a total of 8,083 adult and juvenile Atlantic sturgeon coast-wide while incurring an annual loss of 13 juvenile Atlantic sturgeon and a loss of 3 adults over the life of the permits. Additionally, intentional lethal take of 675 ELS annually is totalized.

Table 16. Requested take of Atlantic sturgeon (juvenile and/or adults, & ELS) in the Proposed Action by DPS				
File No.	**Associated DPS Location**	**Proposed Number Atlantic Sturgeon Captured**	**Proposed Incidental Juvenile/Adult Mortality**	**Proposed ELS Mortality**
16526	**GOM** (ME, NH, MA Rivers & Coast)	**975**	2 Juv and 1 Adult[2]	200
16323	**New York Bight DPS** (LIS & CT River)	200	0	0
16422	**New York Bight DPS** (LIS, NY & NJ Coast)	285[1]	0	0
16436	**New York Bight DPS** (Hudson River)	925[1]	2 Juv	0
16438	**New York Bight DPS** (Delaware River)	284	1 Juv	50
16507	**New York Bight DPS** (Delaware River & Coast)	500[1]	0	350
16431	**New York Bight DPS** (Delaware River)	230	1 Juv	0
	Sub-total	**2,424**		
16547	**Chesapeake Bay DPS** (Bay and Tributaries)	**600**	2 Juv and 1 Adult[2]	25
16375	**Carolina DPS** (North Carolina Rivers)	200	0	0
16442	**Carolina DPS** (South Carolina Rivers)	160	0	100
	Sub-total	**360**		
16442	**South Atlantic DPS** (South Carolina Rivers)	190	0	
16482	**South Atlantic DPS** (Georgia Rivers & Coast)	3,474	5 Juv and 1 Adult[2]	250
16508	**South Atlantic DPS** (Florida/Georgia Rivers)	60	0	0
	Sub-total	**3,724**		
	Total	**8,083**	13 Juv and 3Adult[2]	975

1. Number of animals captured annualized and averaged over five years.
2. Number represents annual mortality or serious harm for juvenile Atlantic sturgeon; and mortality over the life of the permit for adult Atlantic sturgeon.

Summary of Proposed Takes of Atlantic Sturgeon By DPS:

(GOM DPS): In File No. 16526, GOM DPS researchers from four separate groups, each headed by respective CIs, are together proposing to study Atlantic sturgeon in three major river systems, in the GOM while also exploring other interconnecting rivers and coastal area of Maine, New Hampshire and upper Massachusetts. Each group has developed valuable experience over the recent past; however, there have been four mortalities of Atlantic sturgeon and one of shortnose sturgeon during the past five years in the Penobscot and Saco Rivers, ME. Thus, in anticipation of a much larger study area with increased netting activity; albeit, under more conservative permit conditions, an annual capture of 975 with an incidental mortality of two Atlantic sturgeon juveniles and up to one adult Atlantic sturgeon mortality over the life of the permit is requested in all rivers.

(New York Bight DPS): The New York Bight DPS includes the Connecticut River and Long Island Sound, Hudson River and Delaware River. There are six individual action areas defined by different applicants; therefore, in terms of resources and numbers of researchers, it represents the most studied DPS of the Proposed Action, partially because the DPS has the highest documented numbers of Atlantic sturgeon occurring within the species' historical range (ASSRT 2007). In total, there would be 2,424 total captures authorized and four incidental mortalities (or serious harm) to juvenile Atlantic sturgeon annually projected in studies within this DPS. In File 16436 (Hudson River), the New York State DEC is requesting two mortalities of juvenile Atlantic sturgeon annually due to increased netting efforts and a goal to generate a juvenile abundance estimate for the Hudson River. In File 16431, the applicant is requesting one juvenile Atlantic sturgeon mortality annually, justifying it based on increased captures and the recorded past incidences of mortality over the past five years. Likewise, the applicant in File

16438 is requesting one Atlantic sturgeon juvenile mortality annually based on the historical record of sturgeon mortalities experienced, the most recent being a shortnose sturgeon sub-adult in 2010.

(Chesapeake Bay DPS): Throughout the Chesapeake Bay (File 16547), an annual take of 600 captures with two Atlantic sturgeon juvenile mortalities is projected, plus one adult mortality over the life of the permit. The research team would be represented by CIs from five groups of researchers throughout the Maryland and Virginia sections of the Bay. The primary tributary in the Chesapeake Bay where Atlantic sturgeon research has taken place, however, has been the James River. Other Bay tributaries have largely been un-netted for several years, but netting by commercial fishermen, as reported by the Maryland and USFWS Reward Programs (Bryan Richardson; A. Spells; pers. comm.; July 2011), has netted over 2,000 Atlantic sturgeon in all areas of the Bay since 1996. Thus NMFS anticipates the proposed netting and number of captures through directed research to likely increase appreciably in the future. Recent annual mortalities for the last few years has ranged one to three fish in the James River; but while NMFS expects catches to go up with expanded directed research taking place, it expects mortalities to also stabilize when more conservative and consistent sampling protocols are practiced as mandated in researchers' permits.

(Carolina DPS): Researchers from North Carolina (File 16375) and South Carolina (File 16442) researching Atlantic sturgeon in rivers and estuaries of the Carolina DPS project a total annual capture of 360 Atlantic sturgeon with no anticipated mortality. Researchers in both states have experienced their largest catches to date during the 2010 and 2011 season and anticipate tagging as many sturgeon as possible for telemetry work in order to document the movements of Carolina DPS Atlantic sturgeon.

(South Atlantic DPS): A total of 3,724 Atlantic sturgeon are proposed to be annually captured in the South Atlantic DPS by researchers in South Carolina (File 16442), Georgia (File 16482) and Florida (File 16508) rivers. There are no mortalities projected in South Carolina and Florida rivers in respective research; however, five juvenile mortalities are projected from sampling in Georgia rivers annually, with no more than one adult mortality over the duration of the permit. Research in Georgia rivers would be the heaviest sampling in the Proposed Action annually. However, based on the 2010-2011 capture of approximately 2,400 Atlantic sturgeon from the Altamaha, Ogeechee, Satilla and St. Marys Rivers, the projected catch is expected to rise due to plans to sample the Savannah River in efforts for developing a similar population abundance estimate as has been done for the last five years in the Altamaha River.

Conclusions on the Proposed Take of Atlantic Sturgeon: The Proposed Action by researchers primarily is non-lethal take of Atlantic sturgeon; however, in part, because Atlantic sturgeon is a newly listed species for which its population status has not been fully realized across its range, and, as a species with delayed maturity, NMFS recognizes when issuing permits, the species could be potentially vulnerable to research impacts causing mortality. This is particularly true of adult mortality, the life stage having the highest reproductive value to each DPS.

Based on comparisons of past incidences of mortality reported by sturgeon researchers (Table 15 above), it is apparent that the risks of mortality have been greater for juveniles than for adults or sub-adults. This is true because the life history of Atlantic sturgeon creates difficulty when monitoring population trends over time because adults and sub-adults typically migrate from their natal rivers to marine habitat, typically after animals reach their second year class. Thus, juvenile stages have been subjected to more sampling pressure from sturgeon researchers monitoring populations in riverine habitat. This conclusion is also consistent with the sampling methods in the recent past and those proposed in the Proposed Action (Table 16, above). For example, in File 16436 (Hudson River) and File 16482 (Georgia Rivers), researchers are primarily targeting juvenile classes of Atlantic sturgeon generating juvenile population estimates. Consequently, NMFS does not anticipate increased pressure on the adult population, and this is also reflected in the lower projected mortalities for adult Atlantic sturgeon. In this regard for the Proposed Action, the total projected 13 juvenile Atlantic sturgeon mortalities; and 3 adult sturgeon mortalities over the five years of research are considered reliable estimates based on available historical data.

However, it is difficult to estimate how closely the actual numbers of Atlantic sturgeon taken might approach the proposed numbers based on recent historical catch of researchers. The differences (increase) in total proposed take range-wide, when compared with recent historical catch and experienced mortalities, potentially reflects longer range research goals at listing, as well as recent federal and state funding for Atlantic sturgeon research.

Also, because NMFS recognizes the status of individual sub-populations of Atlantic sturgeon have not been fully determined, to limit the impacts of research, permits would be conditioned requiring researchers to consult with the Permits Division bi-annually to insure annually authorized take is meeting conservation goals for the species related to authorized take. Specifically, permit conditions would follow the Conservation Recommendations suggested in the Biological Opinion addressing additional authorized take in future permitting actions for Atlantic sturgeon, stating the following:

> *Take Allocations:* Since Atlantic sturgeon DPSs were recently listed, there are no standardized past catch reports to examine and estimate how many takes will occur per unit effort. Before authorizing any additional permits for activities similar to those contained in the proposed permits, PR1 should require bi-annual progress reports. This frequent progress reporting can gauge whether researchers' actual take is matching up with their anticipated/authorized take. If actual take is lower than anticipated/authorized take, an amendment to the respective permit could be done to lower annual take for that respective permit.

Therefore, to ensure completion of a monitoring and reporting program to confirm NMFS is meeting its objective of limiting the extent of take and minimizing take from permitted activities, researchers would meet with the Permits Division bi-annually to review and confirm actual take of Atlantic sturgeon (including genetic origins) and impacts on other protected species. To accomplish these goals, permit conditions would include:

(1) A report results of all catch effort, including soak times, lengths and types of nets used (e.g., 3, 6, & 12 inch), temperature and D.O., numbers and species of fish captured, and any mortalities;
(2) A report of all genetic samples forwarded to the NOS Tissue Archive (Charleston, SC) or to geneticist with the past six (6) months, with any supporting genetic assignments.
(3) A report of any adverse effects resulting from this research on sea turtles or marine mammals under NMFS jurisdiction;
(4) A report on the level of anticipated and/or incidental take of shortnose sturgeon resulting from interaction with Atlantic sturgeon research.

4.2.1.17 Effects of Capture on Incidental Take of Atlantic Sturgeon from other DPS:
It is evident from the projected take in the Proposed Action that over 77% of captures of Atlantic sturgeon are proposed within waters of the New York Bight and the South Atlantic DPS, the systems having the healthiest populations of Atlantic sturgeon, and the focus of more intense research. However, because of mixing of adults and sub-adult juveniles in the DPSs occurring in both riverine and coastal waters, the distributions of animals from outside of natal waters generally overlap, mixing with one another. Thus, assumptions based on where animals are taken and the resulting impact on its DPS are not well linked because DPSs are not necessarily distinguished by capture location, but by genetic data and ecological separation defining the DPSs.

The following discussion is therefore taken from the biological opinion informing this EA about the DPS composition of mixed stocks of Atlantic sturgeon relative to their rivers and DPSs of origin. Conclusions are made with respect to the anticipated percentages of Atlantic sturgeon that would be incidentally taken by researchers from each of the five designated DPSs when authorized for research within the boundaries of a given DPS.

Mixed Stock Analysis from Individual DPSs: Mixed Stock Analysis (MSA) in the Biological Opinion is used to estimate the proportion of each baseline population in a mixed sample of fish of unknown origin estimating the probability of each individual belonging to each of the baseline stocks. The baseline of known potential genotypes of Atlantic sturgeon in each of the DPSs were compared across the U.S. and Canada with individual-based genetic assignments collected from Atlantic sturgeon captured in directed research or in fisheries bycatch from rivers and marine areas of each of the DPSs. Specifically, the results in the Biological Opinion's analysis is based on recent genetic assignment studies including Grunwald *et al*. 2008, Grunwald *et al.* 2009, King *et al*. 2001, Waldman *et al.* 1996, Wirgin *et al*. 2000, and two workshop presentations entitled Mixed Stock Analysis (MSA) of Atlantic Sturgeon from Coastal Locales and a Non-Spawning River by Wirgin and King (2011) and Conservation Genetics and Genomics of the Acipenseridae: Population Genetics, Phylogeography, and Transcriptomics by King (2011). These presentations also focused on the results of Wirgin and King's genetic research not currently published at the time of the Biological Opinion.

However, since genetic analyses are not available for all areas where researchers propose capturing Atlantic sturgeon, the Biological Opinion also developed models about the ratios of expected catch in areas based on: (1) the available MSAs from the literature, (2) conference presentations, and (3) personal communications. The process of applying each available MSA to each DPS and in turn, to each proposed permit in this Proposed Action was subsequently conducted.

Takes Allocated for Each Permit: The expected ratios of animals captured by researchers are included in Appendix 2 for each proposed permit. These ratios form the basis of the expected origins of Atlantic sturgeon captured from other DPSs and those natal to the local DPSs. Researchers would be required to report on the genetic origins of their takes within annual reports; however, in order to process the workload for genetic analyses in order to understand what DPS the takes are coming from, researchers would be required to submit the samples (within six months of capture) to the NOS Tissue Archive and if planned, the CIs on their permits capable of determining genetic origins.

The Biological Opinion for this Proposed Action acknowledges that there are temporal components for assigning take allocations based upon timing of research during the year, and also the timing of captured for which the genetic analyses is relied upon. Although, at this point, we do not have sufficient information to incorporate a temporal component into how we analyze mixed stock allocations for Atlantic sturgeon, NMFS anticipates that, in the future, our exposure analyses would be better developed as more genetic information is analyzed and incorporated into the analyses from a wider array of sampling locations.

Total Takes Allocated per DPS for all Permits: After applying MSAs and/or modeling assumptions and calculating takes per DPS for each permit, we calculated total takes of Atlantic sturgeon per DPS for all permits and all life stages. Table 17 below reflects the origins of proposed capture per DPS in the Proposed Action.

Table 17. Total Atlantic sturgeon takes per DPS for all permits and all life stages (adult, sub-adult, juvenile, ELS).

DPS	Takes per year for 5 years	Permit year
Gulf of Maine	1,033-1,036	Year 1-5
New York Bight	2,243-2,277 2,268-2,302 3,218-3,252	Year 1 Year 2 & 3 Year 4 & 5
Chesapeake Bay	633-640	Year 1-5
Carolina	410-414	Year 1-5
South Atlantic	4,181-4,332	Year 1-5

4.2.1.18 Effects on Non-Target Species

Each individual permit would contain mitigation developed for avoiding adverse impacts to each of the taxa or species listed where applicable. Since the project area as a whole within the Proposed Action encompasses much of the East Atlantic Coast of the United States, some interactions and impacts are more likely than others based on individual non-target species habitat and range.

Table 18 below differentiates between permits having standard mitigation conditions and those containing additional measures (in bold). Both the standard and additional mitigating conditions for each taxa or species are highlighted in this section.

Table 18	Standard and additional mitigation conditions applied to proposed Atlantic sturgeon permits					
Permit No.	**Sea Turtle**	**Marine Mammal**	**Shortnose Sturgeon**	**Florida Manatee**	**Atlantic Salmon**	**By Catch Species**
16526	Yes	Yes	Yes	N/A	**Yes**	Yes
16323	Yes	Yes	Yes	N/A	N/A	Yes
16436	Yes	Yes	Yes	N/A	N/A	Yes
16422	**Yes**	Yes	Yes	N/A	N/A	Yes
16438	Yes	Yes	Yes	N/A	N/A	Yes
16431	Yes	Yes	Yes	N/A	N/A	Yes
16507	**Yes**	**Yes**	Yes	N/A	N/A	Yes
16547	**Yes**	Yes	Yes	N/A	N/A	Yes
16375	**Yes**	Yes	Yes	**Yes**	N/A	Yes
16442	Yes	Yes	Yes	**Yes**	N/A	Yes
16482	**Yes**	Yes	Yes	**Yes**	N/A	Yes
16508	Yes	Yes	Yes	**Yes**	N/A	Yes
Bold indicates additional measures apply						

***(1) Effects on Sea Turtles*:**

NMFS PR concludes that the potential of the proposed Atlantic sturgeon research for capturing a green, Kemps ridley, loggerhead, leatherback and hawksbill sea turtles would vary with the individual authorized actions within the Proposed Action. This would depend largely on the natural distribution of sea turtles, as well as differences in environmental, temporal or spatial factors associated with each research proposal (e.g., the timing or location of sturgeon sampling during spring, fall, summer or winter, or differences in salinities selected for sampling would impact sea turtles differently). Additionally, differences in capture methods or other research methods utilized would impact sea turtles differently.

Table 19 below summarizes NMFS PR's assessments that each of the research proposals would potentially have on sea turtles and numbers of sea turtles expected to be captured.

Table 19: NMFS PR assessments of sea turtle impacts from proposed Atlantic sturgeon research *(NLAA= Not likely to adversely affect; MA=May affect)*

File No.	Location of Action Area	Assessment	Anticipated Annual Take
16526	Gulf of Maine Rivers	NLAA	0
16323	Connecticut Rivers & Long Island Sound	NLAA	0
16422	Coastal Waters off Long Island Sound and New Jersey to Delaware River	NLAA	0
16436	Hudson River: NY Harbor to Troy, NY	NLAA	0
16431	Delaware River Estuary	NLAA	0
16507	Delaware Bay and Coastal Waters	NLAA	0
16438	Delaware River Estuary	NLAA	0
16547	Chesapeake Bay and Rivers (MD & VA)	MA	2*
16375	North Carolina Rivers and Albemarle Sound	NLAA	0
16442	South Carolina Rivers	NLAA	0
16482	Georgia Rivers and Coastal Waters	MA	2*
16508	Florida/Georgia Rivers and Coastal Waters	NLAA	0

* Takes in permits represent incidental capture of up to 2 total takes annually, including: 2 loggerheads, or 1 loggerhead PLUS 1 green, OR 1 leatherback, OR 1 hawksbill, OR 1 Kemp's ridley, over the course of each permit. Takes do not include mortality, but would include responses ranging from very mild short-term stress to short term minimal injury from capture.

Standard and Additional Conditions Added to Permits Protective of Sea Turtles:

The following standard and additional mitigation conditions would be applied to all of the Atlantic sturgeon permits minimizing impacts on turtles and supporting NMFS' assessment of research impacts on sea turtles.

A Standard Conditions Protecting Sea turtles Applied to All Permits:

- In all boating and research activities within the study area, a close watch must be made for sea turtles to avoid interaction and harassment. (See other protective measures for sea turtles at: http://www.nero.noaa.gov/prot_res/mmv/Aug%2025%202010%20Rec%20Broch.pdf)
- Vessels must only travel at a slow enough speed while engaged in acoustic monitoring to avoid posing a vessel strike risk to sea turtles.
- Nets may not be deployed, or must be removed if deployed, if a sea turtle is sighted within the netting area, unless they are on seen to be on a path moving away.

- Interactions with sea turtles should be documented including any pertinent detail (species, type of interaction, location, date, size, water & air temp, any obvious patterns and photos if possible (see Appendix 5: Sea Turtle Interaction Report)
- When temperatures are ≥15°C and netting in estuarine areas within 20 km from open ocean, or in areas where sea turtles have been documented, researchers must check nets every 30 minutes to prevent lethal sea turtle interactions, regardless of the total netting duration.
- If a sea turtle is incidentally captured during netting, the Permit Holder, Principal Investigator, Co-investigator(s), or Research Assistant(s) acting on the Permit Holder's behalf must use care when handling a live turtle to minimize any possible injury; and appropriate resuscitation techniques must be used on any comatose turtle prior to returning it to the water. All sea turtles must be handled according to procedures specified in 50 CFR 223.206(d)(1)(i).
- In the event a captured sea turtle dies, or is severely injured, all permitted activities must cease and researchers must contact the appropriate NOAA Regional or State marine mammal and/or sea turtle stranding networks identified in the respective permit, as well as the Chief, of the Permits Division and/or the permit analyst at (301) 427-8401.

B. Additional Sea Turtle Conditions Applied to Specific Permits:

Permit 16547 (Chesapeake Bay and Rivers (MD & VA)):

- Up to 2 total takes annually, including: 2 loggerheads, or 1 loggerhead PLUS 1 green, OR 1 leatherback, OR 1 hawksbill, OR 1 Kemp's ridley, over the course of the permit. Takes do not include mortality**.** A take includes responses ranging from very mild short-term stress to short term minimal injury from drift net gear capture.
- Sea turtles must be removed from the gear immediately, and after evaluation, released.

Permit 16375 (North Carolina Albemarle Sound and Rivers and Cape Fear River):

- To avoid sea turtle interactions on the Albemarle Sound, researchers must tend nets continually during daylight hours.
- To avoid sea turtle interactions in the Cape Fear River, researchers may not net in waters south of Wilmington, North Carolina.
- To avoid sea turtle interactions in Albemarle Sound, researchers must net seasonally as illustrated in Table 20 following.

Table 20: Summary of Seasonal Netting Conditions to Avoid Sea Turtles in the Albemarle Sound (A.S.)

Location	Season	Minimum D.O. Level (mg/L)	Maximum Temperature
Western A.S.[1]	Early Spring (Mar 1-May 31)	4.5	<25°C
Eastern A.S.[2]	Fall/Winter (Nov 1 – Feb 28)	4.5	<15°C

1. The boundary for the western A.S. sampling area extends from the mouths of the Roanoke and Chowan Rivers to a distance 6 km downstream of these rivers.
2. The boundary of the eastern A.S. sampling area extends from a north-south line crossing the A.S. at Point Harbor, NC (Currituck County) to Mashoes, NC (Dare County), westward to a distance 6 km downstream of the mouths of the Roanoke and Chowan Rivers.

Permit 16482 (Georgia/Florida Rivers and Coastal Waters):

- Up to 2 total takes annually, including: 2 loggerheads, or 1 loggerhead PLUS 1 green, OR 1 leatherback, OR 1 hawksbill, OR 1 Kemp's ridley, over the course of the permit. Takes do not include mortality**.** A take includes responses ranging from very mild short-term stress to short term minimal injury from capture in gillnet, trammel net or drift net.
- Sea turtles must be removed from the gear immediately, and after evaluation, released.

Summary of Effects of Capturing a Sea Turtle: NMFS concludes that proposed Atlantic sturgeon research methods in File 16547 and 16482 may likely adversely affect sea turtles. In these respective action areas, when sea turtles may be present in the systems at greater than15^{o}C, they would likely not be subject to lethal capture with either anchored gill net or drift-nets when fished in coastal areas of the Chesapeake Bay or in tributaries between river kilometer 0 and 20 (File 16547). Similarly, in Georgia rivers (File 16482), proposed netting with anchored gill nets and drift gill nets may potentially catch sea turtles between river kilometer 0 and 20. Within these zones, anchored net sets would be set for 30 minutes or less between checks and would be tended when turtles are present; whereas drift nets would be fished "floating" at the surface, constantly tended by the research team. However, if a turtle were captured, the potential for mortality or serious harm of the turtle would be considered minimal in each action area. Additionally, personnel handling turtles would be trained in resuscitation techniques for turtles and thus, none would be expected to be at risk of mortality.

After reviewing the current status of sea turtles in the Proposed Action, the environmental baseline for the action area, the effects of the take authorized in this permit, and probable cumulative effects, it was NMFS' biological opinion that issuance of the permits with incidental take of two sea turtles as described in the permits, would not reduce the likelihood of the survival and recovery of the sea turtle populations or the continued existence of the species (Please refer to accompanying biological opinion).

(2) Effects on Marine Mammals

Of the highlighted species of marine mammals in the EA, bottlenose dolphin, gray seal, harbor seal, and harbor porpoise are the most abundant marine mammal species potentially encountered by the proposed research. Seals and harbor porpoise are more highly concentrated in the northern Atlantic locations for research, particularly in the GOM, and extending rarely down to North Carolina. Bottlenose dolphin, however, although rare in the GOM, extend their range commonly along the entire U.S. east coast. However, only occasionally are any of the species reported in upriver locations affected by netting activities proposed for Atlantic sturgeon. Rather, threats are more frequently encountered from boaters and commercial fishers in downstream coastal and near-shore areas.

NMFS does not anticipate serious interactions with marine mammals a result of the Proposed Action, however, as precautionary measures, researchers would agree to permit conditions when netting in coastal or estuarine areas to: (1) Limiting sampling in close proximity (<1km) to known seal haul outs; (2) Limiting disturbance of animals or deployment of netting when animals are observed resting or sighted in the water within the vicinity of the research; (3) Allowing animals to either leave or pass through the area safely before netting is deployed; (4) Attending and monitoring netting activities continuously during deployment; (5) Checking nets frequently subject to NMFS environmental conditions designed to mitigate interactions, or when a disturbance in the net is observed indicating an animal has been captured; (6) Ceasing netting if a marine mammal is sighted after deployment within a 100 meter radius of the research vessel or net; (7) Resuming netting only after the animal were no longer within this safety zone, or 30 minutes has elapsed since the animal was last observed within the safety zone; (8) Pulling nets immediately should an animal not leave the area; and (9) Reporting any serious interactions with marine mammals and contacting sanctioned marine mammal stranding programs for immediate assistance when capturing a marine mammal

Additionally, applied to all boating activities of each applicant— including travel to acoustic receiver arrays outside of the netting area — researchers would be advised to reduce speed of vessels, keeping a close watch for marine mammals to avoid harassment or interaction from boating activity. Additionally researchers are advised to review the *NMFS Guidelines for Viewing Marine Mammals* http://www.nero.noaa.gov/prot_res/mmv and at http://www.nmfs.noaa.gov/pr/education/regional.htm).

Conditions specific to File 16507: Proposed gill netting in nearshore coastal waters of Delaware alerted NMFS to request voluntary mitigation measures of the applicant to further minimize potential bycatch risks to marine mammals when fishing in coastal waters. The applicant included gear modifications for compliance with the Atlantic Large Whales Take Reduction Plan (50 CFR 229.32) and the Mid-Atlantic Harbor Porpoise Take Reduction Plan (50 CFR 229.34). The applicant would set nets and constantly tend nets for 7-10 hours per day, checking them at two to three hour intervals. Additionally, he proposes in his application to feature the use of pingers on netting gear. The research would take place from the end of March to mid-May when water temperatures would be reduced. These provisions would be added to the permit as mitigating conditions to Permit No. 16507.

Pinniped specialist Dr. Gordon Waring (NMFS NEFSC, pers. comm.) was contacted by NMFS PR (email on July 29, 2011) and was asked if there were particular concerns for seal interaction for the research application, given the proposed location off the coast of Delaware and time of year. Additionally, he was asked for any further recommendations for reducing the likelihood of seal interactions (e.g., shorter soak times, more frequent net checks, etc.).

In response, he suggested he was not aware of any harbor or gray seal haul-out sites off the coast of Delaware, and he was only familiar with rare strandings in Delaware. He also suggested there are several harbor seal haul-out sites along the NJ coast, and was recently informed of a new harbor seal haul-out site off Oregon Inlet, NC. Further he said seals usually depart NJ-NY by late April, moving back into New England waters. He concluded that he did not believe seal interactions with the proposed research would be of notable concern, but did request adding to the permit a condition asking researchers to provide the NEFSC reports, including digital photographs of any marine mammal interaction. This reporting requirement would also be placed in all permits issued in the Northeast and Mid-Atlantic waters under NMFS jurisdiction where marine mammals occur as a monitoring condition.

NMFS PR believes these measures in total would lessen the probability of interacting or harming marine mammals while sampling Atlantic sturgeon. However, should incidental or adverse harassment of a marine mammal occur, the permit holder would be required to stop research and contact NMFS within two business days.

(3) ***Effects on Shortnose Sturgeon*:**

Shortnose sturgeon are currently listed as an ESA endangered species under NMFS jurisdiction, co-occurring with Atlantic sturgeon in most rivers described in the Proposed Action. Kahn and Mohead (NMFS 2010) documented research impacts to develop consistent research protocols for researchers when studying shortnose, Atlantic, Gulf and green sturgeon. Atlantic and shortnose sturgeon were documented to be comparable species reacting similarly to stresses and threats when exposed to common standard sturgeon research methods; thus, when taken in the same action, the impacts from research on each species are measured similarly.

Scientific research conducted on shortnose sturgeon has been evaluated during numerous ESA section 10(a)(1)(A) consultations for research permits authorized by NMFS. Currently, there are 16 such permits issued authorizing directed take of shortnose across its range as outlined in Appendix 1. A large majority of researchers applying for an Atlantic sturgeon permit in the Proposed Action are currently authorized to also take shortnose sturgeon under separate ESA section 10(a)(1)(A) permits. Consequently, the cumulative impacts on shortnose and Atlantic sturgeon resulting from concurrent takes of each species in the same study would be measured through the separate permitting processes, and the biological opinions measuring the cumulative impacts on either species would be accounted for separately when taken in directed research on each species.

Also, as stated previously when discussing the research impacts on Atlantic sturgeon, the level and frequency of take would not necessarily increase impacts to shortnose sturgeon upon issuance of 12 new ESA permits authorizing study of Atlantic sturgeon. If when existing permitted limits of shortnose sturgeon were met as researchers concurrently target Atlantic sturgeon in an action area within the overlapping range of the two species, researchers would be required to cease studies of both species until either, modifying their permit or restarting annual research at the next anniversary of permit issuance.

However, there are four individual applicants for Atlantic sturgeon permits in the Proposed Action not currently possessing an ESA permit to take shortnose sturgeon in File Nos. 16422, 16507, 16547, and 16508. Although shortnose and Atlantic sturgeon overlap parts of these individual action areas, varying potential exists for incidental take of shortnose sturgeon related to the sampling location for Atlantic sturgeon. This is the case with File Nos. 16422 and 16507 in the New York Bight DPS, however, where shortnose sturgeon do not frequent the marine part of the action areas where Atlantic sturgeon would be targeted. In File No. 16422, researchers would target Atlantic sturgeon with trawls in marine coastal areas off the Long Island Sound in Connecticut and New York waters and off the New Jersey Coast extending to the Delaware River (See location in Appendix 3, Figure 4). Additionally, in File No. 16507, researchers would target Atlantic sturgeon in the lower Delaware Bay and also in off-shore waters along the Delaware Coast (See location in Appendix 3, Figure 8.) However, based on past telemetry evidence suggesting shortnose sturgeon do not commonly occur in these areas, NMFS does not anticipate interactions with shortnose sturgeons in either of these locations, and thus, discounts the potential of incidental captures of shortnose sturgeon.

However, in File Nos. 16547 (Chesapeake Bay, VA & MD) and 16508 (St Marys, Nassau and St Johns Rivers, FL) the potential does exist to take shortnose sturgeon in the respective action areas and cannot be ruled out by the proposed methods or areas fished when targeting Atlantic sturgeon. Thus, Chesapeake Bay researchers (File 16547) (See location in Appendix 3, Figure 9), lack permit authority to take shortnose sturgeon currently throughout much of the action area (with exception of Permit No. 14176 in the Potomac River), and would therefore need authorization for incidental capture of four (4) shortnose sturgeon through the biological opinion produced for the Proposed Action. However, no mortality or serious harm of shortnose sturgeon would be authorized in the incidental take provision of the permit.

Similarly, in File 16508, the applicant lacks current permit authority for taking shortnose sturgeon in the St. Marys, Nassau and St. Johns Rivers in Florida (See location in Appendix 3, Figure13). Although the status of shortnose sturgeon in these southern rivers remains uncertain, both shortnose and Atlantic sturgeon have been recently documented in the St. Marys River, although in very low numbers (Fritts and Peterson 2011). Consequently, authorization for incidentally capturing one (1) shortnose sturgeon would be a part of the proposed permit for File 16508.

The applicants would monitor gear closely, and if a shortnose sturgeon were captured in efforts targeting Atlantic sturgeon in these rivers, NMFS would require the same standard conditions in permits used for ensuring survival of both species (Kahn and Mohead 2010), however, no additional research would be authorized before releasing the animal unharmed. Further, in the event the number of incidental takes were exceeded or if a serious injury or mortality of a shortnose sturgeon occurred, the permit holder would need to suspend all permitted activities. The permit holder would then be required to report the incident to the Permits Division within two business days and also to submit a written incident report. The Permits Division would then either allow permitted activities to resume with modifications, or revoke the permit based on review of the incident report and in consideration of the Terms and Conditions of the permit.

NMFS biological opinion concluded after reviewing the current status of shortnose sturgeon in the action area for File 16547 and File 16508, the environmental baseline for the action areas, and probable cumulative effects, the incidental capture of shortnose sturgeon in these rivers would not reduce the likelihood of the survival and recovery of its populations in the wild and would not likely jeopardize the continued existence of this species.

***(4) <u>Effects on West Indian Manatee</u>*:**

The following conditions were offered by the USFWS for minimizing interaction and harm to the species and any critical habitat affected by the Proposed Action. The USFWS (October 6, 2011) reviewed the proposed action and informed NMFS PR it concurred that the proposed permits (File Nos. 16375, 16442, 16482, or 16508) "would not adversely impact manatee."

(A) <u>Methods to avoid capture of Florida manatee:</u>

- Vessel personnel must be informed it is illegal to intentionally or unintentionally harm, harass, or otherwise "take" manatees, and to obey all posted manatee protection speed zone, Federal manatee sanctuary and refuge restrictions, and other similar state and local regulations while conducting in-water activities. Such information shall be provided in writing to all vessel personnel prior to beginning the permitted research.
- Crew involved in research activities must wear polarized sunglasses to reduce glare while on the water and keep a look out for manatee. The crew shall include at least one member dedicated to watching for manatee during all in-water activities.
- All vessels engaged in netting and trapping shall operate at the slowest speed consistent with those activities.
- Researchers must avoid conducting research over, on, or near adjacent to sea grass species.
- Rope attaching floats to nets should not have kinks or contain slack that could present an entanglement hazard to manatee.
- All nets must be continuously monitored except as noted in North and South Carolina in freshwater locations below 15°C[5].

5 Nets may be deployed in North Carolina and South Carolina for 14 hours overnight, unattended, however, only when in freshwater and in water temperatures less than 15 ºC; but nets must be monitored continuously in daylight for up to 10 hours

- Netting activities must cease if a manatee is sighted within a 100-foot radius of the research vessel or the net, and may resume only when the animal is no longer within this safety zone, or 30 minutes has elapsed since the manatee was last observed within the safety zone.

B <u>Methods to avoid injury if a manatee is captured</u>:

- Devote all research staff efforts to freeing the animal. Remember that a manatee must breathe and surface approximately every 4 minutes. The PI must brief all research participants to ensure that they understand that freeing a manatee can be dangerous. This briefing will caution people to keep fingers out of the nets, that no jewelry should be worn, that they be careful to stay away from the manatee's paddle, and that they give the animal adequate time and room to breathe as they are freeing it.
- As appropriate, turn off the vessel or put engine in neutral to avoid injury.
- Tension on the net should be released allowing the animal to free itself. Caution should be used when attempting to assist an animal freeing itself. Manatees are docile animals but can thrash violently if captured. A 1,200 to 3,500 pound manatee can cause extensive damage to nets attempting to escape or breathe; quick action is essential for protecting both the manatee and the net. Ensure the animal does not escape with net still attached.
- For immediate assistance with a captured animal, contact the appropriate Marine Mammal Stranding Program (i.e., in South Carolina, contact 800-922-5431; in North Carolina, contact 910-254-5713; in Georgia, contact 912-269-7587; and in Florida, contact 888-404-3922. Also, to report any gear or vessel interactions or sighting of manatees, contact Nicole Adimey (USFWS) at 904-731-3079 (weekdays); 904-655-0730 (cell); fax 904-731-3045. Also contact NMFS, Chief, Permits, Conservation and Education Division at 301-713-2289 as soon as possible.
- Interactions with manatee must be documented with location, date, estimated size, water & air temp, any scar patterns and photos if possible (See Appendix 6: Manatee Sighting Report).

***(5) <u>Effects on Atlantic Salmon in the GOM</u>*:**

As indicated, endangered Atlantic salmon in the GOM DPS could be affected by proposed Atlantic sturgeon netting activities (File 16526) in the Kennebec complex and the Penobscot River system and in intervening rivers and marine areas (See online map location below depicting proposed action areas including netting sites and history of Atlantic salmon interaction by applicants.) [6]

The abundance of Atlantic salmon in the GOM DPS has been low and either stable or declining over the past several decades. The proportion of fish of natural origin is very small (approximately 10%) and is continuing to decline. The conservation hatchery program has assisted in slowing the decline and helping to stabilize populations at low levels, but has not contributed to an increase in the overall abundance of salmon and has not been able to halt the decline of the naturally reared component of the GOM DPS. Further, the majority of returns are primarily to the Penobscot River, accounting for 91 percent of all adult returns to the GOM DPS in 2007 (USASAC 2008).

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when deployed in water with > 2ppt salinity and > 15 ºC.

6 http://maps.google.com/maps/ms?ie=UTF8&hl=en&vps=1&jsv=255b&oe=UTF8&msa=0&msid=107419381652978988335.0004898db79ec5c46aa9b

Contributing to the cumulative impacts on Atlantic salmon are currently two scientific permits for research conducted on shortnose sturgeon issued by NMFS in both river systems as well as a NMFS funded section 6 research grant for studying Atlantic sturgeon in the GOM (Appendix 1). Other cumulative impacts on salmon in the GOM, including dams, water quality, aquaculture, fisheries (including research on other managed species such as striped bass), and industrial development are discussed in the Section 4.7.2 of this EA.

The following measures for minimizing impacts on Atlantic salmon from Atlantic sturgeon and shortnose sturgeon research in the GOM were contributed by Atlantic salmon biologists from NMFS' Northeast Regional office in Orono, Maine. These would appear in the permit for File 16526.

(A) **Kennebec River Complex**:

The Kennebec River complex consists of the Androscoggin, Kennebec and Sheepscot Rivers and estuarine complex, the second largest drainage in the state behind the Penobscot River watershed. The applicant stated in the Kennebec complex, between 1977 and 2009, that there had been a total of 945 directed sets for shortnose and Atlantic sturgeon using similar gill netting methods proposed in the current Atlantic sturgeon research. These efforts resulted in three Atlantic salmon captured as bycatch with no mortalities, the last salmon reported captured in 1979.

Evidence from telemetry studies indicates adult salmon tend to swim in the upper water column at mean depths 3.7–4.0 m and tend to congregate in known areas from year to year (Gowans et al. 1999; and Sturlaugsson 1995). Thus, in order to minimize capture of Atlantic salmon in the Kennebec complex action area of the GOM where interactions with Atlantic salmon might occur, the applicant would adhere to the following specific conditions:

- Avoid fishing in documented locations of the Kennebec complex where Atlantic salmon have been encountered in the past (i.e., Sand Island @ < 43.914465,-69.727821>; Pine Island @ < 43.914465,-69.727821>; and Fort Halifax Park @ <44.54482,-69.627271>).
- Avoid fishing within 0.5 miles upstream or downstream of the confluences of the Kennebec River and Bond Brook, and also fish at least 0.5 miles below Lockwood Dam;
- Fish gillnets in main channels of rivers and bays of the Kennebec Complex at depths greater than 20 feet at low tide. Nets may also be fished in areas characterized as "mudflats," off main channels in waters less than 10 feet at low tide;
- Fish according to NMFS's netting guidelines protective of both sturgeon and salmon; however, researchers would continuously monitor nets, limiting net sets typically to one hour before checking, and also removing any captured animal at time of capture;
- Deploy D-nets by anchoring on the deepest channel bottoms downstream of known or suspected sturgeon spawning areas to avoid drifting salmon smolt near the surface.

Additionally, to further reduce potential for harming Atlantic salmon in the Kennebec complex, the applicant proposes other conservative measures, including: (1) constantly monitoring nets, (2) removing animals from drift nets as soon as capture is recognized; (3) deployed anchored gill nets would be set for six hour durations between 0 and 15^{o}C and checked at three hour intervals; (4) anchored gill nets would be set at three hour durations and checked at 1.5 hour intervals at water temperature between 15and 20^{o} C; and hourly between 20 and 26^{o}C.

(B) **Penobscot River:**
In May 2006, researchers at the University of Maine—co-investigators in the current Atlantic sturgeon permit application—began a study of the distribution, abundance, and movements of Atlantic sturgeon in the Penobscot River. In 576 hours of fishing, two Atlantic salmon and 59 unauthorized shortnose were captured (with one salmon mortality) in waters where the Biological Opinion did not anticipate Atlantic salmon. Research was suspended until a scientific research permit (Permit 1595) for shortnose sturgeon was issued eliminating take prohibitions on shortnose sturgeon and Atlantic salmon. The new permit authorized capture of up to 100 shortnose sturgeon and four conservation hatchery Atlantic salmon annually in the Penobscot from 2007 to 2012; and has also been modified several times since, most recently on January 2011. Currently the permit does not authorize any take of Atlantic salmon, however. And after adding further provisions for minimizing interaction with Atlantic salmon, there have been no Atlantic salmon captured by the researchers during the past five years.

The ongoing permit conditions limiting interaction with salmon when netting Atlantic and shortnose sturgeon would also be adhered to in the Atlantic sturgeon permit, including the following specific mitigating conditions:

- Set nets beyond 0.5 miles upstream or downstream of the confluences of the Penobscot River and Cove Brook, Kenduskeag River, Ducktrap River, or Meadow Brook;
- Fish only 12" mesh from the Waterworks at the site of the former Bangor Dam upstream to the Veazie Dam.
- Fish six or 12 inch (stretched gill or trammel) nets in main channels and bays of the Penobscot River and estuary anchored at depths greater than 20 feet at low tide. Nets may also be fished in areas characterized as mudflats, off main channels in waters less than 10 feet at low tide.
- Avoid fishing in documented locations of the Penobscot River where Atlantic salmon have been encountered in the past (i.e., in shallower, non-channel waters of Oak Point Cove @44.667005,-68.822994; and Graham Station @44.821459,-68.7087215);
- Deploy D-nets by anchoring on the deepest channel bottoms downstream of known or suspected sturgeon spawning areas to avoid drifting salmon smolt near the surface.

Additionally, to further reduce potential for harming Atlantic salmon in the Kennebec complex, the applicant proposes other conservative measures, including: (1) constantly monitoring nets, (2) removing animals from drift nets as soon as capture is recognized; (3) deployed anchored gill nets would be set for six hour durations between 0 and 15^{o}C and checked at three hour intervals; (4) anchored gill nets would be set at three hour durations and checked at 1.5 hour intervals at water temperature between 15and 20^{o} C; and hourly between 20 and 26^{o}C.

Summary**:** NMFS PR concludes, based on the methods proposed by researchers in the GOM, and their demonstrated limited interactions with Atlantic salmon over an extended period of time, adherence to the above measures would likely minimize potential future salmon interactions; and thus, no incidental capture or mortality for Atlantic salmon would be authorized. NMFS PR contacted the NMFS Northeast Region (Orono, ME) requesting Atlantic salmon specialists (Jeff Murphy and David Bean) analyze the potential impacts of research proposed in the action areas of File 16526 on GOM DPS Atlantic salmon. They concurred with our conclusions by email (received December 7, 2011), stating that "overall, NMFS does not expect the proposed Atlantic sturgeon sampling effort in the GOM would result in increased interactions with Atlantic salmon so long as the recommended gear modifications and proposed area restrictions with protective measures were adhered to."

NMFS believes any Atlantic salmon captured in gillnets during sturgeon research would suffer short-term stresses posing a potential risk to the salmon. Further, any incidentally captured Atlantic salmon must be released back to the river alive while being cut free from the net mesh and held in the water to the maximum extent practical. Should an Atlantic salmon be incidentally taken during netting, researchers must suspend operations immediately and notify NOAA Fisheries Northeast Region Protected Resources Division, Jeff Murphy at (207) 866-7379 (Jeff.Murphy@noaa.gov) and the Chief, NMFS Permits Division, Office of Protected Resources at (301) 427-8401 within 48 hours of capturing an Atlantic salmon.

(6) <u>Effects on Non-Listed By-catch Species:</u>

Because nets would typically be checked at short intervals, and all bycatch would be recovered to be released alive, NMFS does not consider impacts on non-listed bycatch to be significant (See Appendix 4 documenting potentially encountered non-listed by-catch species).

4.2.1.19 Environmental Consequences to Critical Habitat

***(1) <u>Effects on Atlantic Salmon Critical Habitat</u>*:**

As stated previously, critical habitat is defined as specific areas containing physical and biological features essential to the conservation of the species. Primary Constituent Elements (PCE's) for critical habitat identified in the GOM DPS Atlantic salmon include factors essential for the conservation of the species. Within the occupied range of the Gulf of Maine DPS, Atlantic salmon PCEs are regarded as providing: (1) sites for spawning and incubation, (2) sites for juvenile rearing, and (3) sites for unobstructed migration. A detailed review of the physical and biological features required by Atlantic salmon is provided in Kircheis and Liebich (2007). Also, the description of Atlantic salmon critical habitat is illustrated online at the location highlighted in the page notes below[7].

The critical habitat relevant to the proposal within File 16526 focuses on providing unobstructed migratory pathways for Atlantic salmon adults and smolts. Thus, NMFS PR identifies specific PCE factors, drawing conclusions about Atlantic sturgeon research potentially impacting Atlantic salmon critical habitat.

- **<u>Freshwater and estuary migratory sites free from physical and biological barriers delaying or preventing access of adult salmon seeking spawning grounds needed to support recovered populations.</u>**

This factor is related to adult Atlantic salmon returning to their natal rivers or streams requiring migration sites free from barriers obstructing or delaying passage to reach their spawning grounds at the proper time for effective spawning (Bjornn and Reiser, 1991). Migration sites free from physical and biological barriers are essential to the conservation of the species because without them, adult Atlantic salmon adults would not be able to access spawning grounds needed for egg deposition and embryo development. The extent adult salmon migration would be blocked by the proposed fisheries research, is relevant to the impacts on critical habitat.

NMFS PR examined the potential for the research obstructing migratory pathways between adjacent riverine and estuarine critical habitat units and concludes the research nets present a small barrier in place relative to the size of the area available for salmon migration. Additionally nets are checked at short intervals when in use, or immediately, if an animal is captured, and is therefore not a permanent structure. Moreover, gill netting employed by researchers has been conditioned in current permits to

7 http://www.nmfs.noaa.gov/pr/species/fish/atlanticsalmon.htm.

successfully limit seasonal interaction within the Atlantic salmon migratory pathways as evidenced by the small numbers of salmon netted historically. Consequently, NMFS does not believe netting activities in the proposed research would affect the ability of the critical habitat to provide unobstructed migratory pathways for adult Atlantic salmon.

- **<u>Freshwater and estuary migration sites free from physical and biological barriers delaying or preventing emigration of smolts to the marine environment</u>:** (Note: This feature is essential to the conservation of the species because Atlantic salmon smolts require an open migration corridor from their juvenile rearing habitat to the marine environment.)

D-shaped ichthyoplankton nets (D-nets) were described earlier as gear for collecting Atlantic sturgeon eggs and larvae in potential sturgeon spawning areas in the Kennebec, Androscoggin and Penobscot River systems (Kieffer & Kynard 1996). D-nets measuring approximately 1 meter in diameter, 3 meters long, with a mesh size of 1-2 mm, could potentially serve as a physical barrier for the emigration of Atlantic salmon smolt. In the proposed research, up to three D-nets would be deployed and anchored in a row along the deepest channel bottoms near spawning sites 100 to 300 meters downstream of known or suspected sturgeon spawning areas. These nets would soak for no more than 3 hours before being raised and examined for eggs or larvae before being re-deployed. However, because D-nets would be anchored to the river bottom, drifting smolt near the surface would not likely be exposed to capture in D-nets. Moreover, as there have been no smolts captured in the Kennebec and Penobscot Rivers while using D-nets in other similar sturgeon research, NMFS concludes D-nets would not affect the ability of the critical habitat to provide an unobstructed downstream migratory pathway for Atlantic salmon smolts.

- **<u>Freshwater and estuary migration sites with abundant, diverse native fish communities to serve as a protective buffer against predation</u>:**

Atlantic salmon adult and smolts interact with other diadromous species indirectly while migrating. Migration through the estuary often coincides with the presence of alewives (*Alosa* spp.), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), and striped bass (*Morone saxatilis*). The abundance of these diadromous species present during adult migration may serve as an alternative prey source for seals, porpoises and otters (Saunders et al., 2006). Additionally, as smolts pass through the estuary during migration from their freshwater rearing sites to the marine environment, they also experience high levels of predation. These features are essential to the conservation of the species because without highly prolific abundant alternate prey species such as alewives and shad, the less prolific Atlantic salmon would likely become a preferred prey species.

NMFS PR examined if proposed research activities would appreciably reduce the abundance of riverine or estuarine “buffer” prey for Atlantic salmon adults or smolts within the migratory critical habitat. NMFS examined whether prey species structure in action area would be affected by the proposed action, but concluded, based on the limited amount of bycatch of the above species captured by researchers in the past, and the fact that virtually all of the bycatch reported has been reported released during sampling, there would be minimal impacts to associated buffer prey organisms in the freshwater and estuarine critical habitat. Thus, NMFS concludes that the ability of the critical habitat to provide diverse prey fish communities as a protective buffer against Atlantic salmon predation would not be affected by the research activities.

***Summary*:** Salmon biologists from NMFS Northeast Region analyzed the potential impacts of research proposed in the action areas of File 16526 on designated critical habitat for Atlantic salmon and concurred with our conclusion by email (received December 7, 2011) that the effects to Atlantic salmon critical habitat from the proposed Atlantic sturgeon research would be insignificant.

***(2) Effects on West Indian Manatee Critical Habitat*:**
As stated, researchers in File 16508 and 16482 would be conducting netting within areas characterized as critical habitat for manatee in Florida waters. To avoid impacting critical habitat of Manatee, researchers would avoid conducting research over, on, or immediately adjacent to any sea grass species. If these species cannot be avoided, then avoidance/minimization measures would be implemented. (For details on these measures, please refer to Section *4.2.1.18: Effects on West Indian Manatee*). Based on the nature of the proposed research and the proposed permit conditions; however, NMFS does not believe manatee critical habitat would be adversely affected by the researcher's activities. The PCE's for manatee critical habitat of substrate, water quality, and biological communities important to the manatee would be minimally affected or not affected at all. The USFWS (October 6, 2011) reviewed the proposed action and informed NMFS it concurred that the proposed permits (File 16508 or File 16482) would not adversely modify designated critical habitat.

4.2.1.20 Aquatic Nuisance Species
To prevent potential spread of aquatic nuisance species identified in sampled watersheds and marine areas, all equipment assigned to the proposed research will not be reassigned to other watersheds until the research is completed or suspended. If the research has been completed or suspended, all gear and equipment would be bleached, washed and air dried prior to being re-deployed to a new location.

4.3 SUMMARY OF COMPLIANCE WITH APPLICABLE LAWS, NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS
As summarized below, NMFS has determined that the Proposed Action is consistent with the purposes, policies, and applicable requirements of the ESA and NMFS regulations. Thus, NMFS issuance of each permit would be consistent with the ESA. However, issuance of the individual permits would not relieve the Permit Holders' responsibilities for obtaining any other necessary permits, or complying with any other Federal, State, local, or international laws or regulations.

4.3.1 Endangered Species Act
This section summarizes conclusions resulting from consultation as required under section 7 of the ESA. The consultation process was concluded after close of the comment period on the application and draft EA ensuring no relevant issues or information were overlooked during the initial scoping process summarized in Chapter 1. For the purpose of the consultation, the draft EA represented NMFS' assessment of the potential biological impacts.

In accordance with Section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.), a biological opinion was prepared by NMFS' Endangered Species Division for the Proposed Action. The consultations and biological opinion concluded that after reviewing the status of Atlantic sturgeon, Atlantic salmon, shortnose sturgeon, sea turtles, the environmental baseline for the action area, the effects of the take authorized in the permit, and probable cumulative effects, it is NMFS' biological opinion that issuance of research permits for Atlantic sturgeon in the Proposed Action, is not likely to jeopardize the continued existence of any ESA-listed species and nor is it likely to destroy or adversely modify any designated critical habitat described. Further, the proposed research would help to lead to the development of the Recovery Plan, and as those components are determined, new and existing permits would comply with and new requirements and mitigations assisting recovery.

As discussed previously in this EA, the USFWS (North Florida ES Office, Jacksonville, FL) was contacted regarding potential impacts of the Proposed Action on the endangered West Indian manatee in Florida, Georgia, South Carolina and North Carolina waters. Given that the researchers expect interaction with this species to be a low probability occurrence, and given the measures (provided by the USFWS) for avoiding capture or harm of manatees that would be incorporated into the researchers' methodology, the USFWS stated it believes the measures would be sufficient to not adversely affect the West Indian manatee or modify its critical habitat where it occurs in the action area.

The USFWS was also asked for separate concurrences on our conclusions that no potential for adverse impacts were expected from the Proposed Action on other listed species under USFWS jurisdiction. These included impacts on endangered wood stork (occurring in Florida, Georgia, South Carolina, and North Carolina); endangered Roanoke log perch (occurring in North Carolina); and endangered Dwarf wedgemussel (occurring in North Carolina).

The respective USFWS Ecological Field Offices (See Chapter 5 for contact information) reviewed the Proposed Action and informed NMFS it concurred with our conclusions that the Atlantic sturgeon research outlined for File 16508 (Florida) File 16482 (Georgia); File 16442 (South Carolina); and File 16375 (North Carolina) would not likely adversely impact endangered wood stork, Roanoke log perch; or dwarf wedgemussel where they occurred in each of the action areas.

4.3.2 Compliance with the Magnuson Stevens Fishery Conservation Management Act

NMFS PR contacted the NMFS Northeast Region Office of Habitat Conservation (Gloucester, MA) by email on September 2, 2011. The Office concurred with NMFS PR on 10/6/2011 (by email from David Stevenson, (NMFS Northeast Region, Marine Habitat Resource Specialist) that the proposed actions would not adversely affect essential fish habitat and no formal consultation was required.

NMFS PR also contacted the NMFS Southeast Region Office of Habitat Conservation (Atlantic Branch, Beaufort, NC) by email on September 2, 2011. The Office replied to NMFS PR on September 14, 2011 (email; Fritz Rodhe; NMFS Fishery Biologist) concurring that the proposed actions would not adversely affect essential fish habitat and no formal consultation was required.

4.3.3 The Coastal Zone Management Act (CZMA)

The Florida Gulf coast extends seaward to 16.8 km (9 NM). Federal license or permit activities and federal financial assistance activities having reasonably foreseeable coastal effects must be fully consistent with the enforceable policies of state coastal management programs. As part of NOAA's approval of a state's coastal management program, the state prepares a list of federal license or permit activities affecting coastal uses or resources which the State wishes to review for federal consistency purposes. NMFS' issuance of the scientific research permits with action areas in Florida waters (File 16508 and File 16482) are not listed as a federal activity of concern under the Florida coastal program, nor are effects to the state's coastal uses or resources foreseeably associated with the proposed action. The proposed issuance of the permit was issued in the Federal Register on September 21, 2011, and no comments requesting additional state review were received.

4.4 COMPARISON OF ALTERNATIVES

While the "no action" alternative would have no environmental effects, the opportunity to conduct this particular research would be lost. Initiation of this research is essential to collect information that would contribute to better understanding of Atlantic sturgeon and to provide information to NMFS needed to implement NMFS conservation and management activities for Atlantic sturgeon in the action areas described above.

The preferred alternative would affect the environment, primarily individual Atlantic sturgeon and bycaught animals. However, the potential effects have been determined to be minimal and this alternative would allow the collection of valuable information that could help NMFS' efforts to recover Atlantic sturgeon. Neither alternative is anticipated to have adverse population-level nor stock-level effects on any species, including Atlantic sturgeon. The preferred alternative has minimal impact to the environment and the potential for positive benefits of the research.

4.5 MITIGATION MEASURES

The activities authorized under proposed Permit Nos. 16526, 16323, 16436, 16422, 16438, 16431, 16507, 16547, 16375, 16442, 16482, and 16508, if approved, would follow certain conditions as described in Section 2.2. and as specified in the respective permits in order to minimize and mitigate effects of the Proposed Action (as described in Section 4.2). The respective permits would require specific conditions for each action described ensuring compliance with appropriate research protocols and minimizing the potential for injury and stress during procedures.

4.6 UNAVOIDABLE ADVERSE EFFECTS

The research activities would cause unavoidable disturbance and adverse effects such as stress and injury to the captured Atlantic sturgeon and non-target species; however, these would be expected as short-term, temporary, recoverable stresses. Further, the mitigation measures imposed by permit conditions are intended to reduce, to the maximum extent practical, the potential effects of the research on the targeted species as well as any other species that may be incidentally harassed. While the research techniques used may have an effect on the individual Atlantic sturgeon being targeted for research, the effect on the animals is not expected to have an adverse or long-term effect on target or non-target individuals or populations.

4.7 CUMULATIVE EFFECTS

Cumulative effects are defined those that result from incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

4.7.1 Cumulative Effects on Atlantic and Shortnose Sturgeon

Due to species and habitat similarities of Atlantic and shortnose sturgeon across the concurrent East Coast range of both species, many of the environmental impacts threatening each species are largely corresponding. Thus, because both Atlantic and shortnose sturgeon may both be adversely affected by human activities including, scientific research, fisheries and recreational bycatch, poaching, ship strikes, artificial propagation, dams, dredging and blasting, poor water quality, climate change and contaminants, these are summarized as major components of cumulative impacts on the species.

4.7.1.1 Other Research Permits and Authorizations

Shortnose and Atlantic sturgeon have been the focus of field studies for decades. Over time, NMFS has issued dozens of permits for takes of endangered shortnose sturgeon within its range for a variety of activities including capture with various gear, handling, surgery, biopsy, lavage, laparoscopy, blood work, habitat, spawning verification, genetics, aging, and tracking. Similarly, because Atlantic sturgeon are a federal fishery having a "species of concern" designation, state agencies, universities and private consultants have simultaneously undertaken studies of Atlantic sturgeon, most occurring within the same action areas concurrent to that of shortnose sturgeon studies. Many captures of both species are taken together in the same deployed gear.

Directed research on both species of sturgeon in the U.S. is carefully controlled and managed so it does not operate to the disadvantage of either species. Range wide, there are currently 16 active scientific research permits issued by NMFS targeting listed shortnose sturgeon populations. Additionally, there are three other NMFS funded studies through ESA section 6 grants and several other state and federal sponsored studies on Atlantic sturgeon having similar objectives to the Proposed Action (Appendix 1). As such, all research has been conditioned with mitigation measures protective of both species ensuring impacts on target and non-target species are minimal. A biological opinion was issued for each of the shortnose sturgeon actions, including the requirement for consideration of cumulative effects to the species (as defined for ESA). For each of the actions, the biological opinion concluded issuance, as conditioned, would not likely jeopardize the continued existence of the species studied, either individually or cumulatively.

4.7.1.2 Bycatch:

Directed harvest in commercial fisheries of both shortnose and Atlantic sturgeon is prohibited. States since 1988 began issuing controls over the harvest of Atlantic sturgeon. In 1998, the Atlantic States Marine Fisheries Commission (ASMFC) finalized a coast-wide fishing moratorium for Atlantic sturgeon until 20 year classes of adult females could be established (ASMFC 1998). NMFS followed this action by closing the Exclusive Economic Zone (EEZ) to Atlantic sturgeon take in 1999. Shortnose sturgeon has also likely benefited from this closure as any bycatch in the fishery targeting Atlantic sturgeon (primarily for meat since the 1950s) has been eliminated.

In 2009 juvenile and young of year Atlantic sturgeon were documented for the first time since the moratorium took effect in the Delaware River (Hal Brundage and Mathew Fisher; pers. comm.. 2010); and the catch trend for Adult and sub-adult and juvenile sturgeon appearing in the Hudson and Altamaha Rivers have risen in consecutive years (K. Hattala and D. Peterson; pers. comm.; 2011). However, the status of the species continues to decline across its range (NMFS 2007).

Although directed harvest of shortnose sturgeons has been prohibited since 1967, bycatch of this species has been documented in other state sponsored fisheries throughout its range. Adults are believed to be especially vulnerable to fishing gears for other anadromous species (such as shad, striped bass and herring) during times of extensive migration – particularly the spawning migration upstream, followed by movement back downstream (Litwiler 2001). Additionally, bycatch in the southern trawl fishery for shrimp *Penaeus* spp. was estimated at 8% in one study (Collins et al. 1996).

The 1998 Recovery Plan (NMFS 1998) for shortnose sturgeon and the 2007 Atlantic sturgeon status review (NMFS 2007) lists commercial and recreational shad fisheries as a source of bycatch for both species. Although shortnose sturgeon are primarily captured in gill nets, they have also been documented in bycatch with pound nets, fyke/hoop nets, catfish traps, shrimp trawls and hook and line fisheries (recreational fishing). In 2010, the states of South Carolina and Georgia have applied for incidental take of shortnose sturgeon occurring in their state shad fisheries through the ESA section 10(a)(1)(B) permitting process. These measures will mitigate certain impacts of state fisheries on shortnose sturgeon by appropriately modifying the shad fishery where threats to the species exist.

Bycatch in the gill net fisheries can be quite substantial and is believed a significant threat to both species. Though, the catch rates in drift gill nets are believed to be lower than for fixed or anchored nets, the longer soak times of the fixed nets appear to be correlated with higher rates of mortalities. In an American shad gill net fishery in South Carolina, of 51 fish caught, 16% were bycatch mortality and another 20% of the fish were visibly injured when nets were not checked for longer periods (Collins et al. 1996).

4.7.2.3 *<u>Poaching</u>*:

There is evidence of shortnose sturgeon targeted by poachers throughout their range, and particularly where they appear in abundance (such as on the spawning grounds) but the extent this is occurring is difficult to assess (Dadswell 1979, Dovel *et al*. 1992, Collins *et al*. 1996). There have been several documented cases of shortnose sturgeon caught by recreational anglers. One shortnose sturgeon illegally taken on the Delaware River was documented by a New Jersey Department of Fish and Wildlife conservation officer in Trenton New Jersey (NJCOA 2006). Additionally, citations have been issued for illegal recreational fishing of shortnose in the vicinity of Troy, New York on the Hudson River and on the Cooper River in South Carolina.

Despite the fact that the Atlantic sturgeon fishery has been closed coast wide and in certain states prior to then (NC, 1991; SC, 1985), poaching of Atlantic sturgeon continues and is a potentially a significant threat to the species, but the present extent and magnitude of such activity is largely unknown. Instances of documented poaching have occurred indicating poaching is contributing to Atlantic sturgeon mortality, and should be considered along with bycatch in other legal fisheries as a factor in assessing present threats. Poaching has been documented by law enforcement agencies in Virginia, South Carolina and New York. In Virginia, Marine Resources Commission law enforcement agents with the Virginia Marine Police, in collaboration with the National Marine Fisheries Service Division of Law Enforcement, arrested commercial fishermen who had killed approximately 95 Atlantic sturgeon from the James and Poquoson rivers, VA, during 1998-1999. The fish documented were purchased by undercover operatives, and the operation was terminated in order to preclude further loss of sturgeon (J. Croft, Virginia Marine Police, Pers. Comm. 2007).

4.7.2.4 *<u>Ship Strikes</u>*:

Although dredging provides safe passage for commercial shipping and recreational boat traffic, with the increase in boating traffic, the potential for sturgeon to be struck by boats is greater, and this seems to happen commonly. Without surveys in place, ten adult Atlantic sturgeon were found in the Delaware River in 2004, six in 2005, and six to date in 2006 that were evidently struck by a passing ship or boat (Kahnle et al. 2005, Murphy 2006). This observation is not unique as four to eight sturgeon are reported each spring to Delaware state officials (DNREC), and these fish are usually 120 cm to 240 cm in length. Based on the external injuries observed, it is suspected these strikes are from ocean going vessels and not smaller boats, although at least one fisher reported hitting a large sturgeon with his small craft (C.

Shirey, DNREC, Pers. Comm. 2005). Similarly, five Atlantic sturgeon were reported to have been struck by commercial vessels within the James River, VA in 2005, and one strike per five years is reported for the Cape Fear River. Subpopulations may be affected by these incidental strikes, but it is unknown what the overall impact of boat strikes is to Atlantic sturgeon subpopulations, but in small subpopulations (< 300 spawners/year) the loss of any spawning adults could have a substantial impact on recovery. Locations supporting large ports having relatively narrow waterways seem to be more prone to ship strikes (e.g., Delaware, James, and Cape Fear rivers).

4.7.2.5 *Artificial Propagation*:

Since there are aquaculture or research facilities currently raising captive shortnose and Atlantic sturgeon on watersheds of native shortnose sturgeon, there is a potential for escapement and impact to the wild population. Potential threats from aquaculture escapement include the genetic alterations to native populations and potential competition for space and resources between hatchery-reared and wild fish. Further, since most sturgeon diseases have been documented in captive-reared fish, there is also the chance that escapees could spread pathogens and disease. To date, there have been no reports of escapees from the two facilities in Canada or from the USFWS facilities in South Carolina and Georgia. However, on the Connecticut River six shortnose sturgeon artificially spawned from adults captured at Holyoke were released with radio tags upstream of the Holyoke Dam in 1989 and 1990 and they were subsequently never recovered. Additionally, several shortnose sturgeon juveniles were accidentally released in 2006 and unrecovered.

There are currently two private companies producing shortnose and Atlantic sturgeon in Canada. Both are located on the St. John River and one is currently operating at a commercial scale. In the United States, the USFWS has been raising shortnose sturgeon (NMFS Permit No. 1604) for approximately 28 years. Until recently Bears Bluff National Fish Hatchery located on Wadmalaw Island in South Carolina raised the bulk of these fish while some fish were also reared at the USFWS' Warm Springs, GA and Orangeburg, SC hatcheries. Propagation of shortnose sturgeon at the Bears Bluff facility ended in the spring of 2008 but a subset of the broodstock and offspring are still maintained at Warm Springs and Orangeburg. The same hatchery acquired 12 mature Atlantic sturgeon adults in 2010 and after conditioning adult Atlantic sturgeon successfully spawned them in holding tanks without hormonal injections (K. Ware, USFWS, pers. comm.).

Commercial culture of other sturgeon also has the potential to impact wild Atlantic sturgeon. White sturgeon escaped from an aquacultural facility in Georgia in the early 1990s, and there have been at least two reports of white sturgeon captured by hook and line 150 miles downstream in the Mobile Basin in Alabama (M. Spencer, Georgia DNR, Pers. Comm. 1998). While this particular incident is unlikely to impact Atlantic sturgeon, it illustrates the potential for escapement of non-native sturgeon from aquacultural facilities that with possible negative impacts on sturgeon through competition for food and habitat, hybridization, and the spread of fish pathogens.

For other information collected on the potential threat of artificial propagation to Atlantic, see the most recent Atlantic sturgeon status review (NMFS 2007).

4.7.2.6 *Dams*:

Dams are used to impound water for water resource projects such as hydropower generation, irrigation, navigation, flood control, industrial and municipal water supply, and recreation. Dams can have profound effects on diadromous fish species by fragmenting populations, eliminating or impeding access to historic habitat, modifying free-flowing rivers to reservoirs and altering downstream flows and water temperatures. Direct physical damage and mortality can occur to diadromous fish that migrate through the turbines of traditional hydropower facilities or as they attempt to move upstream using fish passage devices.

In addition to dams impeding anadromous fish migration and associated mortalities, Hill (1996) identified the following potential impacts from hydropower plants: altered DO concentrations; artificial destratification; water withdrawal; changed sediment load and channel morphology; accelerated eutrophication and change in nutrient cycling; and contamination of water and sediment. Furthermore, activities associated with dam maintenance, such as dredging and minor excavations along the shore, can release silt and other fine river sediments that can be deposited in nearby spawning habitat. Dams can also reduce habitat diversity by forming a series of homogeneous reservoirs; these changes generally favor different predators, competitors and prey, than were historically present in the system (Auer 1996a).

The effects of dams on populations of shortnose and Atlantic sturgeon are generally well documented (Kynard 1998, Cooke *et al.* 2004). However, there are some rivers where these species have been extirpated almost without notice due to the construction of impassable dams. For example, the Susquehanna River is the second largest river on the east coast of the U.S. and there are historical and anecdotal accounts of sturgeon upriver. Currently the Susquehanna has four mainstem dams, the lowermost of which located at approximately rkm 16. The dam has a fish lift but it is unusable by sturgeon. If the Susquehanna River once supported a population of shortnose sturgeon, it is no longer available to them. Perhaps the biggest impact dams have on sturgeon is the loss of upriver spawning and rearing habitat. Migrations of sturgeon in rivers without barriers are wide-ranging with total distances exceeding 200 km or more depending on the river system (Kynard 1997). The construction of dams has blocked upriver passage for the majority of sturgeon populations. Dams have restricted spawning activities to areas below the impoundment, often in close proximity to the dam, but unsuitable for survival of juveniles (Kynard 1997, Cooke *et al*. 2004).

The suitability of riverine habitat for shortnose sturgeon spawning and rearing depends on annual fluctuations in flow, which can be greatly altered or reduced by the presence and operation of dams (Cooke *et al*. 2004). Effects on spawning and rearing may be most dramatic in hydropower facilities operating in peaking mode (Auer 1996a). Daily peaking operations store water above the dam when demand is low and release water for electricity generation when demand is high, creating substantial, daily fluctuations in flow and temperature regimes. Kieffer and Kynard (*in press*), have documented flow fluctuations for hydroelectric power generation affected access to spawning habitat and possibly deterred spawning of shortnose sturgeon on the Connecticut River. Similar results were reported in studies conducted for lake sturgeon *A. fulvescens* in the Sturgeon River, Michigan (Auer 1996b) and white sturgeon *A. transmontanus* in the Columbia River, Oregon and Washington (Parsley and Beckman 1994). Kieffer and Kynard (in review), have also observed flow regimes from an upstream hydroelectric facility that were either so forceful that they scoured the shortnose sturgeon rearing shoals or so low that the shoals were dry and exposed. Auer (1996b) demonstrated that there is greater spawning success of lake sturgeon on the Sturgeon River, MI, when facilities operated in the more natural "run-of-the-river" mode.

4.7.2.7 Dredging and Blasting:

Dredging: Many rivers and estuaries are periodically dredged for flood control or to support commercial shipping and recreational boating. Dredging also aids in construction of infrastructure and in marine mining. Dredging may have adverse impacts on aquatic ecosystems including direct removal/burial of organisms; turbidity; contaminant resuspension; noise/disturbance; alterations to hydrodynamic regime and physical habitat and actual loss of riparian habitat (Chytalo 1996, Winger *et al.* 2000).

Dredges are generally either mechanical or hydraulic. Mechanical dredges are used to scoop or grab bottom substrate while removing hard-packed materials and debris. Mechanical dredge types are clamshell buckets; endless bucket conveyor, or single backhoe or scoop bucket types; however, such dredges have difficulty holding fine materials in the buckets and do not dredge continuously. Material excavated with mechanical dredges is often loaded onto barges for transport to a designated placement site (USACOE 2008).

Hydraulic dredges are used principally to dredge silt, sand and small gravel. Hydraulic dredges include cutterhead pipeline dredges and self-propelled hopper dredges. Hydraulic dredges remove material from the bottom by suction, producing slurry of dredged material and water, either pumped directly to a placement site, or in the case of a hopper dredge, into a hopper and later transported to a dredge spoil site. Cutterhead pipeline dredges can excavate most materials including some rock without blasting and can dredge almost continuously (USACOE 2008).

The impacts of dredging operations on sturgeon are often difficult to assess. Hydraulic dredges can lethally take sturgeon by entraining sturgeon in dredge drag arms and impeller pumps (NMFS 1998). Mechanical dredges have also been documented to lethally take shortnose sturgeon (Dickerson 2006). In addition to direct effects, indirect effects from either mechanical or hydraulic dredging include destruction of benthic feeding areas, disruption of spawning migrations, and deposition of resuspended fine sediments in spawning habitat (NMFS 1998). Another critical impact of dredging is the encroachment of low D.O. and high salinities upriver after channelization (Collins *et al.* 2001). Adult sturgeon can tolerate periods of low D.O. and high salinities, but juveniles are less tolerant of these conditions in laboratory studies. Collins *et al*. (2001) concluded harbor modifications in the lower Savannah River have altered hydrographic conditions for juvenile sturgeon by extending high salinities and low D.O. upriver.

In addition to impacts of dredging, Smith and Clugston (1997) reported dredging and filling eliminates deep holes, and alter rock substrates. Nellis *et al.* (2007) documented dredge spoil drifted 12 km downstream over a 10 year period in the Saint Lawrence River, and those spoils have significantly less macrobenthic biomass compared to control sites. Using an acoustic trawl survey, researchers found Atlantic and lake sturgeon were substrate dependent and avoided spoil dumping grounds (McQuinn and Nellis, 2007). Similarly, Hatin *et al*. (2007) tested whether dredging operations affected Atlantic sturgeon behavior by comparing CPUE before and after dredging events in 1999 and 2000. The authors documented a three to seven-fold reduction in Atlantic sturgeon presence after dredging operations began, indicating sturgeon avoid these areas during operations.

Blasting: Bridge demolition and other projects may include plans for blasting with powerful explosives. Fish are particularly susceptible to effects of underwater explosions and are killed over a greater range than other organisms (Lewis 1996). Unless proper precautions mitigate the damaging effects of shock wave transmission to physostomous fish like shortnose sturgeon, internal damage and/or death may result (NMFS 1998).

A study testing the effects of underwater blasting on juvenile shortnose sturgeon and striped bass was conducted in Wilmington Harbor, NC in December 1998, and January 1999 (Moser 1999). There were seven test runs including 32-33 blasts (3 rows with 10-11 blast holes per row and each hole ~ 10 ft apart) with about 24-28 kg explosives per hole. For each blast 50 hatchery reared shortnose sturgeon and striped bass were placed in cages three feet from the bottom at distances of 35, 70, 140, 280 and 560 ft upstream and downstream of the blast area. A control group of 200 fish was held 0.5 miles from the blast site (Moser 1999). Test blasting was conducted with and without an air curtain in-place 50 ft from the blast site. Survival was similar for both species. External assessments of impacts to the caged fish were conducted immediately after the blasts and 24 h later. After the 24 h period, a subsample of the caged fish, primarily from those cages nearest the blast, at 35 ft and some from 70 ft, were sacrificed for later necropsy.

Externally, shortnose sturgeon and striped bass selected for necropsy all appeared to be in good condition externally and behaviorally after blasts. However, results of necropsies found many had substantial internal injuries. Moser concluded many of the injuries would have resulted in eventual mortality (Moser 1999). Therefore, based on necropsy results, an apparent estimate of mortality was conducted finding that fish held in cages at 70 ft from blast sites were less seriously impacted by the test blasting than those held at 35 ft. Lastly, it was concluded shortnose sturgeon suffered fewer, less severe internal injuries than striped bass tested. For striped bass and shortnose sturgeon held in cages at 35 ft, approximately 66 and 12 percent, respectively, would have probably not survived the blasts due to their internal injuries. Also there appeared to be no reduction of injury in fish experiencing blasts while air curtains were in place

4.7.2.8 Water Quality and Contaminants:

The quality of water in river/estuary systems is affected by human activities conducted in the riparian zone and those conducted more remotely in the upland portion of the watershed. Industrial activities can result in discharges of pollutants, changes in water temperature and levels of D.O., and the addition of nutrients. In addition, forestry and agricultural practices can result in erosion, run-off of fertilizers, herbicides, insecticides or other chemicals, nutrient enrichment and alteration of water flow. Coastal and riparian areas are also heavily impacted by real estate development and urbanization resulting in storm water discharges, non-point source pollution, and erosion.

The water quality over the range of shortnose and Atlantic sturgeon varies by watershed but is notably poorer in the north than in the south. The U.S. Environmental Protection Agency (EPA) published its second edition of the National Coastal Condition Report (NCCR II) in 2005, a “report card” summarizing the status of coastal environments along the coast of the United States (USEPA 2005; See Table 7 below).

Table 7. Summary of the USEPA National Coastal Condition Report (NCCR II) for the U.S. east coast published by the U.S. Environmental Protection Agency (2005) grading coastal environments. (Northeast Region = ME through VA; southeast region = NC-FL; and the Chesapeake Bay = the central region).

	Region		
Status Index	**Northeast**	**Chesapeake Bay**	**Southeast**
Water Quality	D	F	B
Sediment	F	F	B
Coastal Habitat	B	-	C
Benthos	F	F	C
Fish Tissue	F	F	A
Overall	**F**	**F**	**B-**

Areas of concern having poor index scores were: 1) Hudson River – water quality, sediment, and tissue contaminants, 2) Delaware River – water quality and tissue contaminants, 3) Upper Chesapeake Bay – water quality and sediment, 4) Potomac River – sediment, 5) Pamlico Sound – water quality, 6) ACE Basin – water quality, and 7) St. Johns River – sediment. There was also a mixture of poor benthic scores scattered along the Northeast and Southeast region.

The report analyzes water quality, sediment, coastal habitat, benthos, and fish contaminant indices to determine status. The northeast region and the Chesapeake Bay received grades of F. The Southeast region received an overall grade of B-, the best rating in the nation. However, although the south region scored fairly well in water quality, low D.O. and high temperature may limit available habitat and survival of juveniles.

Secor (1995) noted a correlation between low numbers of sturgeon during this century and decreasing water quality caused by increased nutrient loading and increased spatial and temporal frequency of hypoxic water. Further, Secor and Gunderson (1998) and Collins *et al* (2001) hypothesized survival of juvenile sturgeon in estuaries may be compromised due to combined effects of increased hypoxia and temperature in nursery areas impacted by human activity. Hypoxia affects sturgeon species more than other fish species due to their limited ability to oxyregulate at low D.O. (Secor and Gunderson 1998; and Secor 2002). Sturgeon's first year of life may leave it particularly susceptible to low D.O. at early life stages and the limited means to escape from hypoxic waters (Secor and Niklitschek 2002).

Niklitschek (2001) modeled suitable habitat availability for juvenile shortnose and Atlantic sturgeon in the Chesapeake Bay using a multivariable bioenergetics and survival model. Results show the cumulative stresses of hypoxia, high temperatures and salinity during summer months caused large reductions in potential nursery habitat for both species during 1990-1999 (Niklitschek 2001). The modeling established during dry years, when persistent hypoxia in deeper areas consistently precluded access to thermal refuges, there may little suitable habitat for juvenile sturgeon.

The EPA adjusted open water minimum D.O.-criteria for the Chesapeake Bay (increased from ~2 ppm to 3.5 mg/L) to provide protection specifically for sturgeon species, requiring higher levels of D.O. than other fish species (USEPA 2003). Niklitschek and Secor (2005) modeled the achievement of EPA's D.O. criteria for Atlantic sturgeon predicting available habitat for Atlantic sturgeon would increase by 13% per year, while an increase of water temperature by 1°C would reduce available habitat by 65%. Similar results may occur for sturgeons in southern rivers where high water temperatures and low D.O. are a common occurrence during the summer months.

Life history of shortnose and Atlantic sturgeon (i.e., long lifespan, extended residence in estuarine habitats, benthic foraging) predispose them to long-term, repeated exposure to environmental contamination and potential bioaccumulation of heavy metals and other toxicants (Dadswell 1979, NMFS 1998). However, there has been little work on the effects of contaminants on shortnose sturgeon to date.

Chemicals and metals such as chlordane, dichlorodiphenyl dichloroethylene (DDE), DDT, dieldrin, PCBs, cadmium, mercury, and selenium settle to the river bottom and are later consumed by benthic feeders, such as macroinvertebrates, and then work their way higher into the food web (e.g. to sturgeon). Some of these compounds may affect physiological processes and impede a fish's ability to withstand stress, while simultaneously increasing the stress of the surrounding environment by reducing D.O., altering pH, and altering other physical properties of the water body.

Although there have been very few analyses of shortnose sturgeon tissues for contaminants, shortnose sturgeon collected from the Delaware and Kennebec rivers had total toxicity equivalent concentrations of polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), PCBs, DDE, aluminum, cadmium, and copper above adverse effect concentration levels reported in the literature (ERC 2002, 2003). In the Hudson, six fish have been tested over the past 37 years. Most fish carried very high burden load of PCBs, or one of its derivatives (DDT).

Dioxin and furans were detected in ovarian tissue from shortnose sturgeon caught in the Sampit River/Winyah Bay system (SC). Results showed that four out of seven fish tissues analyzed contained tetrachlorodibenzo-*p*-dioxin (TCDD) concentrations greater than 50 pg/g (parts-per-trillion), a level which can adversely affect the development of sturgeon fry (J. Iliff, NOAA Habitat Restoration Division, Silver Spring, MD, unpublished data).

Heavy metals and organochlorine compounds accumulate in sturgeon tissue, but their long-term effects are not known (Ruelle and Henry 1992, Ruelle and Keenlyne 1993). High levels of contaminants, including chlorinated hydrocarbons, in several other fish species are associated with reproductive impairment (Cameron *et al*. 1992, Longwell *et al*. 1992, Hammerschmidt *et al*. 2002, Giesy *et al*. 1986, Mac and Edsall 1991, Matta *et al*. 1998, Billsson *et al*. 1998), reduced survival of larval fish (Berlin *et al*. 1981, Giesy *et al*. 1986), delayed maturity (Jorgensen *et al*. 2004) and posterior malformations (Billsson *et al*. 1998). Pesticide exposure in fish may affect anti-predator and homing behavior, reproductive function, physiological maturity, swimming speed and distance (Beauvais *et al*. 2000, Scholz *et al*. 2000, Moore and Waring 2001, Waring and Moore 2004). Sensitivity to environmental contaminants also varies by life stage.

Early life stages of fish appear to be more susceptible to environmental and pollutant stress than older life stages (Rosenthal and Alderdice 1976). Dwyer *et al*. (2005) compared the relative sensitivities of common surrogate species used in contaminant studies to 17 listed species including shortnose and Atlantic sturgeons. The study examined 96-hour acute water exposures using early life stages where mortality is an endpoint. Chemicals tested were carbaryl, copper, 4-nonphenol, pentachlorophenal (PCP) and permethrin. Of the listed species, Atlantic and shortnose sturgeon were ranked the two most sensitive species tested (Dwyer *et al*. 2005). Additionally, a study examining the effects of coal tar, a byproduct of the process of destructive distillation of bituminous coal, indicated that components of coal tar are toxic to shortnose sturgeon embryos and larvae in whole sediment flow-through and coal tar elutrtraite static renewal (Richland *et al*. 1993).

Lastly, the operation of power plants can have unforeseen and detrimental impacts to water quality which can affect shortnose sturgeon. For example, the St. Stephen Power Plant near Lake Moultrie, South Carolina was shut down for several days in June 1991 when large mats of aquatic plants entered the plant's intake canal and clogged the cooling water intake gates (Balciunas *et al.* 2002). Decomposing plant material in the tailrace canal coupled with the turbine shut down (allowing no flow of water) triggered a low D.O. water condition downstream and a subsequent fish kill. The South Carolina Wildlife and Marine Resources Department reported that twenty shortnose sturgeon were killed during this low D.O. event.

4.7.2 Cumulative Effects on Atlantic Salmon in the GOM

The following segment on the cumulative impacts of Atlantic sturgeon research on GOM Atlantic salmon appears in the *Biological Valuation of Atlantic Salmon Habitat within the Gulf of Maine Distinct Population Segment* (NMFS 2009b).

Future state and private activities reasonably certain to continue to occur in the GOM impacting Atlantic salmon are aquaculture and conservation stocking, fishery related research, bycatch from recreational or conservation fisheries, discharge of pollutants, development and/or construction activities resulting in excessive water turbidity and habitat degradation and the continuations of dams.

Atlantic salmon in the GOM DPS currently exhibit critically low spawner abundance, poor marine survival, and are still confronted with a variety of threats. The abundance of Atlantic salmon in the GOM DPS has been low and either stable or declining over the past several decades. The proportion of fish of natural origin is very small (approximately 10%) and is continuing to decline. The conservation hatchery program has assisted in slowing the decline and helping to stabilize populations at low levels, but has not contributed to an increase in the overall abundance of salmon and has not been able to halt the decline of the naturally reared component of the GOM DPS (NMFS 2009b).

State of Maine Inland Fish and Wildlife hatcheries and stocking of hatchery fish supporting recreational fisheries occurs throughout the GOM DPS designation and can negatively affect PCEs in areas used for spawning and rearing. In addition, conservation hatcheries used to supplement wild populations for rebuilding Atlantic salmon populations could also threaten naturally reproducing fish potentially undermining recovery efforts without proper adherence to genetic, evolutionary, and ecological principles. Management considerations employed to minimize deleterious effects from artificial propagation include genetic and stock management of hatchery reared Atlantic salmon such that stocked fish minimally present a genetic or competitive risk to the natural population; however, stocking of other species for recreational purposes remains a concern.

Federal and State research activities (USFWS, NOAA and MDMR) are authorized under the USFWS' endangered species Section 10(a)(1)(A) blanket permit (No. 697823) to conduct monitoring, assessment, and habitat restoration activities for listed Atlantic salmon populations in Maine. The extent of take from these activities during any given year is not expected to exceed 2% of any life stage being impacted, except that for adults, it would be less than 1%. These resource agencies will continue to conduct Atlantic salmon research and management activities in the GOM DPS while the proposed research is being carried out. The information gained from these activities will be used to further salmon conservation actions in the GOM DPS.

Fisheries research activities on striped bass, shortnose and Atlantic sturgeon by University of Maine and the Maine MDR are also likely to continue and thus each could potentially have impacts on Atlantic salmon. The proposed Atlantic sturgeon permit in the GOM (File 16526) adopts similar mitigation measures currently employed by NMFS Permit Nos. 1578 and 1595 and the Maine DMR 2010 section 6 research grant. These studies do not authorize any lethal takes of listed Atlantic salmon in the GOM during research activities and also provide measures to eliminate interaction or adverse impact to salmon. Impacts from these projects are discounted by NMFS through directed research practices, which have eliminated any capture of Atlantic salmon over the last three years; however, should a take occur, researchers would be required to cease their investigations and consult with NMFS.

However, it is possible occasional recreational fishing for anadromous fish species may result in incidental takes of Atlantic salmon, and thus the operation of recreational fisheries and other fisheries in these waters of the GOM rivers could result in future Atlantic salmon mortality and/or injury. In December 1999, the State of Maine adopted regulations prohibiting all angling for sea-run salmon statewide. However, a limited catch-and-release fall fishery (September 15 to October 15) for Atlantic salmon in the Penobscot River was authorized by the Maine Atlantic Salmon Commission (MASC) in 2007. The fishery was closed prior to the 2009 season. Despite strict state and federal regulations, both juvenile and Atlantic salmon remain vulnerable to injury and mortality due to incidental capture by recreational anglers and as bycatch in commercial fisheries. The best available information indicates Atlantic salmon are still incidentally caught by recreational anglers. Evidence suggests Atlantic salmon are also targeted by poachers (NMFS 2005). Commercial fisheries for elvers (juvenile eels) and alewives may also capture Atlantic salmon as bycatch. Again, however, no estimate of the numbers of Atlantic salmon caught incidentally in recreational or commercial fisheries exists.

Pollution from point and non-point sources has been a major threat to salmon in GOM river systems, which continue to receive pollutant discharges from sewer treatment facilities, paper production facilities (metals, dioxin, dissolved solids, phenols, and hydrocarbons), mining, and agriculture/ silviculture sources. Contaminants introduced into the water column or through the food chain, eventually become associated with the benthos causing long-term impacts to Atlantic salmon in the GOM. Contaminants associated with the action area are directly linked to industrial development along the waterfront. PCBs, heavy metals, and waste associated with point source discharges and refineries are likely to be present in the future due to continued operation of industrial facilities. In addition, many contaminants such as PCBs remain present in the environment for prolonged periods of time and thus would not disappear even if contaminant input were to decrease. It is likely Atlantic salmon will continue to be affected by contaminants in the action area in the future.

Industrialized waterfront development will also continue to impact the water quality in GOM rivers and the action area of the proposed permit modifications. Sewage treatment facilities, manufacturing plants, and other facilities present in the action areas are likely to continue to operate. Excessive water turbidity, water temperature variations and increased shipping traffic are likely with continued future operation of these facilities.

Dams currently obstruct migration of Atlantic salmon in the GOM, delaying or precluding adult salmon access to spawning sites and smolts from access to the marine environment. Dams also preclude or diminish access of co-evolutionary diadromous fish communities, likely serving as buffers from predators of migrating salmon (Saunders et al. 2006). Dams also degrade spawning and rearing sites through alterations of natural hydrologic, geomorphic and thermal regimes (American Rivers et al.

1999; Heinz Center 2002; NRC 2003; Fay et al. 2006 and NMFS 2009a). Dams in the GOM are also the most significant contributing factor to the loss of salmon habitat connectivity within the range of the GOM DPS (Fay et al. 2006) and have been identified as the greatest impediment to self-sustaining Atlantic salmon populations in Maine (NRC 2003).

NMFS considers the proposed removal of the Veazie and Great Works Projects and the surrender of the Howland Project license in the Penobscot River (File 1595) — as well as the 1999 removal of the Edwards Dam on the Kennebec River(File 1578) — will greatly improve upstream and downstream passage for Atlantic salmon (NMFS 2009a). Additionally, these actions have potential to vastly improve several critical habitat features, including migration, spawning and rearing PCEs, but the presence of other dams in the watersheds of the GOM will likely continue to negatively impact salmon recovery, and therefore may require additional special management considerations or protection through further dam removal or improved fish passage devices (NMFS 2009a).

4.7.3 Cumulative Effects on Sea Turtles

This section discusses past, present, and future activities having affected, are affecting, or will affect the sea turtle portion of the affected environment, and then considers the additive effects of the scientific research that would be authorized through the proposed action in order to determine the cumulative impact of the proposed action when added to the other activities.

4.7.3.1 Research Potentially Contributing to Sea Turtles' Current Condition:

Sea turtles have been the focus of field studies for decades. The primary purposes of most studies are for monitoring populations and gathering data for behavioral and ecological studies. Over time, NMFS has issued dozens of permits for takes of sea turtles in the proposed action area for a variety of activities, examples of which include vessel surveys, photo-identification, capture, handling, biopsy sampling, lavage, laparoscopy, attachment of scientific instruments, and release. The number of permits and associated takes indicate that a portion of the populations of turtle species in the proposed action area have been subject to varying levels of stress due to research activities. This research is due to interest in developing appropriate management and conservation measures to recover these species.

Despite the oversight involved with issuing sea turtle research permits, repeated disturbance of individual sea turtles can occur in some instances given the number of permits, associated takes and research vessels and personnel present in the environment. It is difficult to assess the effects of such disturbance. However, NMFS has taken steps to limit repeated harassment of individual turtles avoiding unnecessary duplication of research efforts by requiring coordination among permit holders. All scientific research permits are also conditioned with mitigation measures to ensure that the research impacts target and non-target species as minimally as possible.

4.7.3.2 Other ESA Permitted Activity:

In addition to scientific research permits, NMFS issues permits under Section 10 (a)(1)(B) of the ESA for the incidental take of sea turtles during non-federal marine activities. Some marine activities, such as state fisheries, may require such permits if sea turtles are known to or expected to be caught during their activities. Permits usually authorize the capture and in some cases, the mortality of sea turtles. These permits would continue to be in the foreseeable future.

4.7.3.3 Foreseeable Permit Actions (Not Part of the Proposed Action):
Future Federal actions unrelated to the Proposed Action would include issuance of additional scientific research permits or permit modifications, as well as permits resulting in the incidental take of sea turtles. However, while future research is generally foreseeable, the specific actions are not known at this time, and therefore cannot be considered reasonably foreseeable specific actions available for specific inclusion in this cumulative impacts analysis.

4.7.3.4 Direct Harvest of Sea Turtles – Historic Fisheries:
The historic harvest of sea turtles and/or sea turtle eggs has been documented as far back as the 18th century for sea turtle species in the U.S. or U.S. territories (Witzell 1994). From the early 1800's to the passage of the ESA in 1973, turtle populations were affected through a directed, commercial harvest or 'turtling.' Turtling was one of the first commercial fisheries in the southeastern U.S. (Witzell 1994). Most of the fishery consisted of the incidental take of turtles via other commercial fisheries; however, there was directed take of turtles through gillnetting, seining, harpooning, and diving. These fisheries affected mainly green and loggerhead turtles. Landings averaged 10,000 kg until the passage of the ESA in 1973. This figure is a minimum harvest estimate due to problems with accurate species identification and lack of reporting landings (Witzell 1994). The illegal domestic harvest of eggs and turtles still continues at low levels in the United States, especially in Caribbean. Turtles are still legally harvested in some countries (e.g., in the Caribbean).

4.7.3.5 Effects of Natural Mortality:
A variety of natural and introduced predators, (e.g., hogs, mongooses, foxes, ghost crabs, herons, and ants), prey on sea turtle eggs and hatchlings. In addition to the destruction of eggs, certain predators may take considerable numbers of hatchlings just prior to or upon emergence from the sand. Once they leave the beach, the hatchlings are preyed upon by sharks, fish, and seabirds. Predation may be the most important hatchling mortality factor, but is one which is difficult to quantify.

4.7.3.6 Effects of Disease and Strandings:
A disease known as fibropapillomatosis (FP), originally identified in green turtles, has emerged as a serious threat to green sea turtle recovery. The disease is most notably present in green turtles of Hawaii, Florida, and the Caribbean. The disease can also occur in other species. FP is expressed as tumors which occur primarily on the skin and eyes, and the disease can be fatal. The presence of tumors can reduce vision, provide a physical obstruction to swimming and foraging, and increase the turtle's susceptibility to parasites.
Sea turtle strandings occur each year along the Atlantic coastline of the United States. The strandings can be the result of natural cold stunning, mortality or interaction with human activities (e.g., entanglement in fishing gear or boat collisions). Occasionally, high level unusual mortality or cold stun events occur.

4.7.3.7 Effects (Including Mortality) Due to Loss of Nesting Beach Habitat:
Habitat loss can occur on nesting beaches from natural and man-induced causes, as well as in the nearshore marine environment. Loss of nesting beach habitat and turtle mortality due to exotic vegetation as well as indigenous vegetation can lead to hatchling mortality because turtles develop to full term in the egg and then fail to successfully emerge (Eckert and Eckert 1990). A portion of this mortality is due to entanglement in beach vine roots that have grown into or over the nest cavity since egg deposition. Exotic vegetation may form impenetrable root mats which can prevent proper nest

cavity excavation, invade and desiccate eggs, or trap hatchlings. Nonnative vegetation can lead to increased erosion and degradation of suitable nesting habitat.

Loss of nesting beach habitat due to erosion or inundation and accretion of sand above incubating nests appears to be a principal abiotic factor that may negatively affect incubating egg clutches at some locations. While these factors are often widely perceived as contributing to nest mortality or lowered hatching success, few quantitative studies have been conducted (Mortimer 1989). Erosion control methods (e.g., seawalls, riprap) can result in the degradation of suitable nesting habitat or the permanent loss of a dry nesting beach by accelerated erosion and preventing natural beach and dune accretion. It may prevent or hamper nesting females from reaching suitable nesting sites and trap hatchlings and nesting turtles. Beach nourishment (pumping, trucking, or scraping sand onto the beach to rebuild what has been lost to erosion) can affect turtles by burying nests and, if conducted during the nesting season, by disturbing nesting turtles. Significant reductions in nesting success have been documented on severely compacted nourished beaches (Raymond 1984).

Sand mining for construction aggregate or renourishment of other beaches is a serious threat to nesting beaches throughout the Caribbean. Mined beach sand will not be replaced until offshore supplies build in quantity, a process that could take decades.

Another threat resulting in the loss of nesting beach habitat and potential mortality is artificial lighting. Artificial beachfront lighting from buildings, streetlights, dune crossovers, vehicles, and other sources has been documented as causing the disorientation and misorientation of hatchling turtles (McFarlande 1963; Philibosian 1976; Mann 1977; Erhart 1983). The results of disorientation or misorientation are often fatal for hatchlings and can misorient adults. Carr et al.(1978), Mortimer (1982), and Witherington (1986) found that adult green turtles avoided bright areas on nesting beaches.

Beach cleaning methods include mechanical raking, hand raking and hand picking up debris. Large expanses of open sand may be cleaned with mechanical devices to a depth of several inches. Mann (1977) suggested that mortality within nests may increase when external pressure from beach cleaning machinery is common on soft beaches with large grain sands. Mechanically pulled rakes and hand rakes can penetrate the surface and disturb the sealed nest or may actually uncover pre-emergent hatchlings near the surface of the nest. Disposal of debris near the dune line or on the high beach can cover incubating egg clutches and subsequently hinder and entrap emergent hatchlings and may alter natural nest temperatures.

Coastal development can also deter or interfere with nesting, affect nest success, and degrade nesting habitats for sea turtles. The residential and tourist use of, development, and driving on developed (and developing) nesting beaches generally negatively affect nesting turtles, incubating egg clutches, and hatchlings.

4.7.3.8 Marine Debris, Pollution and Contaminants:

The ingestion of marine debris can be a serious threat to sea turtles. When feeding, sea turtles can mistake debris for natural food items. Some types of marine debris, such as oil, may be directly or indirectly toxic to sea turtles in the action area. Other types of marine debris, such as discarded or derelict fishing gear, may entangle and drown sea turtles. Eutrophication, heavy metals, radioactive elements, and hydrocarbons all may reduce the extent, quality, and productivity of foraging grounds. Chemical pollutants, such as petroleum, sewage, pesticides, solvents, industrial discharges, and agricultural runoff are responsible for an unquantified level of sea turtle mortality each year (NMFS and USFWS 1998). Oil exploration and development pose direct and indirect threats to sea turtles. A rise in transport traffic increases the amount of oil in the water from bilge pumping and disastrous oil spills. Oil spills resulting from blow-outs, ruptured pipelines, or tanker accidents, can result in death to sea turtles.

4.7.3.9 *Vessel Activities:*

Private and commercial vessel operations have the potential to interact with sea turtles resulting in direct injury or death through collision impact (boat strike) or propeller wounds. In addition to commercial traffic and recreational pursuits, private vessels participate in high speed marine events concentrated in the southeastern United States that are a particular threat to sea turtles. The magnitude of these marine events is not currently known.

Federal activities that may affect turtles include military operations and military ordnance detonations. Federal agencies operating in the southeastern United States include the United States Navy (USN) and United States Coast Guard (USCG), which maintain the largest Federal vessel fleets; the Environmental Protection Agency, the National Oceanic and Atmospheric Administration (NOAA), and the Army Corps of Engineer (ACOE). NMFS has conducted formal consultations with the USCG, the ACOE, the USN and other Federal agencies on their vessel operations. Through the ESA Section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. However, the operation of any vessel in the action area represents a potential for some level of interaction.

4.7.3.10 *Other Military Activities that may adversely Affect Sea Turtles:*

Past and ongoing USN bombing training in the ocean off the southeast United States coast, involving drops of live ordnance (e.g., 500 and 1,000 lb. bombs) is estimated to have the potential to annually injure or kill sea turtles (NMFS 1997a; NMFS 2006b). In addition to the threat of injury or death to sea turtles, underwater explosions may destroy or damage habitat. Similarly, the Minerals Management Service (MMS) (although non-military) activities may also adversely affect sea turtles. MMS activities include oil and gas exploration, development, production, abandonment, and removal activities. These activities are anticipated to result in incidental take by injury or mortality (NMFS 2006a).

4.7.3.11 *Navigation Channel Construction and Maintenance:*

The construction and maintenance of federal navigation channels has also been identified as a source of turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle.

4.7.3.12 *Power Plant Entrapment/Entrainment:*

Researchers have recorded accounts of green, hawksbill, loggerhead, and Kemp’s ridley sea turtles entrained in the intake canals to the cooling systems of power plants (TEWG 2000). The cumulative effect of mortality due to entrainment is not known. In an effort to minimize the number of sea turtles caught in the canals, some power plants have put screens over the mouths of the intake areas. Often turtles pass unharmed through the intake pipes and into a holding pond. At the St. Lucie Nuclear Power Plant annual capture rates of loggerheads have exceeded 200 turtles (TEWG 2000).

4.7.3.13 Commercial and Recreational Fisheries, Federal Fisheries, State Managed Fisheries, and International Fisheries:

Commercial and Recreational Fisheries: Commercial and recreational fisheries, including fisheries deploying gillnets, longlines, trawl gear, pots, pound nets and dredges, are known to capture and kill sea turtles and represent the largest known threat to turtles in the marine environment. Many fisheries in the affected area are managed under Federal Fisheries Management Plans (FMPs), others operate under state jurisdiction, and some are unmanaged. Fishery mortality accounts for the largest known proportion of annual human-caused mortality of sea turtles outside the nesting beaches.

Federal Fisheries: A number of federally managed fisheries occur in the U.S. Atlantic Ocean and Gulf of Mexico and turtles could potentially migrate into areas where these fisheries occur. These include the Northeast Multispecies sink gillnet fishery (NMFS 1997c), the American Lobster pot fishery (NMFS 2002b), the Red Crab fishery (NMFS 2002c), the Monkfish Fishery (NMFS 2003b), the Atlantic Highly Migratory Species (HMS) and associated fisheries (NMFS 2004; NMFS 2003a, NMFS 2008b), the Summer Flounder, Scup and Black Sea Bass fisheries (NMFS 2001b), the Atlantic Mackerel /Squid/ Butterfish fishery, the Atlantic Bluefish fishery, the Spiny Dogfish fishery, the Scallop Fishery (NMFS 2008), the Southeast United States Shrimp Fishery (NMFS 2002a), the Tilefish Fishery, the Atlantic Herring Fishery, the Horseshoe Crab Fishery, and the Skate Fishery.

Some of these fisheries annually take small numbers of turtles, others take substantial numbers reaching into the thousands (e.g., shrimp fishery and longline fisheries). These fisheries incidentally capture sea turtles during the course of the fishing activities. Each fishery adversely affects the sea turtle species taken. The exact nature and extent of the effects varies from fishery to fishery. For example, the longline gear used in the HMS fishery is known to capture animals through entanglement in line or direct hooking of animals, sometimes resulting in severe injury or death due to forced submergence or the effects of the hooking. The lines of the pot gear (e.g., lobster pot fishery) are known to entangle sea turtles, which can result in severe injury (e.g., flipper loss) or death (forced submergence). Trawl gear (e.g., the shrimp fishery) is known to catch thousands of turtles, resulting in stress and possible death (those animals that are unable to escape through the turtle excluders and are forcibly submerged). For more detailed information, please see the above references for each fishery. Mortality resulting from incidental capture in fisheries is an important reason for the threatened and endangered status of sea turtles and continues to be a key threat to populations that must be overcome in order to recover these species.

State Managed Fisheries: The level of take in fisheries operating strictly in state waters is largely unknown. Depending on the fishery in question, many state permit holders also hold federal licenses; therefore, section 7 consultations on federal action in those fisheries address some state-water activities. NMFS is also actively participating in a cooperative effort with Atlantic States Marine Fisheries Commission (ASMFC) to standardize and/or implement programs to collect information on level of effort and bycatch in state fisheries. When this information becomes available, it can be used to refine take reduction plan measures in state waters. However, the state managed fisheries for which there is some reason for concern include the fisheries targeting weakfish, horseshoe crabs, whelk, Shad, blue crab, stone crab, lobster (e.g., pots), and flounder (e.g., pound nets).

International Fisheries: In addition to domestic fisheries, sea turtles are subject to incidental capture in numerous foreign fisheries. Although international fisheries do not occur within the action area, it is important to recognize the existence of fisheries outside U.S. waters due to the highly migratory nature of sea turtles. It is hard to fully evaluate the exact effects of international fisheries on sea turtles, however they are substantial.

4.7.3.14 Sea Turtle Conservation and Recovery Activities:

A number of activities are in progress that may ameliorate some of the threat that various activities pose to threatened and endangered sea turtles including the Sea Turtle Stranding and Salvage Network (STSSN), implementation of federal regulations aimed at reducing the potential for incidental mortality of sea turtles in commercial fisheries (e.g., turtle excluder devices), and fishing gear bycatch reduction research. NMFS is also working closely with the USFWS to develop revised recovery plans designed to help guide recovery management of sea turtle species.

4.7.4 Conclusions and Summary of Cumulative Effects:

A complete description of the effects of past and ongoing human and natural factors and current threats occurring (or has occurred) in or near the individual action areas within the Proposed Action. These effects are contributing to the current status of the target species, Atlantic sturgeon, and of the non-target species, shortnose sturgeon, Atlantic salmon and sea turtles, and are included in the baseline section of the Biological Opinion issued for this Proposed Action. These activities and threats are expected to continue into the future.

Overall, the Preferred Alternative would not be expected to have more than short-term effects on the affected species present in the research locations. The impacts of the non-lethal research activities are not expected to have more than short-term effects on individual animals and any increase in stress levels from the capture and handling would dissipate rapidly. Thus, even if animals were exposed to additional capture (e.g., a week later), no significant cumulative effects from the research itself would be expected given the nature of the effects.

Further, with respect to increased impacts on other listed species from issuance of 12 new ESA permits authorizing study of Atlantic sturgeon, the level and frequency of take would not be expected to increase for other listed permitted species. For example, as noted previously, most of the researchers applying for an Atlantic sturgeon permit in the Proposed Action are also currently authorized to take shortnose sturgeon under separate ESA section 10(a)(1)(A) permits. However, the cumulative impacts on shortnose or Atlantic sturgeon resulting from concurrent takes of either would be accounted for separately through the biological opinions measuring the cumulative impacts for each species. Thus, when existing takes in permits have been exhausted of either species where ranges overlap, researchers would be required to cease studies until their permits have either been modified to provide more takes, or the anniversary of permit issuance authorizes more annual take.

Based on the analysis in this EA and as supported by the Biological Opinion’s conclusions, NMFS expects the proposed authorization of 12 Atlantic sturgeon research permits, the Preferred Alternative, would not appreciably reduce any of the affected species likelihood of survival and recovery in the wild, nor would it adversely affect their reproductive rates, mortality rates, or recruitment rates. In particular, NMFS expects the proposed research activities would not affect the reproductive success, survival of young, or the number of young annually recruiting into the breeding populations of the affected species.

The incremental impact of the proposed research on these animals, when added to other past, present, and reasonably foreseeable future actions discussed here, would not be significant at an individual or a population level. Therefore, no species level events would result from the proposed Atlantic sturgeon research. The data collected during sampling activities linked with the Proposed Action would help fill necessary data gaps for Atlantic sturgeon populations throughout the East Coast. The research would provide information helpful in managing, conserving, and recovering this species and would outweigh any adverse impacts.

Finally, the Biological Opinion prepared for issuing permits for File Nos. 16526, 16323, 16436, 16422, 16438, 16431, 16507, 16547, 16375, 16442, 16482, and 16508 provides an integration and synthesis of the information about the status of the species, past and present activities affecting these species, possible future actions that might affect the species, and effects of the Proposed Action to provide a basis for determining the additive effects of the take authorized in this permit on ESA listed sturgeon, in light of their present and anticipated future status. The conclusion of the Biological Opinion for issuing permits for File Nos. 16526, 16323, 16436, 16422, 16438, 16431, 16507, 16547, 16375, 16442, 16482, and 16508 was that the Proposed Action would not likely jeopardize the continued existence of Atlantic sturgeon, shortnose sturgeon, Atlantic salmon or sea turtles.

The opinion also indicates NMFS is not aware of any future State, tribal, local, or private actions in each of the individual action areas that may have a bearing on the risk assessment, and finds that the issuance of the proposed permits would have only negligible impacts to these species. The analysis of past, present and reasonably foreseeable actions indicates that no cumulatively significant impacts would occur associated with the Proposed Action.

CHAPTER 5 LIST OF PREPARERS AND AGENCIES CONSULTED

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National Marine Fisheries Service
Permits, Conservation and Education Division
Silver Spring, MD 20910

Agencies and Personnel Consulted:

Office of Protected Resources National Marine Fisheries Service Endangered Species Division, Silver Spring, MD 20910	Section 7 formal consultations on effects on ESA target species (Atlantic sturgeon, shortnose, sea turtles)
NMFS, Northeast Regional Office Office of Protected Resources Orono, ME 04469	Consultation with NMFS NERO on Atlantic salmon
Office of Protected Resources NMFS, Northeast Regional Office Sea Turtle Stranding and Disentanglement Gloucester, MA 01930	Consultation with NMFS NERO on sea turtle stranding and disentanglement.

NMFS, Southeast Regional Office Center for Coastal Fisheries and Habitat Research 101 Pivers Island Road Beaufort, NC 28516	Informal consultations on effects on EFH of federally managed species
NMFS, Northeast Regional Office Habitat Conservation Division Gloucester, MA 01930	Informal consultations on effects on EFH of federally managed species
NMFS, Northeast Fisheries Science Center 166 Water Street Woods Hole, MA 02543-1026	Informal consultations on impacts on pinnipeds
USFWS Ecological Services, Raleigh Field Office 551F Pylon Drive Raleigh, NC 27606	Section 7 informal consultations on effects on ESA non-target species (Roanoke logperch, dwarf wedgemussel, manatee and wood stork)
USFWS Ecological Services, North Florida Field Office 7915 Baymeadows Way, Suite 200 Jacksonville, FL 32256	Section 7 informal consultations on effects on ESA non-target species (manatee and wood stork)
USFWS Ecological Services, Charleston Field Office 176 Croghan Spur Road, Suite 200 Charleston, SC 29407	Section 7 informal consultations on effects on ESA non-target species (manatee and wood stork)
USFWS Ecological Services, Coastal Georgia Sub-Office 4980 Wildlife Drive, NE Townsend, Georgia 31331	Section 7 informal consultations on effects on ESA non-target species (manatee and wood stork)

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

FINDING OF NO SIGNIFICANT IMPACT

ON THE EFFECTS OF THE ISSUANCE OF 12 SCIENTIFIC RESEARCH PERMITS (File Nos. 16526, 16323, 16422, 16436, 16431, 16507, 16438, 16547, 16375, 16442, 16482, and 16508) TO CONDUCT SCIENTIFIC RESEARCH ON ATLANTIC STURGEON

National Marine Fisheries Service

Background:
From April 19 to August 22, 2011, the National Marine Fisheries Service (NMFS) received twelve (12) applications for permits (File Nos. 16526, 16323, 16422, 16436, 16431, 16507, 16438, 16547, 16375, 16442, 16482, and 16508) from the University of Maine; Connecticut Department of Environmental Protection; Stony Brook University; New York State Department of Environmental Conservation; Delaware DFW; Delaware State University; Environmental Research and Consulting; USFWS, Virginia Fisheries Resource Office; North Carolina Cooperative Fish and Wildlife Research Unit; South Carolina Department of Natural Resources; Warnell School University of Georgia; U.S. Geological Survey, and Florida Integrated Science Center, respectively, to conduct research on Atlantic sturgeon in the East Coast of the United States.

In accordance with the National Environmental Policy Act, NMFS has prepared an Environmental Assessment (EA) analyzing the impacts on the human environment associated with issuance of permits (*Environmental Assessment for the Issuance of Scientific Research Permits (File Nos. 16526, 16323, 16422, 16436, 16431, 16507, 16438, 16547, 16375, 16442, 16482, and 16508) for Research on Atlantic Sturgeon*). In addition, a Biological Opinion was issued under the Endangered Species Act (ESA) (NMFS 2012) summarizing the results of an interagency consultation. The analyses in the EA, as informed by the Biological Opinion, support the following findings and determination.

Analysis:
The National Oceanic and Atmospheric Administration's Administrative Order 216-6 (May 20, 1999) for implementing NEPA, contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality (CEQ) NEPA implementing regulations at 40 C.F.R. 1508.27 state the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

(1) Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat (EFH) as defined under the Magnuson - Stevens Act and identified in Fishery Management Plans?

Response: The permitted taking of sturgeon would occur in marine areas, estuaries and freshwater rivers frequented by Atlantic sturgeon on the East Coast of the United States. No coral reef, seagrass beds and other sensitive ecosystems occur in the action areas of the proposed activities, and thus none would be affected.

Designated EFH does exist for federally managed species in the individual proposed action areas of permits. Specifically, the tidally mixed areas and near shore marine areas have designated EFH.

NMFS PR contacted the Northeast and Southeast Regional Offices of Habitat Conservation by email on September 2, 2011, asking for concurrence with our conclusion that the permitted activities would not likely impact EFH for other managed species in the action area. The Offices sent confirmation to NMFS PR agreeing that the proposed methods of capture Atlantic sturgeon would have minimal impacts on designated Essential Fish Habitat in proposed action areas. Thus, no further consultation was necessary.

(2) Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

Response: No substantial impacts on biodiversity or ecosystem function within the action areas are expected. The bottom substrate of the proposed action areas, upon which the benthic productivity is largely dependent, consists of sandy loam sediment, mud flats, and some deep and shallow rocky substrate in the channels and off drop-offs of elevated shoreline. The impacts to bottom substrate would typically be during capture; however, due to the minimal contact by nets in localized areas— in addition to the proposed mitigation measures set forth in the permit for trawling—NMFS expects minimal disturbance of the benthic organisms and substrate.

Due to the nature of netting, NMFS would however expect some other non-targeted species would become enmeshed. However, non-target fish would be removed from the nets and released at the site of capture at short intervals, and it is believed that virtually all by-catch would be released alive without long-term effects on predator-prey relationships. Ecosystem function would not be substantially impacted for other species with the potential to be affected by the proposed research. It is also expected some juvenile and adult shortnose sturgeon (*Acipenser brevirostrum*) would be taken during sampling for Atlantic sturgeon. With respect to bycatch of shortnose sturgeon, the researchers would monitor gill nets closely, and if shortnose sturgeon are captured, NMFS would require similar netting protocols and standard research conditions in the permit for Atlantic sturgeon be used for ensuring shortnose sturgeon survival.

(3) Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?

Response: Issuance of the permit modifications is not expected to have substantial adverse impacts on public health or safety. These actions would involve the use of 95% ethanol pre-measured in vials for preservation, storage, and transportation of tissue samples. Also pre-measured MS-222 powder would be used for anesthetizing shortnose sturgeon during surgery. However, researchers are well aware of handling these chemicals correctly and would take normal safety measures. They would also be advised in the permit to dispose of the chemicals safely following state-approved measures.

(4) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?

Response: Due to the scope and range of the Proposed Action, other listed species, their critical habitat, marine mammals, or other non-targeted species could be affected. Shortnose sturgeon are currently listed as an endangered species under NMFS jurisdiction, co-occurring closely with Atlantic sturgeon in each of the described action areas. Further, because shortnose and Atlantic sturgeon are comparable species sharing similar life history and habitat types, NMFS concludes current shortnose sturgeon scientific research highly influences the scope of proposed Atlantic sturgeon research analyzed in this EA and supported by the accompanying Biological Opinion. Permitted activities for both species require standard NMFS research and mitigation protocols to minimize stress and harmful effects on the species. The proposed research activities were determined to potentially have adverse effects on individual endangered shortnose sturgeon, but the effects were not expected to be significant on individual levels nor were they expected to be significant at the population or species level. Shortnose sturgeon do not have any critical habitat designated.

With respect to the endangered Atlantic salmon in the GOM and of overlapping range of designated critical habitat with Atlantic sturgeon, NMFS PR concludes the proposed research methods on Atlantic sturgeon in File No. 16526 may potentially have impacts on Atlantic salmon. However, because the methods proposed by sturgeon researchers in the GOM, and the limited historical interactions with Atlantic salmon over an extended period of time, NMFS concludes adherence to proposed protective measures for Atlantic salmon would likely minimize salmon interactions. Atlantic salmon specialists in the NMFS Northeast Region (Orono, ME) analyzed the potential impacts of research proposed and concurred with NMFS PR, stating that "overall, NMFS [Northeast Office of Protected Resources] does not expect the proposed Atlantic sturgeon sampling effort in the GOM would result in increased interactions with Atlantic salmon so long as the recommended gear modifications and proposed area restrictions with protective measures were adhered to." Thus, no incidental capture or mortality for Atlantic salmon would be authorized for Atlantic salmon in the action area.

With respect to endangered sea turtles, NMFS concludes that the proposed Atlantic sturgeon research methods in File Nos. 16547 and 16482 may likely adversely affect sea turtles. In these respective action areas in Chesapeake Bay tributaries and Georgia Rivers, although up to two sea turtles could potentially be captured in each research proposed, turtles would likely not be subject to lethal capture. Within impacted zones when turtles could be present, anchored net sets would be set for 30 minutes or less between checks and would be constantly tended. Also drift nets would be fished "floating" at the surface, constantly tended by the research team. Due to the precautions taken, the potential for mortality or serious harm of the turtle would be considered minimal in each action area. Additionally, personnel handling turtles would be trained in resuscitation techniques for turtles, and thus, none would be expected to be at risk of mortality.

With respect to impacts on marine mammals in individual permit actions, NMFS does not anticipate serious interactions with marine mammals due to precautionary measures researchers would agree to in permit conditions when netting in coastal or estuarine areas where marine mammals might be present. Likewise, NMFS believes any bycatch of non-protected species encountered would be returned to the water with minimal exposure to handling stress. That is, because nets would typically be checked at varied short intervals as dictated by temperature and dissolved oxygen concentrations, NMFS considers virtually all bycatch would be released alive.

(5) Are significant social or economic impacts interrelated with natural or physical

environmental effects?

Response: Effects of the research would be limited to the described impacts of the target and non-target species. Permitting the proposed research could result in a low level of economic benefit to local economies in the individual action areas. However, such impacts would be negligible on a national or regional level and therefore are not considered significant. These impacts are not interrelated with any natural or physical impacts. The Proposed Action would not result in inequitable distributions of environmental burdens or affect access (short- or long-term use) to any natural or depletable resources in the action areas.

(6) Are the effects on the quality of the human environment likely to be highly controversial?

Response: A Notice of Receipt of the applications was published in the Federal Register (76 FR 58469, September 21, 2011) announcing the availability of the applications for permit and related documents for public comments (File Nos. 16526, 16323, 16422, 16436, 16431, 16507, 16438, 16547, 16375, 16442, 16482, and 16508). Comments received from the public regarding the applications were requests to review the applications. However, none were controversial and were addressed by advising the individual where to search online for the applications. Comments from NMFS Southeast and Northeast Regional Offices, Science Centers, and expert reviewers were also solicited and appropriately addressed within the EA and decision memos with respect to how the permit would authorize standard, well known and non-controversial research techniques.

(7) Can the proposed action be reasonably expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas?

Response: Each of the research methods in the proposed permits have been analyzed under the current EA and the activities would not be expected to result in significant impacts to any unique areas mentioned above. Examples of such areas occurring in the proposed action areas include national parks and wildlife refuges, many state parks and conservation areas, and a variety of fishery management closure areas used to protect federal and state fisheries, including those established to recover over-fished stocks, protect by-catch species, or protect essential fish habitats (EFH). The following web site, http://www.mpa.gov/dataanalysis/mpainventory/mpaviewer/ was made available to researchers and included in the EA detailing locations and descriptions of Marine Protected Areas (MPAs) within each of the proposed action areas. As described, these areas have varying levels of access to recreational and commercial activities, seasonal protection levels and site specific management plans. However, most are managed for multiple uses, accessible year round, having few restrictions. In these areas where clear restrictions exist for access, researchers would be required to obtain proper authorization for research from the local regulating authority. Through this process, researchers would be made aware by the maintaining authority of local restrictions established for the protected area; or more formalized permits would be required having specific conditions in place guarding against adverse impacts to protected resources.

In any case, researchers would be responsible for obtaining permits, or complying with any other Federal, State, local, or international laws or regulations necessary when carrying out their actions.

Additionally, as stated above, with respect to anticipated effects on EFH by sampling gear and boating activities, NMFS concluded these would result in minimal disturbance to the physical environment, including the bottom substrate and any portion having EFH.

(8) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: Potential risks by proposed research methods are not unique or unknown, nor is there significant uncertainty about impacts. Monitoring reports from other permits of similar nature, and published scientific information on impacts of research on comparable sturgeon species (i.e., shortnose sturgeon), indicate the proposed activities would not result in significant adverse impacts to the human environment or the species. There is also considerable scientific information available on the minimal likelihood of such impacts.

(9) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Response: Although the environmental effects associated with authorizing scientific research on Atlantic sturgeon have been limited because the animal is newly ESA listed, currently three EAs have been prepared for Atlantic sturgeon research associated with ESA Section 6 grants to the states. However, a large number of other EAs and SEAs have previously been prepared on the effects of similar research techniques related to shortnose sturgeon.

Because shortnose and Atlantic sturgeon are comparable species sharing similar life history and habitat types, NMFS concludes current shortnose sturgeon scientific research highly influences the scope of proposed Atlantic sturgeon research analyzed in this EA. The majority of the applicants applying for Atlantic sturgeon research permits have previously participated or are currently participating in both shortnose and Atlantic sturgeon studies. This arrangement is expected to continue in the future. The EA for the Proposed Action summarizes the currently issued NMFS permits issued for shortnose sturgeon, as well as the titles of Section 6 grants for Atlantic sturgeon research for which EAs or SEAs were prepared. Each of these NEPA documents individually resulted in a Finding of No Significant Impact (FONSI) determination and each action was not considered controversial.

However, with respect to increased impacts on other listed species from issuance of 12 new ESA permits authorizing study of Atlantic sturgeon, NMFS does not anticipate the level and frequency of takes would increase for either listed sturgeon species. Likewise, permits would not be expected to increase the cumulative impacts on shortnose or Atlantic sturgeon. Concurrent takes of either species would be accounted for separately through biological opinions measuring the cumulative impacts for each species. Further, the shortnose sturgeon research would continue regardless of issuing new permits authorizing Atlantic sturgeon research. Thus impacts to Atlantic sturgeon resulting from shortnose sturgeon research would still occur. Lastly, when existing takes in permits have been exhausted for either species where ranges overlap, researchers would be required to cease studies on either species until their permits have either been modified to provide additional takes, or the anniversary date of permit issuance authorizes a new cycle of annual takes. Consequently, the Biological Opinion for the Proposed Action concludes that each of the individual actions would be expected to have no more than short-term effects on individual listed animals and no effects on other aspects of the environment. Further, the incremental impacts of the actions when added to other past, present, and reasonably foreseeable future actions discussed in the EA would be minimal and not significant.

(10) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?

Response: The action would not take place in any district, site, highway, structure, or object listed in or eligible for listing in the National Register of Historic Places, thus none would be impacted. See Response #7 for a discussion about managed protected areas. Research will not occur in National Marine Sanctuaries. Where the Proposed Action would occur in other areas of significant scientific, cultural or historical resources, NMFS PR considers the proposed fishery research would have very limited environmental impact, if any, to these significant resources. The research methods in the proposed permits have been analyzed under the current EA, and the activities would not be expected to result in significant impacts to any unique areas mentioned above. Thus, none of these resources are expected to be directly or indirectly impacted.

(11) Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?

Response: The U.S. Geological Survey has documented several aquatic nuisance species occurring in the proposed research area having potential to be spread by research into adjacent watersheds. However, the applicants are instructed to follow certain conditions proposed by NMFS (outlined in the accompanying EA) minimizing the potential spread of these aquatic nuisance species. Therefore, the proposed research activities would not be expected to result in introduction or spread of non-indigenous species to other watersheds. The research activities would also not involve discharging bilge water or other issues of concern relative to non-indigenous species.

(12) Is the proposed action likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?

Response: The decision to issue these 12 research permits in the Proposed Action would not be precedent setting nor would it affect any future decisions. NMFS has issued numerous scientific research permits to study shortnose sturgeon pursuant to section 10 of the Endangered Species Act; thus, this is not the first permit NMFS has issued for this substantially related research activity. Issuance of permits or permit modifications, to a specific individual or organization for a given similar research activity, does not in any way guarantee or imply NMFS would authorize other individuals or organizations to conduct the same research activity. Any future requests received, including those by the applicants, would be evaluated upon their own merits relative to the criteria established in the ESA and NMFS' implementing regulations.

(13) Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?

Response: Issuance of the 12 proposed permits is not expected to violate any Federal, State, or local laws for environmental protection. NMFS has sole jurisdiction for issuance of such permits for Atlantic sturgeon and has determined the proposed research activities are consistent with applicable provisions of the ESA. The permits contain language stating the permits do not relieve the Permit Holders of the responsibility for obtaining other permits, or complying with other Federal, State, local, or international laws or regulations.

(14) Can the proposed action reasonably be expected to result in cumulative adverse effects having a substantial effect on the target species or non-target species?

Response: NMFS concludes procedures proposed in the individual actions would have potential for adverse effects on individual target animals; however, because the Atlantic sturgeon are robust responding well to handling, the cumulative effects on the population are not likely long-term or significant to the species. Additionally, NMFS established in permits requirements for monitoring for interactions with shortnose sturgeon, placing conditions in the permit detailing procedures to be used if shortnose sturgeon are incidentally captured.

Likewise, the EA considers impacts from interactions with other protected species such as Atlantic salmon, sea turtles or marine mammals. Although based on historical records, interactions with these species would be anticipated as extremely rare, sampling methods would be used to minimize contact and would also be conditioned to minimize adverse effects of boating and netting activities. Where takes of protected species are anticipated, such takes would be provided for through incidental take provision of the Biological Opinion produced for the proposed action.

Finally, the Biological Opinion prepared for issuing permits for File Nos. 16526, 16323, 16436, 16422, 16438, 16431, 16507, 16547, 16375, 16442, 16482, and 16508 provides an integration and synthesis of the information about the status of the species, past and present activities affecting these species, possible future actions that might affect the species, and effects of the Proposed Action, to provide a basis for determining the additive effects of the take authorized in this permit on ESA listed sturgeon, in light of their present and anticipated future status. The conclusion of the Biological Opinion for issuing these permits was that the Proposed Action would not likely jeopardize the continued existence of Atlantic sturgeon, shortnose sturgeon, Atlantic salmon or sea turtles.

DETERMINATION

In view of the information presented in this document and the analyses contained in the EA prepared for issuance of the permit, pursuant to the ESA, and the ESA section 7 Biological Opinion, it is hereby determined that the issuance of Permit Nos. 16526, 16323, 16422, 16436, 16431, 16507, 16438, 16547, 16375, 16442, 16482, and 16508 would not significantly impact the quality of the human environment as described above. In addition, all beneficial and adverse impacts of the proposed action have been addressed, reaching the conclusion of no significant impacts. Accordingly, preparation of an Environment Impact Statement (EIS) for this action is not necessary.

Helen Golde — 4/2/12
Helen Golde
Acting Director, Office of Protected Resources

Date