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

APR - 8 2010

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 on the Effects of the Issuance of a Protected Species Cooperative Conservation Grant to the Delaware Division of Fisheries and Wildlife (Award No. NA10NMF4720030) to Conduct Research on Atlantic Sturgeon.

LOCATION: Research would take place in waters of Delaware, New Jersey and New York.

SUMMARY: The current EA analyzed the effects of the proposed Atlantic sturgeon research, which will be conducted in the Delaware River and estuary and the Connecticut River and adjacent to Long Island Sound. Specifically, the proposed work would involve identification and assessment of spawning and other habitats for both sturgeon species in the Delaware River; analysis of the distribution and habitat use of juvenile Atlantic sturgeon in Delaware and New Jersey; analysis of the abundance, distribution, and habitat use of both species in Connecticut waters, including nearshore marine waters; analysis of interbasin exchange rates of adult Atlantic sturgeon within the New York Bight distinct population segment (DPS) as defined by NMFS (NMFS, 2007); development of spatial models for sturgeon in the mid-Atlantic region; development of an Atlantic Coast telemetry database (the Atlantic Cooperative Telemetry (ACT) Network); and participation in multiple types of stakeholder outreach efforts. Such data and information sharing is critical for recovery planning, and in particular, for identifying appropriate management units and critical habitats.

The proposed action analyzed in the EA would not have significant environmental effects on the target or non-target species; public health and safety would not affected; no unique geographic area would be affected; and the effects of this study would not be highly uncertain, nor would they involve unique or unknown risks. Issuance of this permit would not set a precedent for future actions with significant effects, nor would it represent a decision in principle about a future consideration. There would not be individually insignificant but cumulatively significant impacts associated with the proposed action, and there would not be adverse effects on historic resources. The permit would contain mitigating measures to avoid unnecessary stress to the subject animals.

RESPONSIBLE OFFICIAL: James H. Lecky
Director, Office of Protected Resources

National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910
(301) 713-2332

The environmental review process led us to conclude 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 EA is enclosed for your information.

Although NOAA is not soliciting comments on this completed EA/FONSI, we will consider any comments submitted assisting us to prepare future NEPA documents. Please submit any written comments to the responsible official named above.

Sincerely,

Paul N. Doremus, Ph.D.
NOAA NEPA Coordinator

Enclosure

Environmental Assessment
Issuance of a Protected Species Conservation Grant to the Delaware Division of Fisheries and Wildlife (Award No. NA10NMF4720030) to Conduct Research on Atlantic Sturgeon

I. Background

The National Marine Fisheries Service, Office of Protected Resources (NMFS PR) proposes to provide financial assistance in the form of a grant to the Delaware Division of Fisheries and Wildlife (DEDFW). This award would be issued through the Protected Species Cooperative Conservation Grant Program (CFDA no. 11.472, Unallied Science Programs) authorized under section 6 of the Endangered Species Act (ESA) of 1973 as amended (16 U.S.C. 1535). DE DFW would be partnering with the New Jersey Division of Fish and Wildlife (NJ DFW) and the Connecticut Department of Environmental Protection (CT DEP) to complete the proposed work. In accordance with section 6(d)(2) of the ESA, the Federal Government would provide 90 percent of the cost of the project, and the states would provide the remaining 10 percent. This financial assistance award is planned to extend for three years (three annual payments) and is subject to semi-annual review by NMFS. The grant would support conservation activities for Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), a candidate for listing under the ESA, and the endangered shortnose sturgeon (*Acipenser brevirostrum*) in Delaware, New Jersey, and Connecticut.

II. Purpose and Need

Under section 6 the ESA, NMFS is authorized to cooperate with states to the maximum extent practicable in carrying out programs for the conservation of threatened and endangered species. Scientific research is an important means of gathering valuable information about protected species to inform conservation and management measures and, ultimately, to recover listed species. The purpose of this proposed action is to provide financial assistance to support research that will fill identified data gaps in shortnose and Atlantic sturgeon habitat requirements, migratory pathways, and life history characteristics.

III. Description of the Action Area

The proposed research under Award No. NA10NMF472003 to DEDFW would take place in the Delaware River and estuary and the Connecticut River and adjacent Long Island Sound. Sturgeon collections in the Connecticut River and Long Island Sound may take place in the lower 50 km of the Connecticut River and throughout Long Island Sound (Figure 1). Particular collection effort focus will be placed on the lowest 15 km of the Connecticut River and in two discrete areas in Long Island Sound where sturgeon collections have been highly successful in the recent past. These locations in Long Island Sound include the area around the mouth of the Connecticut River (approximate 5km radius around mouth) and a deep, mud/transition bottom in the Central basin of Long Island Sound. If these areas prove unsuccessful and information suggests other areas (anecdotal reports, telemetry info, etc.) have sturgeon present, effort may be shifted a few km. Gillnet sampling conducted by DEDFW for early stage juvenile sturgeon will be conducted in the oligohaline and tidal freshwater portions of the Delaware River (Figure 2). These areas are outside of the main navigation channel in deep water habitat and have been recently documented as early stage juvenile habitat by DEDFW researchers. Manual tracking will occur in the mainstem Delaware River from the Delaware Memorial Bridge to the mouth of the Schuylkill River (Figure 3). Field sampling efforts will also be conducted in the tidal Delaware River from Marcus Hook, PA (river km 125) to Trenton, NJ (river km 215), and the lower non-tidal Delaware from Trenton to the vicinity of Lumberville, NJ (river km 250). Anchored gillnet sampling in Delaware's coastal waters will take place 3 to 15 kilometers off the Delaware coastline between an area bordered by the Indian River Inlet to the north and the Delaware State line to the south (Figure 4). Acoustic receivers would also be maintained in existing locations in the Delaware River/Estuary/nearshore coastal waters as well as expanded to encompass a broader study area (Figures 4-5); researchers would also maintain an existing array within the Hudson River (Figure 6). Field activities in Connecticut would occur during spring (April) through fall (December) of each year. Gillnetting in Delaware will occur from June through November, and manual tracking will be conducted from June to December. Further descriptions of the action area are provide in the Environmental Assessments for permit nos. 1486 (Delaware River, through the Chesapeake and Delaware Canal and into the upper Chesapeake Bay), 1516 (Connecticut River, the Thames River, and the Housatonic River), 14396 (Delaware River and estuary), and 14604 (Delaware River and estuary) and are hereby incorporated by reference.

IV. Alternatives Under Consideration

Two alternatives have been considered: (1) approving Award No. NA10NMF4720030, i.e. the proposed action; (2) not approving Award No. NA10NMF4720030, i.e. the no action alternative.

Proposed Action

The proposed action is issuance of a grant to DEDFW (Craig Shirey, Program Manager) through the fiscal year 2010 Protected Species Cooperative Grant Program (CFDA no. 11.472, Unallied Science Programs), which is authorized under section 6 of the ESA (16 U.S.C. 1535). The proposed action includes nine different project components, encompassing field research, database development and outreach activities. Field work activities will include side-scan sonar surveys of benthic habitat (using Edgetech 4125-P 1250 kHz high frequency search and recovery system), gillnetting (using multi-mesh gillnets) and trawling (9.7 m x 7.0 m trawl) to capture sturgeon, surgical implantation of acoustic tags (VEMCO), and deploying artificial substrates and D-frame nets to collect shortnose sturgeon eggs and larvae. Development of spatial models using remote sensing data and management of the ACT Network database would take place within a laboratory or office setting and do not involve the taking or handling of fish or samples. This work would provide information on the distribution, movement, and habitat use of shortnose and Atlantic sturgeon within the New York Bight region. Results would advance current understanding of shortnose and Atlantic sturgeon populations within this region and data would be used by both state and federal agencies to define appropriate management units and critical habitats. The applicant proposes to complete this research within a three-year period.

All capture and handling protocols for shortnose sturgeon would be followed as described in permit conditions and previous NEPA analyses (permit nos. 1486, 1516, 14396 and 14604); methods described in prior NEPA analyses associated with issuance of these scientific research permits are hereby incorporated by reference. Specific activities targeting Atlantic sturgeon are described further in this document.

Capture Methods
Since incidental take or directed take of endangered shortnose sturgeon may occur during sampling for Atlantic sturgeon, capture and handling protocols will follow the same conditions as proscribed for shortnose sturgeon in ESA scientific research permit nos. 1486, 1516, 14396 and 14604. In Connecticut, researchers propose to capture up to 300 juvenile/adult Atlantic sturgeon - 250 of which would be from Long Island Sound and 50 from the Connecticut River - using standardized netting protocols (gill net and small trawl nets). Gill nets are typically fished in an anchored manner and every effort is made to haul gear around slack tide. Tidal stage is less important in trawling, depending upon the vessel and thus horsepower available. Trawling done from smaller vessels, for example, would be coordinated around slack tide. Gill nets would be used in New Jersey, Delaware, and Connecticut waters, and small trawl gear would be used in nearshore areas off Connecticut only. The sampling effort would be conducted primarily during the spring, summer, and fall months. In Connecticut waters, sampling will take place approximately up to 4 days per week from May through November.

All sampling and handling of Atlantic sturgeon would be conducted following the guidelines established in "A Protocol for the Use of Shortnose and Atlantic Sturgeon" (Moser et al. 2000). Net mesh sizes used during this project in Connecticut waters would measure 12.7 to 25.4 mm (stretched measure). Netting material would consist of heavy multifilament nylon (size 208-233) mesh and would measure 100 m long by 1.8 m deep. Trawl nets (9.7. m x 7.0 m) would consist of mesh sizes from 5.1 to 10.2 cm. In Connecticut waters, trawls are typically pulled at 1.0 to 2.5 knots with a small (5.2 or 6.4m) outboard powered boat and set and hauled by hand. Given the footrope length and horsepower of the tow vessel, the footprint of this trawl is very small. Setting and retrieval of gear by hand dictates that depths in excess of 10 m are not practical and average depths fished are generally only 4 to 6 m in sand and sandy soft bottoms. The areas fished with trawls are generally within the lower, estuarine portion of the Connecticut River and the nearby shallow mouth area in Long Island Sound. These areas are both subject to annual spring freshets and are highly dynamic with sediment transport of sand from the river into Long Island Sound. Trawling would be conducted in 6-30 minute intervals depending on bottom topography and vessel traffic. To lessen benthic disturbances, a GPS would be used to direct trawls so that nets would not be towed over the same location more than once in a 24-hour period. Further, trawling would be conducted primarily over sandy substrates, avoiding hard bottoms, vegetated areas, organic material, or woody debris. If a trawl became snagged on bottom substrate and debris, it would be untangled immediately to reduce stress on captured animals.

The following net-setting protocol summarized in Table 1 below would be adhered to by researchers. All nets would be attended to avoid marine mammal and sea turtle interactions. As indicated in the table, nets would be set in waters having minimum dissolved oxygen (D.O.) concentrations of 5 mg/L with one exception (i.e., soak times would be reduced to the next lower duration when D.O. measures between 4 and 5 mg/L).

Table 1: Summary of Netting Conditions

Water Temperature (°C)	Minimum D.O. Level (Mg/L)*	Maximum Net Set Duration (Hours)
<15	5	10
15 – 20	5	4
20 – 25	5	2
25 – 28	5	1
> 28	Any	Cease netting until consulting with NMFS

* If DO concentration is between 4 and 5 mg/L at any temperature range, netting may occur, but only at the next lower net set duration indicated.

General Handling
Once removed from nets, captured Atlantic sturgeon would be recovered in either floating live cars or on-board flow-through tanks. Two sizes of live cars are used by researchers in Connecticut. One measures 1m x 1m x 1m deep and is constructed of 2.5 cm (stretched) mesh multifilament netting. A larger live car measures 3.0 m diameter by 2.5 m deep and is constructed of 10.2 cm (stretched) mesh multifilament netting. DEDFW researchers would place Atlantic sturgeon in floating live cars measuring 1.8 m long by 1.2 m wide by 1.5 m high. Other cooperators (Dewayne Fox; Delaware State University) would place captured Atlantic sturgeon into live wells (rather than "live cars"), approximately 1,100 liters in capacity, with water pumped in directly from the ocean, maintaining ambient temperature, salinity and dissolved oxygen levels.

From live cars or wells, fish would be moved to a wetted measuring board for all processing (measurements, PIT tag; except for surgical transmitter implantation), which typically occurs in less than 45 seconds. Both fork and total length of each sturgeon would be measured using a standard measuring board in the cases of individuals < 1m and using a tape measure for larger individuals. When using an onboard measuring box, sturgeon would be immersed in a continuous stream of water supplied by a pump-hose assembly mounted over the side of the research vessel, and, if needed, D.O. would be supplemented with compressed oxygen to ensure the D.O. concentration does not fall below saturation. Young-of-year (YOY) and juvenile Atlantic as well as adult and juvenile shortnose sturgeons would be weighed on a platform scale fitted with a small waterproof cushion attached to the surface of weighing platform. Large (>25 kg) juvenile and adult Atlantic sturgeon would be weighed using a wetted sling with a boom mounted scale.

Following measuring and other handling, fish would be placed back into the live car or well and allowed to recover for 10 to 15 minutes prior to performing any surgery. Following surgeries, fish would be transferred to a 1,100 liter recovery tank and monitored. Upon gaining equilibrium and showing signs of responsiveness, sturgeon would be released near the location of capture but away from any potential recapture hazards by gently lowering the fish, using a sling, into the water.

The time required to complete routine, non-invasive methods (i.e., measuring, weighing) would be less than one minute per fish. However, in some instances the size and strength of these fish would sometimes dictate several minutes per fish just to move, examine, and measure them. The time required for procedures such as anesthetizing and telemetry tagging, would vary, but would average less than 15 minutes per fish. Following processing, all fish would be placed in a separate net pen to ensure full recovery prior to release.

Anesthesia and Surgical Implantation of Acoustic Tags
Regarding research conducted in Connecticut waters, up to 70 sturgeon per year would be surgically implanted ultrasonic transmitters. All fish selected for transmitters will be at least 75.0 cm fork length (FL). Three different transmitters will be used in Connecticut (2 different sizes, VEMCO V13 and V16). V13 transmitters will include 30 that have pressure sensors and 20 that have temperature sensors. These will be equally split between shortnose and Atlantic sturgeon. An additional 20 V16, long term transmitters will be implanted into Atlantic sturgeon. DEDFW and their cooperators would surgically implant up to 50 juveniles per year (250 mm – 1000 mm TL) and up to 100 adults per year (>1.3 m TL). All fish selected for surgical implantation of tags would be in good overall health. All implanted sonic transmitters would also be limited in size to no more than 2% of a fish's body weight. Specifications of transmitters that would be used are as follows:

Model	**Length (mm)**	**Diameter (mm)**	**Weight (H20) (gm)**	**Weight (O2) (gm)**
V7	22.5	7	1.0	1.8
V9	21.0	9	1.6	2.9
V13	36	13	6	11
V16	98	18	16	36

Surgeries would be performed in a rubber coated mesh sling held by a wooden table at working height (1.0 m). During surgery the sturgeon's body would be kept moist by flowing water from an adjustable, low-volume pump, and water would be delivered over the sturgeon's gills by placing a tube into the mouth. The pump would pull water from an open 75 liter cooler placed directly below the sturgeon; the cooler also catches water as it drains away. The draining action of the water stream falling 0.8 m into the cooler serves to re-oxygenate the water as it re-circulates; the water in the cooler would also be replaced every 30 minutes. A 19 liter bucket with anesthesia would be placed inside the cooler, and when anesthesia is needed, the pump would be placed inside the bucket and the bucket would be placed under the fish to catch the draining 'anesthesia water'. When it is time to bring the fish out of anesthesia, the pump would be placed back into the freshwater in the cooler. To reduce stress, the sturgeon and crew would be shaded by a Bimini® top over the work area. To minimize handling stress, each fish would be moved and handled by researchers using latex gloves.

All sturgeons would be scanned for the presence of PIT tags and if none were recorded a PIT tag would be implanted at the base of the dorsal fin in accordance to standardized NMFS protocols (Moser et al. 2000). Additionally each sturgeon would be scanned for the presence of a functional acoustic transmitter using a VEMCO receiver and hydrophone. Sturgeon with an operational transmitter would not be implanted with a new transmitter to avoid code collision between acoustic tags.

The following 3-5 minute transmitter implantation surgery under surgical anesthesia (Coyle et al. 2004) would be used. Atlantic sturgeon selected for transmitter implantation would be netted at temperatures 27 ^{O}C or below. Each sturgeon would be anaesthetized as described above using a solution of 100-150 mg/L of tricaine methane sulfonate (MS-222) buffered to neutral pH with sodium bicarbonate or seawater. This solution would be administered until a state of anesthesia is reached (i.e., loss of equilibrium, little reaction to touch stimuli, cessation of movement, except for opercula movement). The anesthetic's induction and recovery time would vary but would be appropriate for sturgeon under the specific water temperature and oxygen conditions present (Fox et al. 2000). Just prior to the surgical procedure, the tube supplying the anesthetic would be removed and the sturgeon placed on the moist surgery 'rack'. Respiration would be maintained by directing fresh ambient water pumped across the gills with tube inserted in the animals' mouth. The incision site (about 40 to 60 mm anterior to the pelvic fins) would be disinfected with Betadyne, and a sterile surgical scalpel would be used to make a 10 mm incision. Sterilized sonic transmitters, coated with an inert polymer compound, would be inserted into the surgical openings of sturgeon, and the incision would be closed with resorbable sutures. A thin layer of petroleum jelly mixed with Betadyne would then be spread over the incision areas to protect against infection (Fox et al. 2000). Following processing, all fish would be placed in a separate net pen or recovery tank to ensure full recovery prior to release. Any fish not responding readily would be recovered further in the net pen by holding the fish upright and immersed in river water within a net pen and gently moving the fish front to back to aid freshwater passage over the gills to stimulate the fish. When showing signs of being able to swim away strongly, the fish would be released and a spotter would watch to make sure the fish stays down and is fully recovered.

Side-scan Sonar Surveys

In the first year of the project, areas previously identified as Atlantic and shortnose sturgeon habitat through the Delaware Bay Benthic Mapping Program will be targeted for remote sensing of benthic habitat. In selected locations (rkm 72-128), a stratified (depth) random design will be used; side-scan sonar (Edgetech 4125-P 1250 kHz) survey transects ($n \geq 50$, 500 m length) will be conducted along specified bathymetric contours on a quarterly basis. Data will be collected and stored on a laptop computer for later analysis. Objects perpendicular and parallel to the transects will be counted and measured using the side-scan sonar's minimal range resolution of 2 and 5 cm at a range of 25 m and 3 and 8 mm at a range of 10 m (Quinn et al. 2005; Edgetech 2007). Remote sensing data will be 'groundtruthed' by conducting gillnet sampling of sturgeon (following protocols described above) for 20% of the transects. In the second and third years of the project, this study will be expanded to include areas that have not yet been mapped by the Delaware Bay Benthic Mapping Program (~rkm 220). During May-June the same surveying design will be used to assess adult Atlantic sturgeon habitat use.

No Action Alternative

The no action alternative would not issue any funding to the SCDNR, thus not initiating any research on loggerhead sea turtle (*Caretta caretta*) life history, biology and ecology since NOAA is providing 90 percent of the funding. Therefore, no activities would be conducted in the natural environment.

V. Description of the Affected Environment

This EA evaluates the potential impacts to the human environment from issuance of the proposed funding award and the potential impacts on the social, economic, physical, and biological environment, specifically those that may result from the proposed research activities.

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. here are no significant social or economic impacts of the proposed action interrelated with significant natural or physical environmental effects.

Physical Environment

The following section provides a summary description of the critical resources within the action area. More detailed descriptions of the action area can be found within the EAs prepared for the associated shortnose sturgeon research permits (permit nos. 1486, 1516, 14396 and 14604) and are thus incorporated by reference.

Delaware River System

The Delaware River is one of the major rivers of the eastern United States draining an area of 31,000 sq km. Beginning on the western slopes of the Catskill Mountains in eastern New York, the river consists of two branches: the West Branch, 145 km long, and the East Branch, 121 km long. The West Branch is the chief branch flowing southwest as far as Deposit, New York, and then turning southeast at the confluence at Hancock, New York (rkm 452). From this point, the Delaware River continues flowing southeasterly along the New York-Pennsylvania boundary as far as Port Jervis, New York. There, bordering Pennsylvania and New Jersey, it follows a generally eastward course to its mouth in the Delaware Bay. The last 100 kilometers is bounded by New Jersey to the north and Delaware to the south (DRBC 2009).

The Delaware River is a source of hydroelectric power and is a vital commercial and recreational waterway. It is navigable by large, oceangoing vessels as far inland as Philadelphia, Pennsylvania, and by smaller vessels to Trenton, New Jersey. The Chesapeake and Delaware

Canal is navigable by oceangoing vessels, connecting the Delaware River below Wilmington, Delaware, with the Chesapeake Bay. The Delaware River Basin Commission, the Federal government, and the four Delaware Basin states—New York, Pennsylvania, New Jersey, and Delaware—jointly manage assets and concerns of the Basin. The U.S. Army, Corps of Engineers has responsibility for maintaining navigation on the river and has historically dredged the Delaware River's federal shipping channel since the late 1800s when the controlling depth of the Delaware River was 18 feet (USACE 2009).

Channelization plans include appropriated construction funds to deepen and maintain the existing shipping channel from 40 feet to 45 feet from Philadelphia Harbor, Pennsylvania, and Beckett Street Terminal, Camden, New Jersey, to the mouth of the Delaware Bay. Although this is a total distance of 165 kilometers, the lower portion of the river channel (53 km), mostly in the Delaware Bay, is already at 45 feet or deeper (USACOE 2009).

Delaware Coastal Waters

Sampling will occur in nearshore coastal waters of the Atlantic Ocean from Indian River Inlet, DE (38°36'29.85"N/75°03'40.43") south to the Delaware/Maryland border (38°27'02.48"N/75°02'55.75"W), 2 to 15km off the beach. Depths in this area range from 12 to 25 meters. Sampling will take place in late March through April when typical water temperatures range from 6-15°C and again in November when temperatures are between 18-20°C. This reach of the Atlantic Ocean is mostly sand bottom with some gravel located in the eastern portion. Tidal flows are light to moderate and mainly influenced by the nearby Delaware River Estuary.

Connecticut River System

The Connecticut River is the longest river in New England. It originates 2,625 feet above sea level in Quebec, Canada, and flows 660 km into Long Island Sound (LIS), accumulating water from several major tributaries as it flows south at a slope of about six feet per mile. The waterway serves as the boundary between New Hampshire and Vermont, and then runs through Massachusetts and Connecticut before emptying into LIS.

Construction and operation of hydroelectric projects in the Connecticut River have significantly altered the natural characteristics of the river by altering the river flows and temperatures necessary for successful sturgeon spawning and/or migration. Hydroelectric projects also elevate the turbidity levels as a result of erosion generated by abnormal flow fluctuations. These projects also reduce the water velocity within the impoundment, making it difficult for sturgeon to find or effectively use the fishways. Probably the most significant hindrance to sturgeon migration is the existence of the Holyoke Dam, a 150 year old barrier to normal upstream and downstream movement patterns.

Hudson River System

The Hudson River is tidal along the entire 246 km-length from New York Harbor to the Federal Dam at Troy, NY. The upper two-thirds of the river are freshwater, with saltwater intrusion occurring in the lower third of the river. Generally, salt water intrusion occurs as far north as West Point (km 83) in the late spring. During the summer months, the salt wedge can move as far north as Poughkeepsie (km 122). The river is classified as a 'drowned' river valley, straight and fairly deep in some sections, especially in the Hudson Highlands near West Point, where the river is greater than 60 m in depth. In the lower 70 km, the river opens into two large wide, shallow "bays", Haverstraw Bay and the Tappan Zee, before narrowing down to a deep section just above New York harbor. Activities proposed to take place in this system involve monitoring of 15 acoustic receivers in the Hudson River and estuary. Collection of fish or samples would not occur in this system (Figure 6).

Long Island Sound
Long Island Sound is a semi-enclosed body of water, 182 km long by 32 km wide, best described as an estuary (Wolfe et al. 1991). The sound could be characterized by three bottom types (sand, transition and mud; Reid et al. 1979). Sand bottoms are generally found along the south shore and around the mouth of the Connecticut River along the north shore. Transition bottom types dominate the eastern half of the sound, replaced by mud in the western half. Capture and collection attempts could be made throughout Long Island Sound, but effort is expected to focus in the general shallows around the mouth of the Connecticut River and another previously defined sturgeon concentration area (Savoy and Pacileo 2003) located approximately mid-sound in the central basin (Figure 1).

Essential Fish Habitat (EFH), Critical Habitat, and Other Protected Areas
There are no designated critical habitats located within the area for the proposed activities. Additionally, there are no protected areas (e.g., National Estuarine Research Reserves, National Marine Sanctuaries or state protected aquatic areas) affected by the research, nor are there eligible historic resources in the project location. However, designated EFH exists for 26 managed species in the tidal portion of the Delaware River, extending to rkm 148 at the mouth of the Schuylkill River in Pennsylvania.

NMFS considered that the potential for adverse impacts on EFH in the Delaware River would be defined by the area proposed for boating activities (rkm 0 to 245), and by the boundaries proposed for netting activities, the later coinciding with the freshwater-tidally mixed area of the river (rkm 79 to 148). This proposed action areas overlaps with the action areas of currently permitted research on shortnose sturgeon, and the impact of boating, gillnetting, and trawling on EFH has previously been considered. The NMFS, Northeast Office of Habitat Conservation, was contacted by email on December 21, 2009, to consult on whether the permitted actions would have adverse impacts on designated EFH. The results of this informal consultation appear in Section 4.3.2 of the EA associated with ESA section 10(a)(1)(A) permit no. 14604 and is hereby incorporated by reference.

Biological Environment
The target of the proposed research is Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), currently a candidate species. The following is a brief summary of the status and occurrence of Atlantic sturgeon range-wide, including within the proposed study area. Since the majority of the proposed field work (5 of 7 in-water projects) will take place in the Delaware River and estuary and several other (2 of 7 in-water projects) are proposed for the Connecticut river and adjacent nearshore areas within Long Island Sound, the status of Atlantic sturgeon in those systems is also discussed in further detail in this section. Full descriptions of the status of this

species can be found in the NMFS Status Review Report at http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm.

Background on Atlantic Sturgeon

The Atlantic sturgeon was first designated as a candidate[1] species in 1991, meaning that this species was being considered for listing as endangered or threatened but was not yet the subject of a proposed rule. On June 2, 1997, NMFS and the U.S. Fish and Wildlife Service (USFWS) received a petition from the Biodiversity Legal Foundation requesting that Atlantic sturgeon in the United States be listed as threatened or endangered and that critical habitat be designated. A notice was published in the *Federal Register* on October 17, 1997, stating that the NMFS had determined substantial information existed indicating the petitioned action may be warranted (62 FR 54018). In 1998, after completing a comprehensive status review, a 12-month determination was published in the *Federal Register* announcing that listing was not warranted at that time (63 FR 50187; September 21, 1998). Atlantic sturgeon was retained on the candidate species list. Concurrently, the Atlantic States Marine Fisheries Commission (ASMFC) completed Amendment 1 to the 1990 Atlantic Sturgeon Fishery Management Plan (FMP) that imposed a 20-40 year moratorium on all Atlantic sturgeon fisheries until the Atlantic Coast spawning stocks could be restored to a level where 20 subsequent year classes of adult females were protected (ASMFC, 1998). In 1999, pursuant to section 804(b) of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA) (16 U.S.C. 5101 et seq.), NMFS followed this action by closing the Exclusive Economic Zone (EEZ) to Atlantic sturgeon retention.

In 2003, NMFS sponsored a workshop along with the USFWS and the ASMFC to discuss the status of Atlantic sturgeon along the Atlantic Coast and determine what obstacles, if any, were impeding their recovery (Kahnle et al., 2005). The results of the workshop indicated some river populations seemed to be recovering while others were declining. Bycatch and habitat degradation were noted as possible causes for continued declines. Based on the information gathered from the 2003 workshop, NMFS decided that a second review of Atlantic sturgeon status was needed to determine if listing as endangered or threatened under the ESA was warranted. A comprehensive, peer-reviewed status review report was completed in 2007 and indicated that some populations warranted protections under the ESA. (This report is available at http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm and is cited within this document as SRT 2007) Then, on October 6, 2009, NMFS received a petition from the Natural Resources Defense Council to list Atlantic sturgeon as endangered under the ESA and designate critical habitat. NMFS accepted this petition on January 6, 2010 (75 FR 838) and must make a 12-month finding by October 6, 2010.

Range-wide status of Atlantic sturgeon

Historically, Atlantic sturgeon were present in approximately 38 rivers in the United States from St. Croix, ME to the Saint Johns River, FL, of which 35 rivers have been confirmed to have supported spawning for Atlantic sturgeon (Atlantic Sturgeon Status Review Team (SRT), 2007). It is unknown how many Canadian rivers were historically used by Atlantic sturgeon. However,

1 A candidate species is a) one that is actively being considered for listing as either threatened or endangered under the ESA and is the subject of a positive 90-day finding but not yet the subject of a proposed rule, or b) is a species for which NMFS has initiated an ESA status review and has announced the review in the *Federal Register* (see 71 FR 61022; October 17, 2006). This status carries any procedural or substantive protections under the ESA.

it is likely that Atlantic sturgeon spawned in the Miramichi, Shubenacadie, Avon, Annapolis, and in other systems of similar size in addition to the presently known subpopulations that spawn in the Saint Lawrence and Saint John rivers (reviewed in Dadswell, 2006; ASSRT 2007). Overall, historical sightings of Atlantic sturgeon were generally reported from Hamilton Inlet, Labrador, south to the Saint Johns River, Florida (Murawski and Pacheko, 1977; Smith and Clugston, 1997; SRT, 2007). Occurrences south of the Saint Johns River, Florida and north of Hamilton Inlet, Labrador may have always been rare.

It is clear that Atlantic sturgeon underwent significant range-wide declines from historical abundance levels due to overfishing (reviewed in Smith and Clugston, 1997). Although Atlantic sturgeon had been previously exploited in commercial fisheries (Scott and Crossman, 1973; Dadswell, 2006; SRT, 2007), records from the 1700's and 1800's document large numbers of sturgeon in many rivers along the Atlantic coast (Kennebec River Resource Management Plan, 1993; Armstrong and Hightower, 2002). However, in 1870, a significant fishery for the species developed when a caviar market was established. Record landings were reported in 1890, when over 3350 metric tons (mt) of Atlantic sturgeon were landed from coastal rivers along the Atlantic Coast (reviewed in Smith and Clugston, 1997; Secor and Waldman, 1999). The fishery collapsed in 1901, ten years after peak landings, when less than 10% (295 mt) of its 1890 peak landings were reported. During the 1950s, the remaining fishery switched to targeting sturgeon for flesh, rather than caviar. Commercial fisheries were active in many rivers during all or some of the period from 1962 to 1997 albeit at much lower levels than in the late 1800's – early 1900's (Smith and Clugston, 1997). Nevertheless, many of these contemporary fisheries also resulted in overfishing, which prompted the ASMFC to impose the 1998 coastwide moratorium for fisheries targeting Atlantic sturgeon and NMFS to close the EEZ to Atlantic sturgeon retention in 1999.

Currently, Atlantic sturgeon presence is documented in 36 rivers in the United States and Canada, combined (SRT, 2007; J. Sulikowski, UNE, pers. comm.). At least 20 rivers are believed to support spawning based on available evidence (i.e., presence of young-of-year or gravid Atlantic sturgeon documented within the past 15 years) (SRT, 2007). These rivers are: Saint Lawrence, QB; Annapolis, NS; Saint John, NB; Kennbec, ME; Hudson, NY; Delaware, NJ/DE/PA; James, VA; Roanoke, NC; Tar-Pamlico, NC; Cape Fear, NC; Waccamaw, SC; Great PeeDee, SC; Santee, SC; Cooper, SC; Combahee, SC; Edisto, SC; Savannah, SC/GA; Ogeechee, GA; Altamaha, GA; and, the Satilla, GA (SRT, 2007). Rivers with possible, but unconfirmed, spawning include: St Croix, NB/ME; Penobscot, Androscoggin, and Sheepscot, ME, York, VA; and, Neuse, NC (SRT, 2007).

Comprehensive information on current abundance of Atlantic sturgeon is lacking for any of the spawning rivers (SRT, 2007). In the United States, an estimate of 870 spawning adults/year is available for the Hudson River (Kahnle et al., 2007). However, the estimate is based on data collected from 1985-1995 and may underestimate current conditions (Kahnle et al., 2007). An estimate of 343 spawning adults/year is available for the Altamaha River, GA, based on data collected in 2004-2005 (Schueller and Peterson, 2006). Data collected from the Hudson River and Altamaha River studies cannot be used to estimate the total number of adults in either population since mature Atlantic sturgeon may not spawn every year (Vladykov and Greeley, 1963; Smith, 1985; Van Eenennaam et al., 1996; Stevenson and Secor, 1999; Collins et al. 2000;

Caron et al., 2002), and it is unclear to what extent mature fish in a non-spawning condition occur on the spawning grounds. Nevertheless, since the Hudson and Altamaha rivers are presumed to have the healthiest Atlantic sturgeon populations within the U.S., other U.S. populations are predicted to have fewer spawning adults than either the Hudson or the Altamaha (SRT, 2007). In Canada, an estimate of spawning population size is available for the Saint Lawrence River for which tagging work suggests a total spawning population of over 500 adults (Caron et al., 2002; Dadswell, 2006).

Status of Atlantic sturgeon in the Delaware River

The Delaware River, flowing through New Jersey, Delaware, Pennsylvania and into Delaware Bay, historically may have supported the largest stock of Atlantic sturgeon of any Atlantic coastal river system (Kahnle et al. 1998; Secor and Waldman 1999, Secor 2002). Prior to 1890, it is expected that more than 180,000 adult females were spawning in the Delaware River (Secor and Waldman 1999, Secor 2002). Juveniles were once abundant enough to be considered a nuisance bycatch of the American shad fishery. Very little is known about adult stock size and spawning of Atlantic sturgeon in the Delaware river; however, based on reported catches in gill nets and by harpoons during the 1830s, they may have spawned as far north as Bordentown, south of Trenton, NJ (Pennsylvania Commission of Fisheries 1897).

The current abundance of all Atlantic sturgeon life stages in the Delaware River has been greatly reduced from the historical level. Brundage and Meadows (1982) recorded 130 Atlantic sturgeon captures between the years of 1958 – 1980. The DEDFW began sampling Delaware Bay in 1966 by bottom trawl and have rarely captured Atlantic sturgeon. During the period from 1990 to 2004, the trawl survey captured 17 Atlantic sturgeon (Murphy 2005). However, there are several areas within the estuary where juvenile sturgeon are found regularly. Lazzari et al. (1986) frequently captured juvenile Atlantic sturgeon from May-December in the upper tidal portion of the river below Trenton, New Jersey (N = 89, 1981 – 1984). In addition, directed gill net surveys by DEDFW from 1991-1998 consistently took juvenile (N > 1,700) Atlantic sturgeon in the lower Delaware River near Artificial Island and Cherry Island Flats from late spring to early fall (Shirey et al. 1999). The number of fish captured in the lower river annually has declined dramatically throughout this time period from 565 individuals in 1991 to 14 in 1998. Population estimates based on mark and recapture of juvenile Atlantic sturgeon declined from a high of 5,600 in 1991 to less than 1,000 in 1995; however, it is important to note that population estimates violated most tagging study assumptions and should not be used as unequivocal evidence that the population has declined dramatically. No population estimates are available from 1996 and 1997, given the low number of recaptures.

In September 2009, during regular gill net surveys conducted by DEDFW on the Delaware River as part of their Atlantic Sturgeon Research program, personnel captured their smallest sturgeon yet; an age 0 fish, which was seven-inches (178 mm TL) long and weighed less than an ounce (DNREC, 2009). As of October 1, 2009, 10 additional small sturgeon between 240 and 350 mm TL have been captured in the freshwater transition zone (M. Fisher, DNREC, pers. comm., 2009). These captures suggest that successful spawning is still occurring in the Delaware River.

Carcasses of large adult fish (> 150 cm TL) are commonly reported along the lower Delaware

River and upper Delaware Bay during the historic spawning season (G. Murphy, DFW, Pers. Comm. 2006). Fifteen adult size fish have been documented since 1994, including several gravid females and males. In 2005, DEDFW began tracking reported sturgeon mortalities during the spawning season. During the first year, six adults were found dead washed ashore in May 2005, including two from Woodland Beach (~250 cm and 170 cm TL), one from Artificial Island (>180 cm TL), one from South Bowers Beach (205 cm TL), one from Conch Bar (160 cm TL) and one from Slaughter Beach (160 cm TL). Six additional carcasses, presumed adults, were found during April-May 2006, including a gravid female at Augustine Beach (144 cm), a gravid male at Sleusch Ditch (180 cm), one at South Bowers Beach (119 cm), one at Brockonbridge Gut (112 cm), one at Kitts Hummock (208 cm), and one at Little Tinicum Island, PA (106 cm). The majority of adults documented had substantial external injuries and were severed. The role of vessel strikes and subsequent mortality has been raised as a potential impediment to Atlantic sturgeon recovery in the Delaware River, (Simpson and Fox 2009)

In addition to the carcasses reported annually during the spawning season, several males were captured by directed gill net efforts and a reward program conducted by Delaware State University during April and May 2006. These males were collected in the lower Delaware River and upper Delaware Bay and were implanted with sonic transmitters to assist in determining spawning locations in the Delaware River. Although catch rates declined throughout the mid 1990s, the mature adults documented within the Delaware System provide further evidence that a reproducing population exists. It is speculated, however, that the abundance of subadults within the Delaware River during the 1980s and early 1990s was the result of a mixture of stocks including the Hudson River stock. However, genetic data indicate that the Delaware River has a distinct genetic signature of a remnant population (Waldman et al. 1996, Wirgin 2006, King supplemental data 2006).

Status of Atlantic sturgeon in the Connecticut River

No estimate of Atlantic sturgeon abundance is available for the Connecticut River, but the river is predicted to have fewer spawning adults than either the Hudson or the Altamaha Rivers (SRT, 2007). Questions exist regarding the historic range of Atlantic sturgeon in the Connecticut River. The falls at South Hadley, MA, which is now the site of the Holyoke Dam, are considered the northern limit of sturgeon in this system; however, there is one historical record of an Atlantic sturgeon sighted as far north as Hadley, MA (24 rkm upstream from South Hadley). Since the Enfield Dam has been breached, an additional 90 km of habitat are available, and depending on the interpretation of historical spawning grounds, Atlantic sturgeon either have 100% (Holyoke Dam, South Hadley, MA), or 86% (Hadley, MA) of their historic habitat available. There is a chance that Atlantic sturgeon can reach habitat above the dam via a fish lift located at the Holyoke Dam, where 81 shortnose sturgeon have been observed to pass over the 21 years of the lift operation (Kynard 1996). However, no Atlantic sturgeon have been observed to pass the dam until just recently. On August 31, 2006, one 152.4 cm TL Atlantic sturgeon was observed in the spill way lift.

Water quality on the Connecticut River has improved dramatically in the last 40 years. It is now swimmable and fishable with some downstream exceptions, although there are still fish consumption advisories in Connecticut (T. Savoy, CTDEP, pers. comm. 2006). As of 2005, the

Connecticut Department of Public Health had two species of fish listed as non-consumptive due to PCB contamination in the Connecticut River.

In the Connecticut River, coal tar leachate has been suspected of impairing sturgeon reproductive success. Kocan et al. (1993) and Kocan et al. (1996) conducted a laboratory study to investigate the survival of shortnose sturgeon eggs and larvae exposed to polycyclic aromatic hydrocarbons (PAHs), a by-product of coal distillation. Only 5% of sturgeon embryos and larvae survived after 18 days of exposure to Connecticut River coal tar (i.e., PAHs), demonstrating that contaminated sediment is toxic to shortnose sturgeon embryos and larvae under laboratory exposure conditions. Also, in 1988, it was observed that one out of every four female shortnose sturgeon which underwent surgical procedures for egg removal (N = 4) could not be spawned as a result of the presence of a tumor, thought to be related to coal tar or other industrial pollution present (B. Kynard, CAFL, pers. comm. 2006). Since the discovery of the coal tar deposits and impacts on biota, a significant amount of the coal tar has been removed from the river. A more recent review of the contaminants within the Connecticut River revealed that total mercury and dioxin-like (coplanar) PCBs posed a risk to recreational and subsistence fishers, as well as the fish-eating mammals and birds, suggesting that contaminant levels were relatively high (Hellyer 2006).

Dredging is required about every six to seven years to maintain a Federal Navigation Project in the lower river from Hartford, CT to the mouth of the river. Seasonal restrictions have been implemented in the past to protect shad and Atlantic salmon (W. Neidermyer, USFWS, Pers. comm. 1998); seasonal restrictions to protect shortnose sturgeon in this area likely also benefit Atlantic sturgeon.

Biology and Natural History of Atlantic Sturgeon

Atlantic sturgeon are distinguished by armor-like plates and a long snout with a ventrally located protruding mouth. Four barbels crossing in front of the mouth help the sturgeon to locate prey. Sturgeon are omnivorous benthic feeders (feed off the bottom) and filter quantities of mud along with their food. Adult sturgeon diets include mollusks, gastropods, amphipods, isopods, and fish. Juvenile sturgeon feed on aquatic insects and other invertebrates (SRT, 2007).

The general life history pattern of Atlantic sturgeon is that of a long lived (approximately 60 years; Mangin, 1964; Stevenson and Secor, 1999), late maturing, estuarine dependent, anadromous species (SRT, 2007). They can reach lengths up to 14 feet (4.26 m), and weigh over 800 pounds (≈364 kg).

Fecundity of female Atlantic sturgeon has been correlated with age and body size, with observed egg production ranging from 400,000 to 4 million eggs per spawning year (Smith et al., 1982; Van Eenennaam et al., 1996; Van Eenennaam and Doroshov, 1998; Dadswell, 2006). Female gonad weight varies from 12–25% of the total body weight (Dadswell, 2006). Therefore, the fecundity of a 770 pound (350 kg) female, like the one captured in the St. John River, Canada, in 1924, could be 7–8 million eggs (Dadswell, 2006). The average age at which 50% of the maximum lifetime egg production is achieved is estimated to be 29 years (Boreman, 1997).

Atlantic sturgeon likely do not spawn every year. Multiple studies have shown that spawning intervals range from 1-5 years for males (Smith, 1985; Collins et al., 2000a; Caron et al., 2002) and 2-5 years for females (Vladykov and Greeley, 1963; Van Eenennaam et al., 1996; Stevenson and Secor, 1999). Spawning behavior also differs between the sexes. While there is a window of time for each river during which spawning occurs, spawning females do not migrate upstream together. Individual females make rapid spawning migrations upstream and quickly depart following spawning (Bain, 1997). Spawning males usually arrive on the spawning grounds before any of the females have arrived and leave after the last female has spawned (Bain, 1997). Presumably, this provides an opportunity for a single male to fertilize eggs of multiple females.

Spawning is believed to occur in flowing water between the salt front of estuaries and the fall line of large rivers, where optimal flows are 46-76 cm/s and depths are 11-27 meters (Borodin, 1925; Leland, 1968; Scott and Crossman, 1973; Crance, 1987; Bain et al., 2000). Sturgeon eggs are highly adhesive and are deposited on the bottom substrate, usually on hard surfaces such as cobble (Gilbert, 1989; Smith and Clugston, 1997). Hatching occurs approximately 94 and 140 hours after egg deposition at temperatures of 20° and 18° C, respectively, and, once hatched, larvae assume a demersal existence (Smith et al., 1980). The yolksac larval stage is completed in about 8-12 days, during which time the larvae move downstream to the rearing grounds (Kynard and Horgan, 2002). During the first half of this migration, larvae move only at night and use benthic structure (e.g., gravel matrix) as refuge during the day (Kynard and Horgan, 2002). During the latter half of migration to the rearing grounds, when larvae are more fully developed, movement occurs during both day and night. Larvae transition into the juvenile phase as they continue to move even further downstream into brackish waters, developing a tolerance to salinity as they go, and eventually become residents in estuarine waters for months or years. Juveniles then transition to the subadult phase while commencing oceanic migrations. Subadults travel widely once they emigrate from rivers (Doevel and Berggen, 1983; Waldman et al., 1996; Dadswell, 2006; SRT, 2007). Likewise, Atlantic sturgeon spend most of their adult life in the marine environment distributed along the eastern coast of North America (SRT, 2007). However, adult Atlantic sturgeon return to their natal rivers to spawn (Collins et al., 2000; K. Hattala, NYSDEC, pers. comm. in SRT, 2007).

Atlantic sturgeon that originate from different rivers demonstrate differences in growth rate, maturation, and timing of spawning. For example, Atlantic sturgeon mature in South Carolina river systems at 5 to 19 years (Smith et al., 1982), in the Hudson River at 11 to 21 years (Young et al., 1998), and in the Saint Lawrence River at 22 to 34 years (Scott and Crossman, 1973). In general, Atlantic sturgeon subpopulations show clinal variation with faster growth and earlier age at maturation for fish originating from more southern systems, though not all data sets conform to this trend. Timing of spawning migrations also exhibit a latitudinal pattern in which migrations generally occur during February-March in southern systems, April-May in mid-Atlantic systems, and May-July in Canadian systems (Murawski and Pacheco, 1977; Smith, 1985; Bain, 1997; Smith and Clugston, 1997; Caron et al., 2002). In some rivers, predominantly in the south, a fall spawning migration may also occur (Rogers and Weber, 1995; Weber and Jennings, 1996; Moser et al., 1998).

Non-Target ESA Listed Species

Highlighted below is a listing of all the non-target ESA-listed species (threatened or endangered) under NMFS and USFWS jurisdiction occurring in the Delaware Basin states of Delaware and

New Jersey, as well as waters within the Hudson River and Connecticut included within the action area (see Figures 1-6).

In Delaware NMFS species include — shortnose sturgeon (*Acipenser brevirostrum*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempii*), Leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), and right whale (*Balaena glacialis*). USFWS species include — Delmarva Peninsula fox squirrel (*Sciurus niger cinereus*), bog turtle (*Clemmys muhlenbergii*), seabeach amaranth (*Amaranthus pumilus*), Canby's dropwort (*Oxypolis canbyi*), swamp pink (*Helonias bullata*), small whorled pogonia (*Isotria medeoloides*), and piping plover (*Charadrius melodus)*.

In New Jersey NMFS species include — shortnose sturgeon (*Acipenser brevirostrum*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), and right whale (*Balaena glacialis*). USFWS species include — bog turtle (*Clemmys muhlenbergii*), dwarf wedgemussel (*Alasmidonta heterodon*), Knieskern's beaked-rush (*Rhynchospora knieskernii*), American chaffseed, (*Schwalbea americana*), sensitive joint-vetch, (*Aeschynomene virginica*), swamp pink (*Helonias bullata*), small whorled pogonia (*Isotria medeoloides*), seabeach amaranth, (*Amaranthus pumilus*), northeastern beach tiger beetle, (*Cicindela dorsalis dorsalis*), Indiana bat (*Myotis sodalis*), piping plover (*Charadrius melodus*), and roseate tern (*Sterna dougallii dougallii*).

In Connecticut NMFS species include - shortnose sturgeon (*Acipenser brevirostrum*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle (*Lepidochelys kempii).*
USFWS species include - Eskimo curlew (*Numenius borealis),* roseate tern (*Sterna dougallii),* Bald eagle (*Haliaeetus leucocephalus),* Piping plover (*Charadrius melodus),* Dwarf wedge mussel (*Alasmidonta heterodon),* Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis),* Puritan tiger beetle (*Cicindela puritana),* American burying beetle (*Nicrophorus americanus),* Eastern cougar (*Puma concolor couguar),* Indiana bat (*Myotis sodalist),* Gray wolf (*Canis lupus),* Sea-beach amaranth (*Amaranthus pumilus).*

Interactions with Non-Target ESA-Listed Species
Based on the reported ranges of protected species under the jurisdiction of the USFWS occupying habitat well outside of the defined action area, NMFS determined the researchers' impact in the Delaware, Connecticut, and Hudson Rivers and Long Island Sound would not affect these species recorded in this assessment. Discussion of non-target species interaction of listed species under USFWS jurisdiction is therefore concluded here and summarized in Section IX, Compliance with Endangered Species Act.

Several of the above listed species under NMFS jurisdiction have varying potential for interaction with the proposed research activity. These species include: finback whale, humpback whale, and right whale, leatherback sea turtle, Kemp's ridley sea turtle, hawksbill sea turtle, loggerhead sea turtle, and green sea turtle. These interactions are described in detail in the

Environmental Assessments and/or the Biological Opinions that accompany ESA research permits nos. 1486, 1516, 14396 and 14604 and are hereby incorporated by reference. These interactions are summarized here.

Potential Whale Interactions

While right and humpback whales have been documented near the mouth of Delaware Bay occurring seasonally off the Atlantic coast of Delaware and New Jersey, no listed whales are known to occur in the action area. Although the likelihood of interaction with whales by research activity is highly unlikely, in all boating activities (including travel to acoustic receiver arrays) researchers would be advised to keep a close watch for all marine mammals to avoid harassment or interaction and to review the NMFS Northeast Region Marine Mammal Approach and Viewing Guidelines located online at http://www.nero.noaa.gov/prot_res/mmv/.

Sampling along Delaware coastal waters would also be conducted in compliance with the NMFS Atlantic Large Whale Take Reduction Plan. Specifically, gillnets would be constructed to meet all requirements laid out in this plan (e.g. breakaway panels and anchor size requirements). Additionally, the research vessel would be in the immediate vicinity of gillnets at all times; and nets would either be removed if large whales were sighted, or deployment of nets would be delayed until the whales have moved through the sampling area.

Potential Sea Turtle Interactions

Four species of sea turtle have been reliably documented within the action area from early June to late October. Loggerhead sea turtles are the most commonly encountered followed by juvenile Kemp's ridley, and more rarely, juvenile green turtles. The hawksbill is considered extremely rare in the Mid-Atlantic, but a few have been documented as far north as New England, carried by storm events from tropical waters. Further, only one leatherback sea turtle has been documented stranded off New Jersey coastal waters, and is also considered very rare. As such, these later two species are discounted in this analysis.

Principal investigators have indicated that in previous field work on the Delaware River and nearshore coastal environments within the action area, involving extensive gill netting and trawling, that sea turtles have never been captured during sampling (H. Brundage; pers. comm.; email, November 11, 2009) In addition, water temperatures during spring sampling are generally too cool to encounter sea turtles; and during fall sampling, sea turtles have typically already migrated south (D. Fox, pers. comm., March 17, 2010).

Potential Marine Mammal Interactions

The following is a listing of marine mammals protected under the MMPA that have some potential to enter the action of area of the proposed research. These interactions are described in detail in the Environmental Assessments and/or the Biological Opinions that accompany ESA research permits nos. 1486, 1516, 14396 and 14604 and are hereby incorporated by reference. These interactions are summarized here.

Harbor seal, *Phoca vitulina* (relatively common occurrence)
Harp seal, *Phoca groenlandica* (rare occurrence)
Hooded seal, *Cystophora cristata* (rare occurrence)

Gray seal, *Halichoerus grypus* (rare occurrence)
Harbor porpoise, *Phocoena phocoena* (periodical occurrence)
Bottlenose dolphin *Tursiops truncatus* (relatively common occurrence)
Beluga whale *Delphinapterus leucas* (extremely rare occurrence)
Florida manatee, *Trichechus manatus latirostris* (extremely rare occurrence)

Bottlenose dolphin, harbor seal, and harbor porpoise are the most abundant marine mammal species potentially affected by the proposed research. However, only occasionally are these reported in upriver locations affected by netting activities. Rather, they are more frequently encountered by boaters and researchers in the lowest part of Delaware Bay bordering coastal waters of Delaware and New Jersey. The proposed sampling is limited to the river and coastal areas outside the Bay.

The protected Florida manatee, documented only once in the Delaware River in 2008, and the beluga whale, sighted as far as Trenton, New Jersey, during 2005, are considered extremely rare incidental occurrences in the Delaware River, well outside their officially recognized range.

It is possible, as noted by the researchers (T. Savoy, CT DEP, pers. comm. 2/22/10; and in the grant proposal, marine mammals of certain species may occasionally be sighted during research activities in the Delaware River estuary and nearshore areas within Long Island Sound. Consequently, as advised by the NMFS Regional Office of Protected Resources and as noted in the grant proposal, measures to minimize interaction would be required. Namely, nets would not be deployed when animals are observed within the vicinity of the research; and animals would be allowed to either leave or pass through the area safely before net setting is initiated. Nets used in coastal waters would be built and fished in compliance with both the Harbor Porpoise Take Reduction Plan (http://www.nero.noaa.gov/prot_res/porptrp/doc/HPTRPNewEnglandGuide.pdf), the Atlantic Large Whale Take Reduction Plan (http://www.nero.noaa.gov/whaletrp/plan/ALWTRPGuide.pdf ; note: Long Island Sound is exempt from this plan), and the Bottlenose Dolphin Take Reduction Plan (http://sero.nmfs.noaa.gov/pr/mm/dolphins/bdtrp.htm). Additionally, in all boating activities (including travel to acoustic receiver arrays outside of the netting area) a close watch would be made for marine mammals to avoid harassment or interaction. Researchers would be advised to also review the NMFS Northeast Region Marine Mammal Approach and Viewing Guidelines located online at http://www.nero.noaa.gov/prot_res/mmv/.

Other Non-Listed By-catch Species
Due to the nature of netting, researchers would expect that some other non-target species such as American shad (*Alosa sapidissima*), Gizzard shad (*Dorosoma cepedianum*), Atlantic menhaden (*Brevoortia tyrannus*), blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*), striped bass (*Morone saxatilis*), white perch (*Morone americana*), channel catfish (*Ictalurus punctatus*), monkfish (Lophius americanus), spiny dogfish (*Squalus acanthias*) smooth dogfish (*Mustelus canis*), winter skate (*Leucoraja ocellata*)and white catfish (*Ameiurus catus*) would become enmeshed. Channel catfish, white perch, Atlantic menhaden, and gizzard shad are the most common non-target species that would be captured. The bycatch mortality of these species would be predicted as follows: channel catfish - <5%, white perch - 10%, Atlantic

menhaden - 60%, and gizzard shad - 50% (H. Brundage, pers. comm., April 2010). While menhaden and gizzard shad suffer high mortality, it is anticipated that fewer than 100 menhaden and 200 gizzard shad would be caught per year. Gillnets would typically be checked at short intervals and trawl nets would have limited tow times (5 to 15 minutes) to minimize bycatch mortality. No significant effects to these non-listed species are anticipated since mortality of individuals would be low for most species and no population level effects are anticipated.

Aquatic Nuisance Species
The U.S. Geological Survey has documented several aquatic nuisance species (USGS 2009) potentially occurring in the action area including: bowfin (*Amia calva*); flathead catfish (*Pylodictis olivaris*); Asian clam (*Corbicula fluminea*); water hyacinth (*Eichhornia crassipes*); hydrilla (*Hydrilla verticillata*); parrot feather (*Myriophyllum aquaticum*); Eurasian water milfoil (*Myriophyllum spicatum*) and water chestnut (*Trapa natans*). Because the proposed research activities have the potential to spread such aquatic nuisance species to other watersheds, measures proposed by NMFS, outlined in Section VII. of this EA and the research permits authorizing concurrent work on shortnose sturgeon, were agreed to by the researcher to be implemented as standard research protocol.

VI. Environmental Consequences

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

A. Proposed Action

Any impacts of the proposed action would be limited primarily to the biological environment, specifically the animals that would be studied or affected by the research. The type of actions proposed in the grant application would be unlikely to affect the socioeconomic or physical environment or pose a risk to public health and safety. Gill nets are temporary and do not disturb the physical structure of bottom habitat. There are no significant social or economic impacts of the proposed action interrelated with significant natural or physical environmental effects.

Effects of Proposed Research Activities

Effects of Capturing
The applicant proposes to use bottom-set gill nets and trawl nets to capture up to 450 Atlantic sturgeon (CT: 300, DE: 150), or totaling 1,350 Atlantic sturgeon over three years. Entanglement in nets or damage suffered in trawls could result in injury and mortality, reduced fecundity, and delayed or aborted spawning migrations of sturgeon (Moser and Ross 1995, Collins et al. 2000, Moser et al. 2000). To evaluate these impacts, a surrogate species, shortnose sturgeon, is discussed here; comparable data are not currently available for Atlantic sturgeon. Historically, the majority of shortnose sturgeon mortality during scientific investigations using nets or trawls has been related to such factors as water temperature, low D.O concentration, netting duration, meshes size, net composition, and netting experience of the researcher (Table 2).

Table 2: The number and percentage of shortnose sturgeon killed by gill nets associated with scientific research permits prior to 2005

	Permit Number					
	1051	1174	1189	1226	1239	1247
Time Interval	1997, 1999 – 2004	1999–2004	1999, 2001 – 2004	2003–2004	2000 – 2004	1988 – 2004
Sturgeon captured	126	3262	113	134	1206	1068
Sturgeon mortality	1	7	0	0	5	13
Percentage	0.79	0.22	0	0	0.41	1.22

In 2005, NMFS PR began analyzing the results of previous research and updating permit conditions to reduce the chances of stress and mortality to shortnose sturgeon during capture. Since that time, there have been no mortalities caused during their capture (Table 3). The primary causes of mortality identified during a review of permits issued prior to 2005 were high temperatures, low dissolved oxygen, and long net set durations. Despite the permit modifications reducing mortality of sturgeon in nets, there is a chance of delayed mortality occurring without being reported. There is no way to estimate the rate of delayed mortality, but NMFS believes it would be less than one percent based on reports of various species of sturgeon captured and transported to rearing facilities.

Table 3: Number of shortnose sturgeon killed during capture under existing scientific research permits

Permit Number	Shortnose sturgeon captured	Shortnose sturgeon mortalities
1420 (2005-2009)	1472	0
1447 (2006-2009)	107	0
1449 (2007-2008)	50	0
1486* (2006-2009)	416	0
1505 (2006-2009)	276	0
1516 (2007-2009)	160	0
1547 (2006-2009)	112	0
1549 (2006-2009)	390	0
1575 (2007-2009)	12	0
1580 (2007-2008)	66	0
1595 (2007-2009)	505	0
10037 (2007-2009)	235	0
10115 (2008-2009)	1	0
Totals	3802	0

* NMFS Permit No. 1486 is the current permit proposed to be replaced by Permit File 14604.

To limit stress and mortality of sturgeon due to capturing with gill nets, the grant applicants propose that at lower water temperatures (< 15^{O}C) soak times must not exceed 10 hours; at water temperatures between 15^{O}C and 20^{O}C, net sets must not exceed 4 hours; and at water temperatures between 20^{O}C and 28^{O}C, soak times of must not exceed 2 hours. Netting activities must cease at 28^{O}C or higher until consulting with NMFS PR. Further, dissolved oxygen would also be measured prior to each net set to ensure that at least 5.0 mg/L concentration is maintained. Also, to minimize injury, heavy multifilament (size 208-233) mesh would be used instead of monofilament or light twine, which is more apt to cut into the fish and cause injury.

Most negative effects resulting from trawling to capture juvenile sturgeon occur as a result of the speed and duration of the trawl (Moser et al. 2000). However, by proposing similar methods of trawling as employed in the upper and lower Connecticut River, five South Carolina rivers, and in the applicants' pervious permits on the Delaware River (NMFS permit nos. 1549, 1516, 1505 and 1486), which have yielded no mortalities and limited impacts on the bottom substrate, NMFS anticipates the applicants' proposed trawling outside the mouth of the Connecticut River would have similar outcomes.

To limit effects of trawling, measures would include trawling at slow speeds, towing for no more than thirty minutes, and avoiding multiple trawls over the same area during the day. Trawling would primarily be conducted over sand substrates avoiding hard bottoms, vegetated areas, organic material, or woody debris. If the trawl does become entangled in debris, efforts would begin immediately to free the gear to avoid injuring any captured target or non-target species. Based on proposed capture methods with the trawl, and results from similar efforts from other permits, no mortality or serious injury to target and non-target species, or damage to habitat, is anticipated while trawling. Any adverse effects to Atlantic sturgeon, non-target species, or habitat would be localized and minor.

Effects of Handling (*e.g., holding, measuring, weighing*)
Sturgeon are a hardy species, but sensitive to handling stress when water temperatures are high or D.O. is low. Handling stress can escalate if sturgeon are held for long periods after capture; and conversely, stress is reduced the sooner fish are returned to their natural environment to recover (D. Peterson, pers. comm. November 2008). Signs of handling stress are redness around the neck and fins and soft fleshy areas, excess mucus production on the skin, and a rapid flaring of the gills. Additionally, sturgeon tend to inflate their swim bladder when stressed and when handled in air (Moser et al. 2000). If not returned to neutral buoyancy prior to release, sturgeon 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).

Although sturgeon are sensitive to handling stress, the proposed methods of handling fish are the same methods as though currently permitted for endangered shortnose sturgeon and described in the associated permits (1486, 1516, 14604, and 14396). These methods are consistent with the best management practices recommended by Moser et al. (2000) and endorsed by NMFS and, as such, should minimize the potential handling stress and therefore minimize indirect effects resulting from handling in the proposed research.

Effects of Implanting Acoustic Transmitters
In Connecticut waters, up to 70 Atlantic sturgeon per year (70.0 to 200.0 cm FL) would be selected for surgical implantation of VEMCO ultrasonic transmitters. In Delaware Coastal waters, up to 40 adults (>1.3m) each spring and up to 60 adult and larger juvenile Atlantic sturgeon each fall would be implanted with VEMCO acoustic transmitters. In the Delaware River, up to 50 juvenile and young-of-the-year Atlantic sturgeon per year would be implanted

with acoustic transmitters. Implantation of internal sonic transmitters would be conducted as described in Section III of this EA and would also follow protocols described in the associated permits for shortnose sturgeon (1486, 1516, 14604, 14396).

To minimize the effects caused by internally implanting transmitter tags, the researchers propose to use standardized protocols endorsed by NMFS (Moser et al. 2000). Researchers would use sterile surgical techniques and tags would be coated with an inert elastomer polymer to avoid tag rejection. Invasive tools used would be sterilized with Nolvasan® between uses on each fish as well as the incision area swabbed with Nolvasan® prior to making the incision. After surgery a Vaseline betadyne mixture would be spread over the area to deter bacteria from entering the wound. Moreover, implanting transmitters would only be attempted when fish are in excellent condition and would not be attempted on pre-spawning fish in spring or fish on the spawning ground. Surgeries would also not be attempted if the water temperature exceeds 27° C (to reduce handling stress) or is less than 7° C (as incisions do not heal rapidly in lower water temperatures). To ensure normal mobility and swimming behavior of the juvenile sturgeon receiving internal transmitters, 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, this tagging procedure provides greater retention rates than external attachment. In general, adverse 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, using proper anesthesia, sterilized conditions, and the surgical techniques described above, will minimize or eliminate potential short-term adverse effects from tagging and greatly lower the risk of injury and mortality. NMFS expects the tagging would result in no more than short-term stress to the animal.

Lastly, many fish have sensitivity to sound energy from 200 Hz up to 800 Hz, and some species are able to detect lower frequency sounds (Popper 2005). However, the frequency of the acoustic tags used in the proposed research (69 kHz) is well above the hearing threshold of most fish and would thus be inaudible causing little effect.

Effects of Anesthesia

Protocols proposed for anesthetizing Atlantic sturgeon will follow those outlined in the researchers' permits for shortnose sturgeon (1486, 1516, 14504, 14396) and are summarized here. The researcher proposes to use tricaine methane sulphonate (MS-222) to anesthetize sturgeon at concentrations up to 100 mg/L to prevent captured sturgeon from stress during surgery. Because MS-222 is acidic (resulting in a prolonged induction time), sodium bicarbonate (NaHCO3) would be used to buffer the water.

MS-222 is one of the most broadly used anesthetic and tranquilizing agents for poikilotherms and is recommended as safe by Moser et al. (2000). Risks associated with MS-222 to anesthetize shortnose sturgeon would be overdosing to lethal or harmful levels due to inexperience at recognizing the proper stage of surgical anesthesia (Coyle et al. 2004). The proposed rate of 100 mg/L dose is considered a moderate rate and the induction time would be approximately five minutes; complete recovery times would range from five to six minutes

(Brown 1988). The researchers are experienced in using MS-222, having performed surgical procedure over 100 times in Atlantic sturgeon research over the past five years. Fish would be monitored closely during induction to determine when the proper surgical stage of narcosis is reached. When recovering from anesthesia, sturgeon would be placed in boat-side net pens prior to release. Therefore, NMFS believes that sturgeon anesthetized in this manner would not be at risk, and long term effects to the fish and the environment would be minimal.

An existing FDA 21 day withdrawal period for MS-222 applied to food fish would not be applicable to Atlantic sturgeon because of the existing moratorium on fishing. Thus, there would not be a legitimate health risk by accidental consumption by humans (F. Pell, FDA pers. comm., email; 2/24/2009). Moreover, MS-222 has been documented to be excreted from fish urine within 24 hours and tissue levels decline to near zero in the same amount of time (Coyle et al. 2004).

Effects of Side-Scan Sonar Surveys
Remote detection and identification of Atlantic sturgeon using hydroacoustic/sonar equipment data collection is proposed. NMFS considered the frequencies of sound emitted by the hydroacoustic and sonar equipment (400kHz- 1250 kHz, 220 dB; Edgetech 4125-P side-scan sonar system) to be much higher than the hearing range of sturgeon (Popper, 2005) and thus would be inaudible, causing little, if any, effect on the animal. This frequency is also above the hearing range for pinnipeds and cetaceans, so would likewise have little to no effect on these animals should they occur within the action area. Effects on marine mammals are also expected to be negligible as a result of the location of tows, which would be confined to the freshwater portions of the estuary.

B. No Action
An alternative to the proposed action is no action, i.e., denial of the grant. This alternative would eliminate any potential risk to the environment from the proposed research activities. However, the no action alternative would not allow the research to be conducted and would deny the opportunity for collection of information that would advance our understanding of Atlantic sturgeon populations and improve current management practices.

VII. Minimization and Mitigation Measures
The activities authorized under proposed Award NA10NMF4720030, if approved, would follow certain procedures in order to minimize and mitigate effects of the proposed action. If the grant is awarded, a Special Award Condition (SAC) would be placed on the award to ensure compliance with appropriate research protocols.

General Measures

- The grantee must apply all capture, handling, anesthesia, and surgery protocols to Atlantic sturgeon as outlined in the companion ESA section 10 research permits for shortnose sturgeon (permit nos. 1486, 1516, 14604, 14396) and take all necessary precautions to ensure sturgeon are not harmed during the course of the research. The grantee must also comply with all permit conditions during the course of all research activities, whether the activity targets Atlantic or shortnose sturgeon. For example, fish smaller than 250 mm TL will not be PIT tagged or used in any other surgical

- Location (GPS), temperature, dissolved oxygen., gear used (e.g., mesh size, trawl, gill net, trammel), soak time, species captured, and any mortalities should be measured and recorded (at the depth fished) each time nets are set to ensure appropriate values according to the conditions below. This data must be made available to NMFS in annual reports or upon request.

- In all boating and research activities within the study area, a close watch must be made for marine mammals and sea turtles to avoid interaction and harassment. Researchers are advised to review the marine mammal approach and viewing guidelines online at http://www.nero.noaa.gov/prot_res/mmv/. All sampling and boating activities must also comply, as applicable, with the relevant portions of the Atlantic Large Whale, the Bottlenose Dolphin, and Harbor Porpoise Take Reduction Plans.

- In the unlikely event a marine mammal or sea turtle is captured, the animal must be assessed and, if possible, and if safe for the researchers and animal, the animal must be supported to prevent it from drowning. The NOAA Northeast Region Marine Mammal and Sea Turtle Stranding and Entanglement Hotline must be immediately contacted at 978-281-9351 as well as the New Jersey Marine Mammal Stranding Center at (609) 266-0538 (in New Jersey waters) and/or the Marine Education Research and Rehabilitation Institute at (302) 228-5029 (in Delaware waters), or the Mystic Aquarium at (860) 572-5955 (in Connecticut waters).

- In the unlikely event a captured marine mammal or sea turtle dies, or is severely injured, all permitted activities must cease and researchers must contact the NOAA, NE Region Marine Mammal and Sea Turtle Stranding and Entanglement Hotline at 978-281-9351, as well as the Chief, Permits Division and/or the permit analyst at (301) 713-2289.

Aquatic Nuisance Species

- To prevent potential spread of aquatic nuisance species identified in the watershed, all equipment assigned to the research should not be reassigned to other watersheds until the research is completed or is suspended.

- If the research has been completed or is suspended, all gear and equipment used should be bleached, washed and air dried before being redeployed to another location.

VIII. Cumulative Impacts

In addition to the direct and indirect effects assessed above, in accordance with NEPA, this EA considers the potential for cumulative effects. Cumulative effects are those that result from the incremental impacts of the proposed action when added to the impacts of other past, present, and reasonably foreseeable future threats or actions, regardless of which agency (federal or nonfederal) or person(s) undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time. For Atlantic sturgeon range-wide, these effects include: bycatch, poaching, dams, dredging, water quality, contaminants, boat strikes, and research.

These activities and threats are expected to continue into the future. Synthesis of the information about the status of the species, past and present activities affecting the species, possible future actions that might affect the species, and effects of the proposed action provide a basis for determining the additive effects of the activities supported by the proposed grant. Given the cumulative threats information and the known effects of the proposed action, NMFS concludes that the proposed action would not likely reduce the species' likelihood of survival and recovery in the wild by adversely affecting their birth rates, death rates, or recruitment rates. In particular, NMFS would not expect the proposed research activities to affect spawning success in a way that appreciably reduces the reproductive success of adult Atlantic sturgeon, the survival of larval sturgeon, or the number of juvenile sturgeon that annually recruit into spawning populations.

This EA considers the cumulative effect the research would have on live animals that are occupying fresh, estuarine and marine waters. The short-term stresses resulting from the research activities proposed are expected to be minimal. Taking into account the effects and impacts resulting from the handling and surgeries, NMFS expects that the additional short-term stress of the research activities would not significantly affect the sturgeon. The proposed activities would be completed as quickly as possible, typically taking less than 20 minutes per animal. The award would contain conditions (see Section VII. Minimization and Mitigation Measures) to mitigate potential adverse impacts to Atlantic sturgeon. Overall, the proposed actions would be expected to have no more than short-term effects. The incremental impact of the action when added to other past, present, and reasonably foreseeable future actions discussed here would be minimal and not significant. The data generated by the research activities associated with the proposed action would help improve management and recovery efforts and further the conservation of this candidate species. The proposed action would not be expected to have any effects on any other marine species or other portions of the environment and would not result in any significant cumulative effects to either.

IX. Compliance with Endangered Species Act

Section 6 of the Endangered Species Act (ESA) provides that states and territories maintaining an adequate and active program for the conservation of endangered and threatened species may receive federal funds for the purpose of conserving these species. To remain eligible for this funding, states must enter into a section 6 agreement with NMFS and undergo subsequent annual reviews of their program to reconfirm the finding that the state's program is adequate and active in accordance with section 6(c) of the ESA. Annual renewal of DEDFW's section 6 agreement with NMFS was successfully completed, and the agreement has been renewed through October 1, 2010. Activities supported through this financial assistance are authorized by regulation (50 CFR 17.21) and have been determined to comply with the requirements therein.

To comply with section 7 of the ESA, a consultation on the effects to listed species and critical habitat is required. Biological Opinions have been completed for the relevant shortnose sturgeon permits No. 1486, 1516, and 14396; the Biological Opinion for Permit No. 14604 has been drafted and is in clearance. These permits and associated consultations have been reviewed (including the draft Opinion for 14604), and a determination was made that the effects of the proposed action (i.e., issuance of the grant and the research it would support) have already been analyzed in these Opinions. As such, additional analysis under section 7 of the ESA is not required. A memorandum to the record has been prepared and signed by the Office of Protected Resources to document this finding.

Prior consultations with the NMFS Northeast Regional Office to confirm that negative interactions with sea turtles and marine mammals would not be anticipated (Amanda Johnson; Carrie Upite, pers. comm., by email 8/31/09) and with the USFWS to confirm that negative impacts on listed species and habitats under their jurisdiction would not occur were also determined to address all effects of the proposed action (Pamela Shellenberger, ES Field Office, State College, PA; August 18, 2009).

X. Coordination with the National Ocean Service (NOS)

The actions supported by Award NA10NMF4720030 would not occur in a National Marine Sanctuary nor impact any National Marine Sanctuaries, so no consultation with NOS was conducted.

XI. Recommendation

It is recommended that the proposed action be determined to not have a significant impact on the quality of the human environment and that preparation of an environmental impact statement is not required.

XII. List of Preparers and agencies consulted

Preparers:
Office of Protected Resources
National Marine Fisheries Service
Endangered Species Division
Silver Spring, MD 20910

Agencies Consulted:
Office of Protected Resources
National Marine Fisheries Service
Permits, Conservation and Education Division (shortnose sturgeon analyst)
Silver Spring, MD 20910

Office of Protected Resources
National Marine Fisheries Service
Endangered Species Division (section 7 team)
Silver Spring, MD 20910

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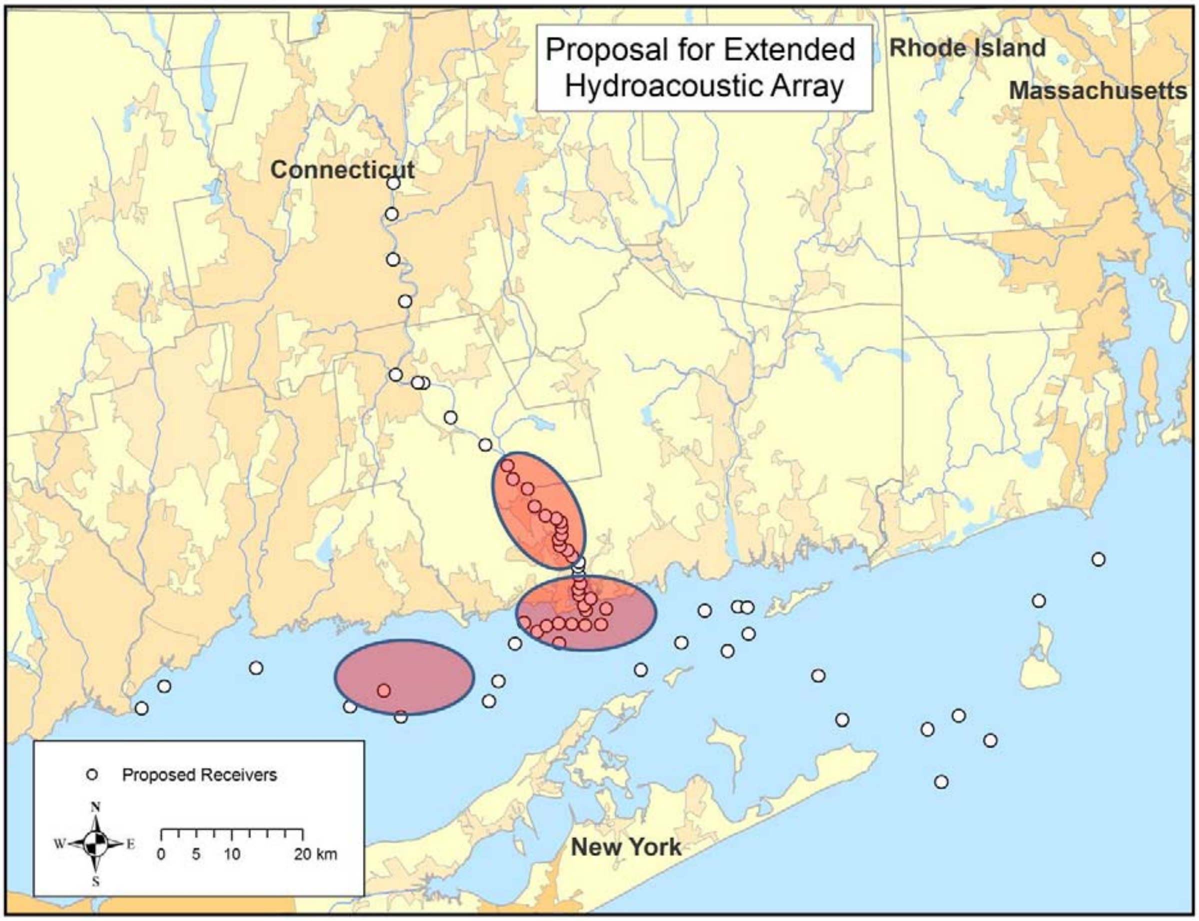

Figure 1: Ellipses denote probable locations to be fished in Long Island Sound and the lower Connecticut River for collection of Atlantic sturgeon. Proposed locations for deployment of passive acoustic receivers is also depicted.

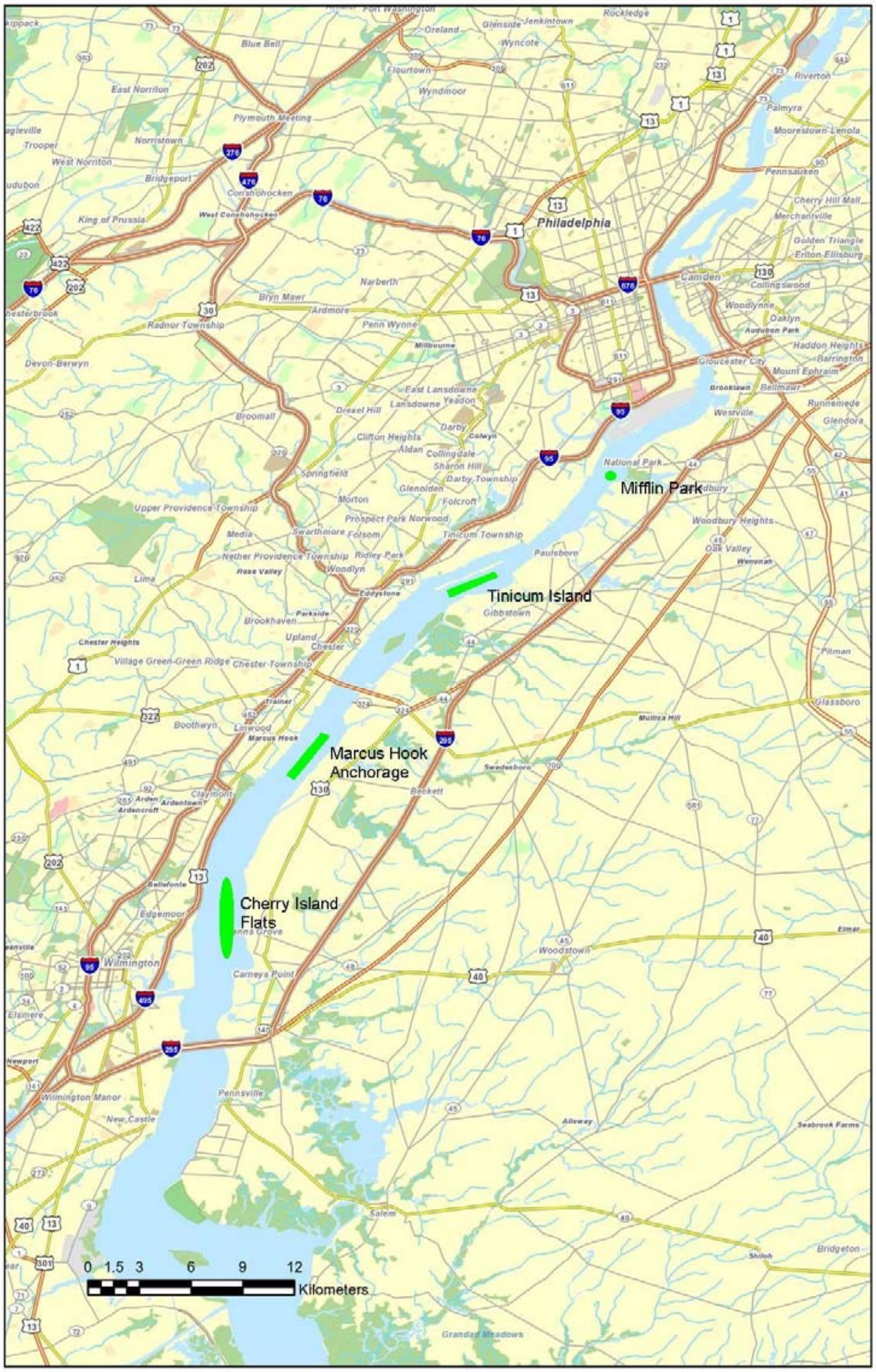

Figure 2: Juvenile Atlantic sturgeon sampling areas in the Delaware River are indicated in green. Cherry Island Flats (DE) Marcus Hook Anchorage (DE and NJ), Tinicum Island (NJ), and Mifflin Park (NJ). Additional sampling areas upriver to Trenton, NJ may be incorporated in year 2 and 3 of the study based on passive receiver location results from year 1.

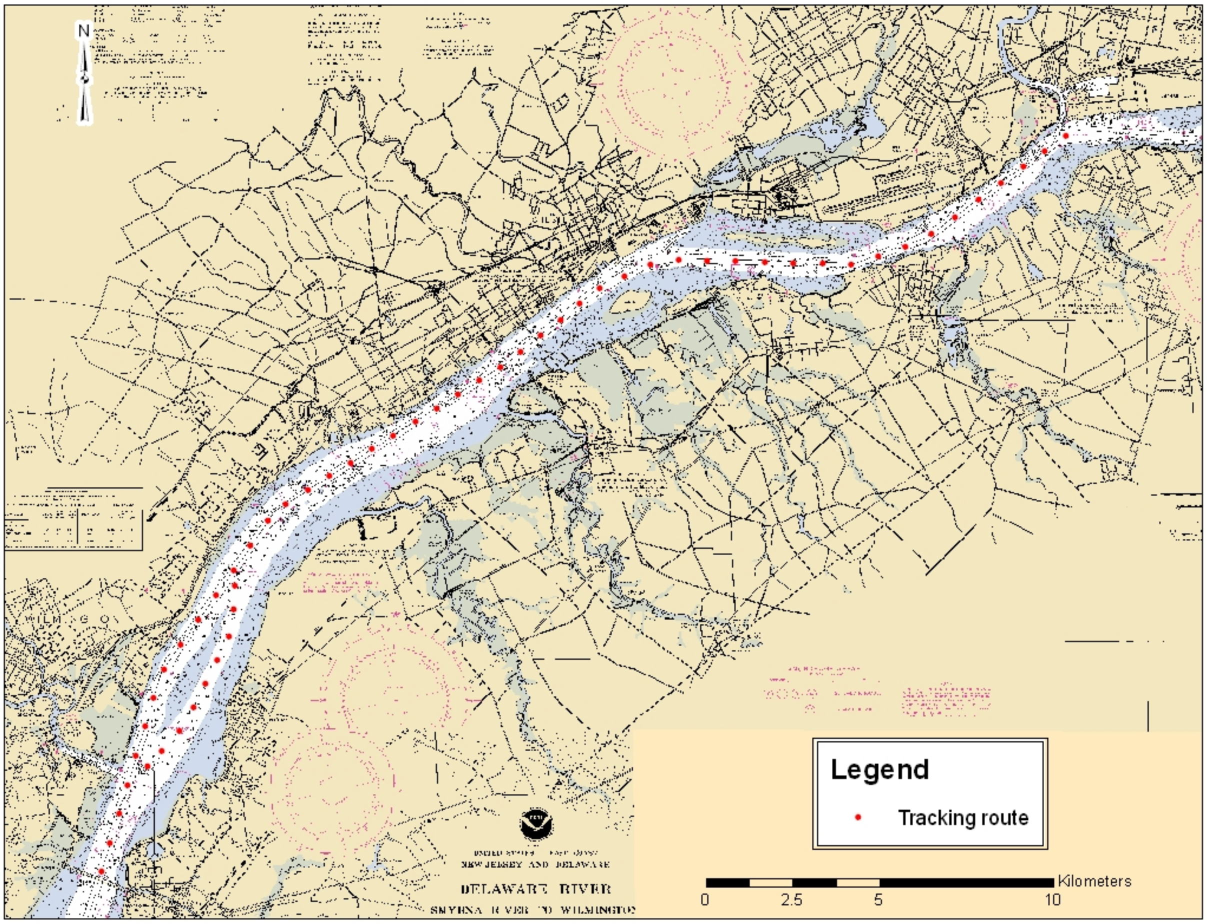

Figure 3: Locations of manual tracking stations to be employed by DEDFW personnel in the Delaware river to document habitat use of early stage Atlantic sturgeon.

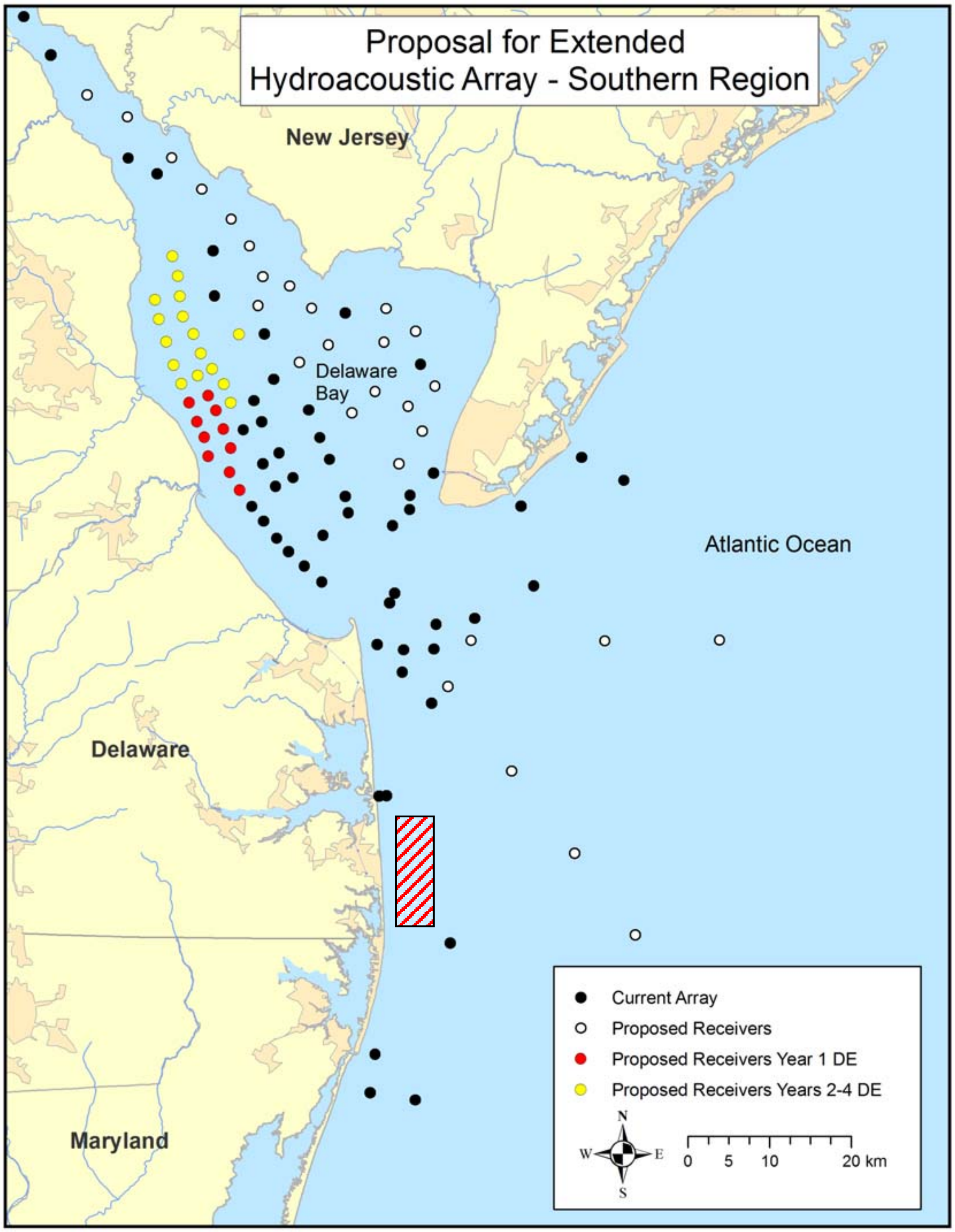

Figure 4: location of existing and planned acoustic receivers and directed gillnet sampling areas (inset rectangle) in lower Delaware Bay and nearshore coastal waters.

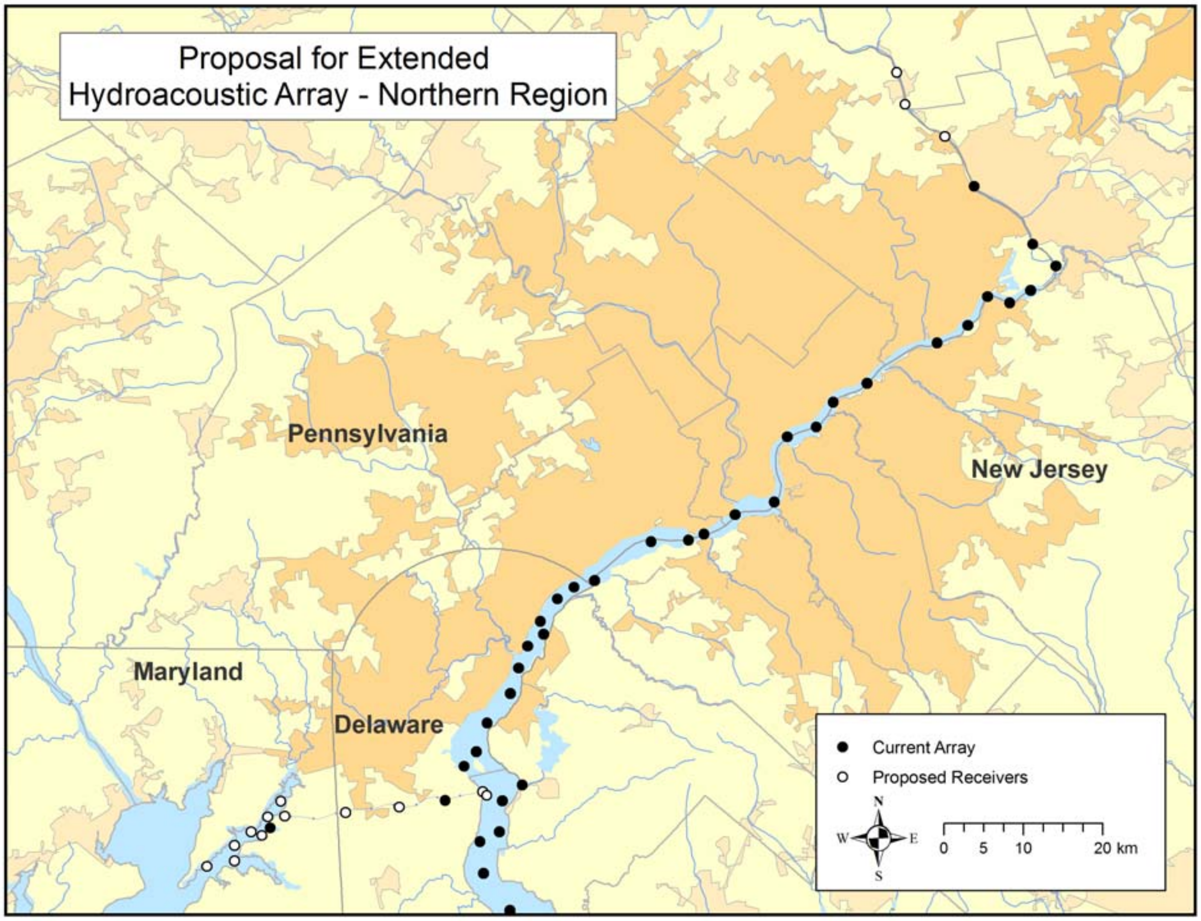

Figure 5: location of existing and planned acoustic receivers and in the upper section of the Delaware River Estuary.

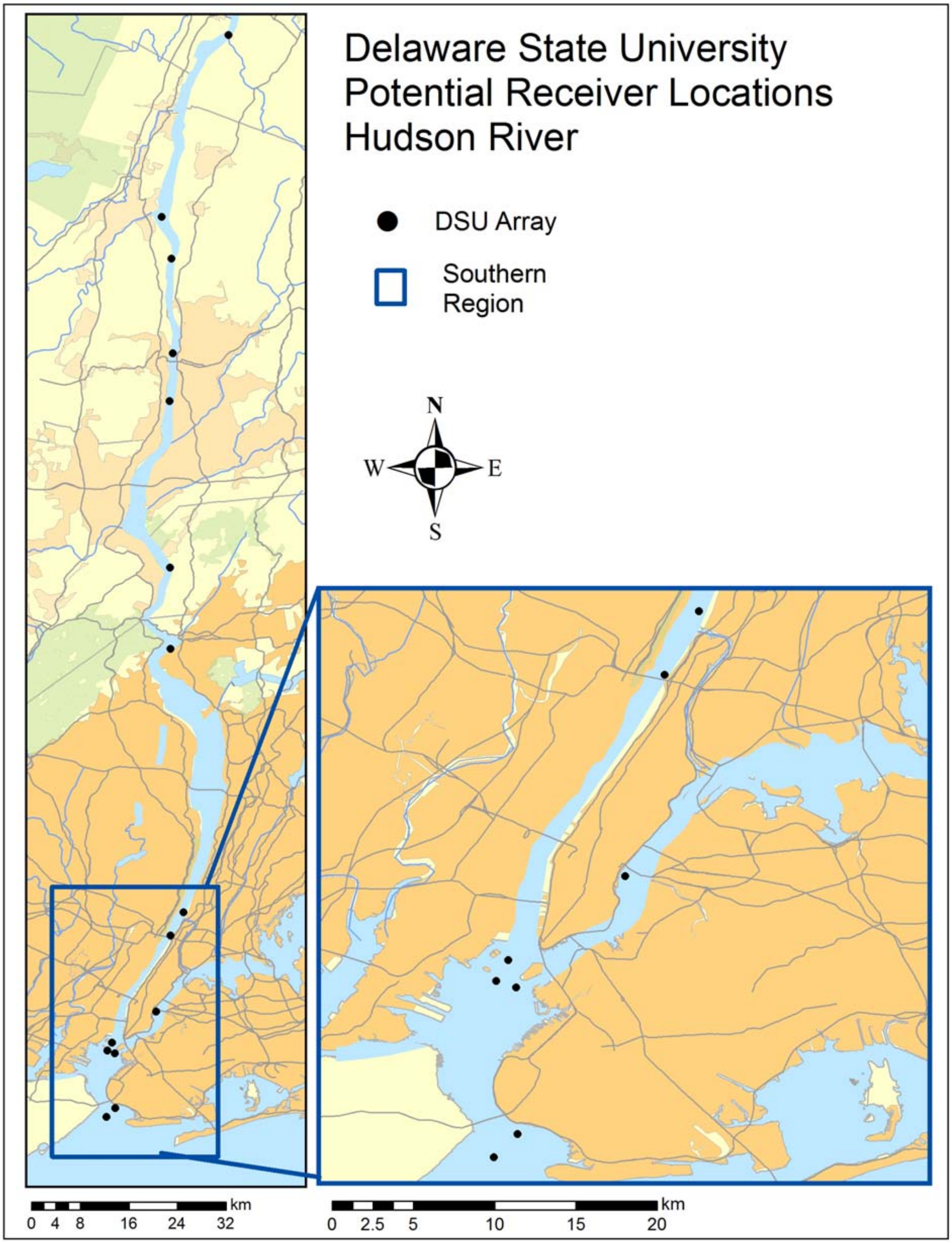

Figure 6: Location of existing acoustic receivers and in the Hudson River Estuary.

Finding of No Significant Impact
for Issuance of Award No. NA10NMF4720030 the Delaware Division of Fisheries and Wildlife to Conduct Research on Atlantic Sturgeon

National Marine Fisheries Service

National Oceanic and Atmospheric Administration Administrative Order 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality (CEQ) regulations at 40 C.F.R. 1508.27 state that 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 as defined under the Magnuson-Stevens Act and identified in Fishery Management Plans?

Response: This action would not adversely impact any ocean, coastal habitats, or essential fish habitat (EFH). NMFS determined that the applicant's proposed netting and boating activity would occur within designated EFH zones for managed species in the Delaware River. However, NMFS concluded the activities would likely have only minimal impacts based on the history of mitigation conditions contained in scientific research permits for activities similar to those in the subject proposed action. NMFS Office of Protected Resources also requested concurrence by email on December 21, 2009, from NMFS, Northeast Office of Habitat Conservation on the conclusion that the proposed research activities would not adversely impact designated EFH in the Delaware River. On January 8, 2010, Karen Greene, Habitat Specialist, responded by email agreeing the proposed boating and netting activities would have no more than minimal impact to EFH in the action area for the proposed research.

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: Effects on target and non-target species and habitat were considered. The research would not affect predator-prey relationships, other species, or any habitat. Measures would be employed to avoid interactions with marine mammals, and any non-listed, non-target species are expected to be released alive and without injury. Measures would also be employed to minimize any potential affect to benthic habitat (e.g. trawls would not be repeated in same area within the same day). The research would cause short term effects to Atlantic and shortnose sturgeons; however, no long-term or population level effects are reasonably expected to occur. No substantial impact on biodiversity and ecosystem function within the effected areas would be expected. Effects of the proposed research on shortnose sturgeon have also been analyzed previously in EAs prepared for issuance of scientific research permits.

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

Response: The proposed action involves basic research and does not involve hazardous methods, toxic agents or pathogens, or other materials that would have a substantial adverse impact on public health and safety.

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: The effects of the action on ESA-listed species and their habitat, EFH, marine sanctuaries, non-target species, and marine mammals were all considered. As discussed in the attached environmental assessment the effects of the proposed action on the biological resources would be short-term in nature. The incremental impact of the action when added to other past, present, and reasonably foreseeable future actions discussed in the environmental assessment would be minimal and not significant. The proposed action is focused on the target species and would not adversely impact other ESA-listed species or any designated critical habitat. Critical habitat has not been designated within the proposed action area for any listed species and would not be affected.

The action is not expected to have an adverse impact on any marine mammals; however, multiple species of marine mammals may occur within the action area. Consequently, as advised by the NMFS Regional Office of Protected Resources, and as noted in the grant proposal, measures to minimize interaction would be required. Namely, nets would not be deployed when marine mammals are observed within the vicinity of the research; and animals would be allowed to either leave or pass through the area safely before net setting is initiated. Nets used in coastal waters would be built and fished in compliance with the Harbor Porpoise Take Reduction Plan, the Atlantic Large Whale Take Reduction Plan, and the Bottlenose Dolphin Take Reduction Plan. Additionally, in all boating activities (including travel to acoustic receiver arrays outside of the netting areas) a close watch would be made for marine mammals to avoid harassment or interaction, and researchers would adhere to the NMFS Northeast Region Marine Mammal Approach and Viewing Guidelines.

Due to the nature of netting, some non-target species would be captured (e.g., American shad, gizzard shad, Atlantic menhaden, blueback herring, alewife, striped bass, white perch, channel catfish, monkfish, spiny dogfish, smooth dogfish, winter skate, and white catfish). Channel catfish, white perch, Atlantic menhaden, and gizzard shad are the most common non-target species that would be captured. The bycatch mortality of these species would be predicted as follows: channel catfish - <5%, white perch - 10%, Atlantic menhaden - 60%, and gizzard shad - 50%. While menhaden and gizzard shad suffer high mortality, it is anticipated that fewer than 100 menhaden and 200 gizzard shad would be caught per year, thus population effects would be minimal. Gillnets would typically be checked at short intervals and trawl nets would have limited tow times (5 to 15 minutes) to minimize bycatch mortality. No significant effects to these non-listed species are anticipated since mortality of individuals would be low for most species and no population level effects are anticipated.

Additionally, Award No. NA10NMF4720030 would contain mitigation measures to minimize the adverse effects of the research on Atlantic and shortnose sturgeon by requiring use of best practices when handling these fish. All activities involving endangered shortnose sturgeon have been authorized under ESA section 10(a)(1)(A) research permits. Atlantic sturgeon is a candidate species for ESA listing but currently do not receive any Federal protections under the ESA.

5) Are significant social or economic impacts interrelated with natural or physical environmental effects?

Response: The research is anticipated to have minor, short-term impacts to target and non-target species that do not result in significant environmental effects, therefore, no significant social or economic impacts interrelated with these effects are anticipated.

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

Response: Funding provided under this grant process is for scientific research or conservation activities of limited size and magnitude and does not individually or cumulatively have a significant effect on the quality of the human environment. This program will not result in any significant changes to the human environment and will result in improved management and conservation of sturgeon. Section 6 cooperative agreements have been used for many years to fund states' protected species conservation programs and do not present any new or unusual issues for future consideration. Neither the financial assistance nor the activities supported are precedent-setting or controversial. Proposed conservation elements funded under this grant program are specifically intended to aid in the conservation and recovery of sturgeon and present no conflict with existing environmental protection laws.

In addition, special awards conditions will dictate measures that will be taken to mitigate the effects of sampling and handling. The Atlantic sturgeon population is not expected to be adversely affected by the proposed sampling, handling, or tagging.

7) Can the proposed action reasonably be 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: The action would not adversely affect these types of areas. The action would not be conducted in or near any National Marine Sanctuary or other unique area, therefore, no impacts to these areas are expected. As discussed in the attached environmental assessment, NMFS concluded the proposed activities would likely have only minimal impacts on EFH based on the history of mitigation conditions contained in scientific research permits for activities similar to those in the subject proposed action. NMFS Office of Protected Resources also requested concurrence by email on December 21, 2009, from NMFS, Northeast Office of Habitat Conservation on the conclusion that the proposed research activities would not adversely impact designated EFH in the Delaware River. On January 8, 2010, Karen Greene, Habitat Specialist, responded by email agreeing the proposed boating and netting activities would have no more than minimal impact to EFH in the action area for the proposed research.

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

Response: The proposed research is not new and involves standard, accepted protocols; therefore, the risks are known to be minimal.

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

Response: Funding provided under this grant process is for scientific research or conservation activities of limited size and magnitude and does not individually or cumulatively have a significant impact. The proposed action is also not related to other actions with individually insignificant, but cumulatively significant impacts. The short-term effect (separately and cumulatively when added to other stresses the sturgeon face in the environment) resulting from the research activities would be expected to be minimal. The award would contain conditions to mitigate adverse impacts to strugeon from these activities.

Overall, the proposed action would be expected to have no more than a short-term effect on any individual Atlantic sturgeon or on Atlantic sturgeon populations. The incremental impact of the action when added to other past, present, and reasonably foreseeable future actions discussed in the environmental assessment 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 of these areas nor affect them indirectly, thus none would be impacted.

11) Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?

Response: The action would not be removing nor introducing any species; therefore, it would not result in the introduction or spread of a nonindigenous species. In addition, to prevent potential spread of any aquatic nuisance species identified in the action area, all equipment assigned to the research would not be reassigned to other watersheds until the research is completed or is suspended. If the research is completed or suspended, all gear and equipment used would be bleached, washed and air dried before being redeployed to another location.

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 this grant would not be precedent setting and would not affect any future decisions.

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: The action would not result in any violation of Federal, State or local laws for environmental protection. This grant program is authorized under section 6 of the ESA.

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

Response: The action is not expected to result in any cumulative adverse effects to the species that is the subject of the proposed research. The proposed action would not be expected to have more than short-term effects on the target species (Atlantic sturgeon). No adverse effects on other non-target ESA listed species are expected. The effects on non-target, non-ESA species were also considered and no substantial effects are expected. No cumulative adverse effects that could have a substantial effect on any species would be expected.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for Issuance of a Protected Species Conservation and Recovery Grant (Award No. NA10NMF4720030) to the Delaware Division of Fisheries and Wildlife to Conduct Research on Atlantic Sturgeon, it is hereby determined that the issuance of Award NA10NMF472003o to the Delaware Division of Fisheries and Wildlife will not significantly impact the quality of the human environment as described above and in the Environmental Assessment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environment Impact Statement for this action is not necessary.

James H. Lecky
Director, Office of Protected Resources

APR - 7 2010
Date