DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Parts 223 and Part 224

RIN 0648–XJ00

[Docket No. 100903414–0414–02]

Endangered and Threatened Wildlife and Plants; Proposed Listing Determinations for Three Distinct Population Segments of Atlantic Sturgeon in the Northeast Region

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments.

SUMMARY: We, NMFS, have completed an Endangered Species Act (ESA) status review for Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Based on the status review report (ASSRT, 2007), and other information available since completion of the status review report, we have determined that the species is comprised of five distinct population segments (DPSs) that qualify as species under the ESA: Gulf of Maine (GOM); New York Bight (NYB); Chesapeake Bay (CB); Carolina; and South Atlantic. We have also determined that, for those DPSs that are located within the jurisdiction of NMFS' Northeast Region, listing as threatened is warranted for the GOM DPS, and listing as endangered is warranted for the NYB DPS and CB DPS. A separate proposed listing determination is issued for the two DPSs within NMFS' Southeast Region in today's **Federal Register.**

DATES: Comments on this proposal must be received by January 4, 2011. At least one public hearing will be held in a central location for each DPS; notice of the locations and times of the hearings will be published in the **Federal Register** not less than 15 days before the hearings are held.

ADDRESSES: You may submit comments, identified by the RIN 0648–XJ00, by any of the following methods:

- *Federal eRulemaking Portal: http//www.regulations.gov.* Follow the instructions for submitting comments.
- *Fax:* To the attention of Lynn Lankshear at (978) 281–9394.
- *Mail or hand-delivery:* Submit written comments to the Assistant Regional Administrator, Protected Resources Division, NMFS, Northeast Region, 55 Great Republic Drive, Gloucester, MA 01930.

Instructions: All comments received are a part of the public record and will generally be posted to *http://www.regulations.gov* without change. All Personal Identifying Information (for example, name, address, etc.) voluntarily submitted by the commenter may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information.

We will accept anonymous comments (enter "n/a" in the required fields if you wish to remain anonymous). Attachments to electronic comments will be accepted in Microsoft Word, Excel, WordPerfect, or Adobe PDF file formats only.

The proposed rule, status review report, and other reference materials regarding this determination are available electronically at the following Web site at *http://www.nero.noaa.gov/prot_res/CandidateSpeciesProgram/cs.htm* or by submitting a request to the Assistant Regional Administrator, Protected Resources Division, NMFS, Northeast Region, 55 Great Republic Drive, Gloucester, MA 01930.

FOR FURTHER INFORMATION CONTACT: Lynn Lankshear, NMFS, Northeast Region (978) 282–8473; Kimberly Damon-Randall, NMFS, Northeast Region (978) 282–8485; or Marta Nammack, NMFS, Office of Protected Resources (301) 713–1401.

SUPPLEMENTARY INFORMATION:

Public Comments Solicited

We solicit scientific and commercial information to inform the listing determinations for the GOM, NYB, and CB DPSs to ensure that the final action resulting from this proposal considers information that is comprehensive and current. We particularly seek comments concerning: information on the abundance and distribution of Atlantic sturgeon belonging to the GOM, NYB, and/or the CB DPSs; information concerning the viability of and/or threats to Atlantic sturgeon belonging to the GOM, NYB, and/or the CB DPSs; efforts being made to protect Atlantic sturgeon belonging to the GOM, NYB, or CB DPSs; and the mixing of fish from different DPSs in parts of their ranges, particularly the marine environment.

We are not proposing critical habitat for the GOM, NYB, or CB DPSs at this time, given that further analysis of GIS mapping data is necessary for determining the critical habitat of each of the three DPSs. Therefore, we will propose to designate critical habitat for each DPS in a separate **Federal Register** notification once analysis of the data is complete. If the proposed listing is finalized, a recovery plan will be prepared for each DPS. In addition, any protective regulations determined to be necessary and advisable for the conservation of the GOM DPS under ESA section 4(d) will be proposed in a subsequent **Federal Register** document.

Background

There are two subspecies of Atlantic sturgeon—*Acipenser oxyrinchus oxyrinchus,* which is commonly referred to as Atlantic sturgeon, and *Acipenser oxyrinchus desotoi,* commonly referred to as Gulf sturgeon. This proposed rule addresses the subspecies *Acipenser oxyrinchus oxyrinchus* (hereafter referred to as Atlantic sturgeon), which is distributed along the eastern coast of North America.

Listing Species Under the Endangered Species Act

We, NMFS, are responsible for determining whether Atlantic sturgeon are threatened or endangered under the ESA (16 U.S.C. 1531 *et seq.*). Accordingly, based on the statutory, regulatory, and policy provisions described below, the steps we followed in making our listing determination for Atlantic sturgeon were to: (1) Determine how Atlantic sturgeon meet the definition of "species"; (2) determine the status of the species and the factors affecting it; and (3) identify and assess efforts being made to protect the species and determine if these efforts are adequate to mitigate existing threats.

To be considered for listing under the ESA, a group of organisms must constitute a "species." A "species" is defined in section 3 of the ESA to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." On February 7, 1996, the NMFS and U.S. Fish and Wildlife Service (collectively the "Services") adopted a policy to clarify our interpretation of the phrase "distinct population segment of any species of vertebrate fish or wildlife" (61 FR 4722). The joint DPS policy describes two criteria that must be considered when identifying DPSs: (1) The discreteness of the population segment in relation to the remainder of the species (or subspecies) to which it belongs; and (2) the significance of the population segment to the remainder of the species (or subspecies) to which it belongs. As further stated in the joint policy, if a population segment is discrete and significant (*i.e.,* it meets the DPS policy criteria), its evaluation for endangered or threatened status will be based on the ESA's definition of those terms and a review of the five factors enumerated in section 4(a)(1) of the ESA.

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

Section 4(b)(1)(A) of the ESA further requires that listing determinations be based solely on the best scientific and commercial data available after taking into account efforts being made to protect the species. In judging the efficacy of existing protective efforts, we rely on the Service's joint "Policy for Evaluation of Conservation Efforts When Making Listing Decisions" ("PECE"; 68 FR 15100; March 28, 2003). The PECE provides direction for consideration of conservation efforts that have not been implemented, or have been implemented but not yet demonstrated effectiveness.

Status Review

We first identified Atlantic sturgeon as a candidate species in 1991; at that time, the candidate species list served to notify the public that we had concerns regarding these species that may warrant listing in the future, and it facilitated voluntary conservation efforts. On June 2, 1997, the Services received a petition from the Biodiversity Legal Foundation requesting that we list Atlantic sturgeon in the United States as threatened or endangered and designate critical habitat within a reasonable period of time following the listing. A notice was published in the **Federal Register** on October 17, 1997, stating that the Services had determined substantial information existed indicating the petitioned action may be warranted (62 FR 54018). In 1998, after completing a comprehensive status review, the Services published a 12-month determination in the **Federal Register,** announcing that listing was not warranted at that time (63 FR 50187; September 21, 1998). We retained Atlantic sturgeon on the candidate species list (subsequently changed to the Species of Concern List (69 FR 19975; April 15, 2004)).

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.*), we followed this action by closing the Exclusive Economic Zone (EEZ) to Atlantic sturgeon retention. In 2003, we sponsored a workshop with the U.S. Fish and Wildlife Service (FWS) and the ASMFC entitled "Status and Management of Atlantic Sturgeon," 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 (hereafter referred to as "subpopulations") 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 on Atlantic sturgeon, we decided that a second review of Atlantic sturgeon status was needed to determine if listing as endangered or threatened under the ESA was warranted. We, therefore, established a status review team (SRT) consisting of NMFS, FWS, and U.S. Geological Survey (USGS) scientists with relevant expertise to assist us in assessing the viability of the species throughout all or a significant portion of its range. The SRT was asked to consider the best scientific and commercial information available, including the technical information and comments from state and regional experts. The draft status review report prepared by the SRT was peer reviewed by experts from academia, and their comments were incorporated. A Notice of Availability of this report was published in the **Federal Register** on April 3, 2007 (72 FR 15865).

On October 6, 2009, we received a petition from the Natural Resources Defense Council to list Atlantic sturgeon as endangered under the ESA. As an alternative, the petitioner requested that the species be delineated and listed as the five DPSs described in the 2007 Atlantic sturgeon status review (ASSRT, 2007) (*i.e.,* Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs), with the Gulf of Maine and South Atlantic DPSs listed as threatened, and the remaining three DPSs listed as endangered. The petitioner also requested that critical habitat be designated for Atlantic sturgeon under the ESA. We published a Notice of 90-Day Finding on January 6, 2010 (75 FR 838), stating that the petition presented substantial scientific or commercial information indicating that the petitioned actions may be warranted.

The status review report upon which this proposed rule is based provides extensive information on Atlantic sturgeon biology, life history, distribution, and abundance to support its conclusions. A summary of this information is provided below. More detailed information is available in the status review report.

Biology and Life 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 (ASSRT, 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 (ASSRT, 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 percent of the total body weight (Smith, 1907; Huff, 1975; 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 percent 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.,* 2000; 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 m (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 to years before emigrating to open ocean as subadults (Holland and Yelverton, 1973; Doevel and Berggen, 1983; Waldman *et al.,* 1996a; Dadswell, 2006; ASSRT, 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).

Distribution and Abundance

Historically, Atlantic sturgeon were present in approximately 38 rivers in the United States from St. Croix, ME, to the Saint Johns River, FL, 35 of which have been confirmed to have supported spawning for Atlantic sturgeon (ASSRT, 2007). It is unknown how many Canadian rivers were historically used by Atlantic sturgeon. However, it is likely that Atlantic sturgeon spawn(ed) 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 River and Saint John River (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; ASSRT, 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; Taub, 1990; Dadswell, 2006; ASSRT, 2007), records from the 1700s and 1800s 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 3,350 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, 10 years after peak landings, when less than 10 percent (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 1800s—early 1900s (Taub, 1990; 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 (ASSRT, 2007; J. Sulikowski, UNE, pers. comm.). At least 18 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) (ASSRT, 2007). These rivers are: Saint Lawrence, QB; Annapolis, NS; Saint John, NB; Kennebec, ME; Hudson, NY; Delaware, NJ/DE/PA; James, VA; Roanoke, NC; Tar-Pamlico, NC; Cape Fear, NC; Waccamaw, SC; Great PeeDee, SC; Combahee, SC; Edisto, SC; Savannah, SC/GA; Ogeechee, GA; Altamaha, GA; and, the Satilla, GA (ASSRT, 2007). Rivers with possible, but unconfirmed, spawning include: St Croix, NB/ME; Penobscot, Androscoggin, and Sheepscot, ME, York, VA; Neuse, NC; Santee and Cooper Rivers; spawning may occur in the Santee and/or the Cooper Rivers, but it may not result in successful recruitment (ASSRT, 2007).

Comprehensive information on current abundance of Atlantic sturgeon is lacking for any of the spawning rivers (ASSRT, 2007). In the United States, an estimate of 870 spawning adults/year is available for the Hudson River (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 subpopulation, 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 subpopulations within the United States, other U.S. subpopulations are predicted to have fewer spawning adults than either the Hudson or the Altamaha (ASSRT, 2007). In Canada, an estimate of spawning size is available for the Saint Lawrence River where tagging work suggests a total spawning subpopulation of over 500 adults (Caron *et al.,* 2002; Dadswell, 2006).

Surveys and other programs (*e.g.,* reward programs) have provided more qualitative information on Atlantic sturgeon subpopulations. While these programs may not have sufficient information by which to generate any subpopulation estimate(s), they do provide some river-specific information on abundance, trends, evidence of spawning, and/or documentation of multiple-year classes. For example, a multi-filament gill net survey conducted intermittently in the Kennebec River from 1977–2000 captured 336 Atlantic sturgeon (9 adults and 327 subadults) (Squiers, 2004). During this period, the catch-per-unit effort (CPUE) of subadult Atlantic sturgeon increased by a factor of 10–25 (1977–1981 CPUE = 0.30 versus 1998–2000 CPUE = 7.43). The CPUE of adult Atlantic sturgeon showed a slight increase over the same time period (1977–1981 CPUE = 0.12 versus 1998–2000 CPUE = 0.21) (Squiers, 2004).

An intensive gill net survey was conducted in the Merrimack River from 1987–1990 to determine annual movements, spawning, summering, and wintering areas of shortnose and Atlantic sturgeon (Kieffer and Kynard, 1993). Thirty-six Atlantic sturgeon were captured (70–156 cm total length (TL)); most were under 100 cm TL, suggesting that these were all subadult sturgeon (Kieffer and Kynard, 1993).

In Delaware, gill net surveys are conducted on the Delaware River by the state's Division of Fish and Wildlife as part of their Atlantic Sturgeon Research program. Since 1991, more than 2,000 Atlantic sturgeon have been captured and tagged (DNREC, 2009). Based on their length, most are believed to have been subadults. In September 2009, however, personnel captured their smallest sturgeon yet; an age 0 fish, which was 7 inches TL (178 mm) and weighed less than an ounce (DNREC, 2009). In all, 34 young-of-year (YOY) sturgeon were caught during the sampling period (September 9–November 9, 2009), ranging in size from 178 to 349 mm TL (Fisher, 2009). These captures provide evidence that successful spawning is still occurring in the Delaware River.

Within the Chesapeake Bay, the FWS has been funding the Maryland Reward Program since 1996; this program has resulted in the documentation of approximately 1,700 Atlantic sturgeon. Five hundred and sixty-seven of these fish were hatchery fish, of which 462 were first time captures (14 percent recapture rate), and the remaining captures (1,133) were wild fish.

Virginia also instituted an Atlantic sturgeon reward program in the Chesapeake Bay in 1997 and 1998 (ASSRT, 2007; A. Spells, FWS, pers. comm., 2008). This reward program documented and measured 295 Atlantic sturgeon. Data collected during the reward program documents the presence of YOY fish. Such data include length information which shows that 18.6 percent (55 of 295 measured) of the fish caught were within the 20 to 40 cm fork length size class (A. Spells, FWS, pers. comm., 2008). In addition, aging of fish spines collected from the fish suggested that 34 percent were age 1 (A. Spells, FWS, pers. comm., 2008). This information is important in that it strongly suggests the presence of spawning in one or more rivers that flow into the Bay. Further evidence of Atlantic sturgeon spawning in the Chesapeake Bay area is provided by three carcasses of large adults found in the James River in 2000–2003; the discovery of a 213 cm TL carcass of an adult found in the Appomattox River in 2005; the capture and release of a 240 cm TL Atlantic sturgeon near Hoopers Island, MD in April, 1998 (S. Minkkinen, FWS, pers. comm., 2006); documentation of a gravid adult female Atlantic sturgeon off Tilghman Island, MD in April, 2007 (the first gravid female documented in the Maryland portion of the Chesapeake Bay since the early 1970s); and the capture of several males producing milt (sperm) in the James River in 2007 and 2008 (A. Spells, FWS, pers. comm.).

Identification of Distinct Population Segments

As described above, the ESA's definition of "species" includes "any subspecies of fish or wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife which interbreeds when mature." As previously described, Atlantic sturgeon originating from different rivers are known to co-occur in the marine environment and use multiple river systems for life functions, such as foraging. The DPS policy does not require absolute separation of a DPS from other members of its species (61 FR 4722; February 7, 1996). The high degree of reproductive isolation of Atlantic sturgeon (*i.e.,* homing to their natal rivers for spawning) (K. Hattala,, NYDEC, pers. comm., 1998; Wirgin *et al.,* 2000; King *et al.,* 2001; Waldman *et al.,* 2002) as well as the ecological uniqueness of those riverine spawning habitats and the genetic diversity among subpopulations, provides evidence that several populations meet the DPS Policy criteria. Therefore, prior to evaluating the conservation status for Atlantic sturgeon, and in accordance with the joint DPS policy, we considered: (1) The discreteness of any Atlantic sturgeon population segment in relation to the remainder of the subspecies to which it belongs; and (2) the significance of any Atlantic sturgeon population segment to the remainder of the subspecies to which it belongs.

Discreteness

The joint DPS policy states that a population of a vertebrate species may be considered discrete if it satisfies either one of the following conditions: (1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors (quantitative measures of genetic or morphological discontinuity may provide evidence of this separation); or (2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of Section 4(a)(1)(D) of the ESA.

As has already been discussed, adult and subadult Atlantic sturgeon which originate from different rivers mix in the marine environment (Stein *et al.,* 2004; USFWS, 2004). Nevertheless, there is marked separation of Atlantic sturgeon as a result of both spatial and temporal separation of reproduction among river subpopulations. Tagging studies and genetic analyses provide evidence that Atlantic sturgeon return to their natal rivers for spawning (K. Hattala, NYDEC, pers. comm., 1998; Wirgin *et al.,* 2000; King *et al.,* 2001; Waldman *et al.,* 2002). As previously mentioned, Atlantic sturgeon are temporally separated with respect to spawning, since all adults are not reproductively active at the same time within each year (Murawski and Pacheco, 1977; Smith, 1985; Rogers and Weber, 1995; Bain, 1997; Smith and Clugston, 1997; Moser *et al.,* 1998; Caron *et al.,* 2002). For example, Atlantic sturgeon spawn in the Hudson River in May through July (Bain, 1997), while spawning in the St. Lawrence

River occurs in June through July (Caron *et al.,* 2002).

The SRT also considered genetics data to further inform its decisions as to whether there is discreteness amongst Atlantic sturgeon subpopulations. Genetics analyses for Atlantic sturgeon using mitochondrial DNA (mtDNA), which is maternally inherited, and nuclear DNA (nDNA), which reflects the genetics of both parents, have consistently shown that Atlantic sturgeon subpopulations are genetically diverse and that individual subpopulations can be differentiated (Bowen and Avise, 1990; Ong *et al.,* 1996; Waldman *et al.,* 1996a; Waldman *et al.,* 1996b; Waldman and Wirgin, 1998; Waldman *et al.,* 2002; King *et al.,* 2001; Wirgin *et al.,* 2002; Wirgin *et al.,* 2005; Wirgin and King supplemental data, 2006; Grunwald *et al.,* 2008). New analyses of both mtDNA and nDNA were conducted specifically for the status review. In comparison to previous studies, the genetic analyses for the status review employed greater sample sizes from multiple rivers, and limited the samples analyzed to those collected from YOY and mature adults (≤ 130 cm TL) to ensure that the fish originated from the river in which it was sampled (Wirgin and King supplemental data, 2006; ASSRT, 2007). The results for both the mtDNA haplotype and microsatellite (nDNA) allelic frequencies indicated that all of the Atlantic sturgeon subpopulations for which there are samples available are genetically differentiated (ASSRT, 2007; Tables 4 and 5) from each other. The results of the mtDNA analysis used for the status review report were also subsequently published by Grunwald *et al.* (2008). In comparison to the mtDNA analyses used for the status review report, Grunwald *et al.* used additional samples, some from fish in the size range (< 130 cm TL) excluded by Wirgin and King (supplemental data, 2006) because they were smaller than those considered to be mature adults. Nevertheless, the results were the same and demonstrated that each of the 12 sampled Atlantic sturgeon subpopulations could be genetically differentiated from each other (Grunwald *et al.,* 2008).

Genetic distances and statistical analyses (bootstrap values and assignment test values) were also used to investigate significant relationships among, and differences between, Atlantic sturgeon subpopulations (ASSRT, 2007, Table 6 and Figures 16–18). Overall, the genetic markers used in this analysis resulted in an average accuracy of 88 percent for determining a sturgeon's natal river origin, but an average accuracy of 94 percent for correctly classifying it to one of five population groups (Kennebec River, Hudson River, James River, Albemarle Sound, and Savannah/Ogeechee/Altamaha Rivers) when using microsatellite data collected only from YOY and adults. A phylogenetic tree (neighbor joining tree) was produced from only YOY and adult samples (to reduce the likelihood of including strays from other subpopulations) using the microsatellite analysis. Bootstrap values (which measure how consistently the data support the tree structure) for this tree were for analyses of: (1) 12 loci of samples collected from YOY and adults; and (2) 7 loci for samples of YOY, subadult, and adult Atlantic sturgeon (ASSRT, 2007, Figures 16–18). Classification success rate averaged 79.0 percent for determining a sturgeon's natal river and 86.9 percent for correctly classifying sturgeon to one of five population groups (Kennebec River, Hudson River, James River, Albemarle Sound, and Savannah/Ogeechee/Altamaha Rivers) (ASSRT, 2007). Regarding sturgeon from northeast rivers, this analysis resulted in a range of 81 to 89 percent accuracy in determining a sturgeon's natal river of origin and correctly classifying a sturgeon to a population group. To further assess the accuracy of the results, King (supplemental data, 2006) reanalyzed the nDNA using a greater number of loci. His results showed that increasing the number of loci from 7 to 12 improved the classification rates for natal origin and identification of population groupings (*e.g.,* from 84 percent to 95 percent for the James River), but did not change the conclusion that there are five discrete Atlantic sturgeon population segments in the United States.

In summary, evidence to support that there are discrete Atlantic sturgeon populations includes temporal and spatial separation during spawning and the results from genetic analyses. Genetic samples for YOY and spawning adults were not available for river populations originating from other rivers in the northeast region. However, nDNA from an expanded dataset that included juvenile Atlantic sturgeon was used to produce a neighbor-joining tree with bootstrap values (ASSRT, 2007; Figure 18). This dataset included additional samples from the Delaware River and York River populations in the Northeast. Atlantic sturgeon river populations also grouped into five population segments in this analysis (Delaware River population with the Hudson River population, and York River population with the James River population).

We have considered the information on Atlantic sturgeon population structuring provided in the status review report and Grunwald *et al.* (2008) and have concluded that five discrete Atlantic sturgeon population segments are present in the United States, with three located in the Northeast: (1)—The "Gulf of Maine (GOM)" population segment, which includes Atlantic sturgeon that originate from the Kennebec River, (2)—the "New York Bight (NYB)" population segment, which includes Atlantic sturgeon originating from the Hudson and Delaware Rivers, and (3)—the "Chesapeake Bay (CB)" population segment, which includes Atlantic sturgeon that originate from the James and York Rivers. Each is markedly separate from the other four population segments as a consequence of physical factors.

With respect to Atlantic sturgeon of Canadian origin, mtDNA analysis has shown that Atlantic sturgeon originating from rivers ranging from the Kennebec River, Maine, to the Saint Lawrence River, Canada, are predominately homogenous (one genotype) (Waldman *et al.,* 2002; Grunwald *et al.,* 2008; ASSRT, 2007). However, nDNA microsatellite analysis has found these same rivers to be genetically diverse (King, supplemental data, 2006). The SRT concluded that the differences in nDNA were sufficient to determine that Atlantic sturgeon which originate in Canada are markedly separate from Atlantic sturgeon of U.S. origin.

The genetic analyses support that at least one, and possibly more, discrete Atlantic sturgeon population groupings occur in Canada. The SRT did not further consider the status of Atlantic sturgeon originating in Canada once it was determined that they were discrete from the five U.S. Atlantic sturgeon population groupings. We did not consider a listing determination for these populations given the lack of information by which to determine whether the Canadian subpopulations represent one or more DPSs, and given the regulatory controls on import and export of Atlantic sturgeon and their parts per the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

Significance

When the discreteness criterion is met for a potential DPS, as it is for the GOM, NYB, and CB population segments in the Northeast identified above, the second element that must be considered under the DPS policy is significance of each DPS to the taxon as a whole. The DPS policy cites examples of potential considerations indicating significance, including: (1) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon; (2) evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon; (3) evidence that the DPS represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or, (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

We believe that the five discrete Atlantic sturgeon population segments persist in ecological settings unique for the taxon. This is evidenced by the fact that spawning habitat of each population grouping is found in separate and distinct ecoregions that were identified by The Nature Conservancy (TNC) based on the habitat, climate, geology, and physiographic differences for both terrestrial and marine ecosystems throughout the range of the Atlantic sturgeon along the Atlantic coast (Figure 1).

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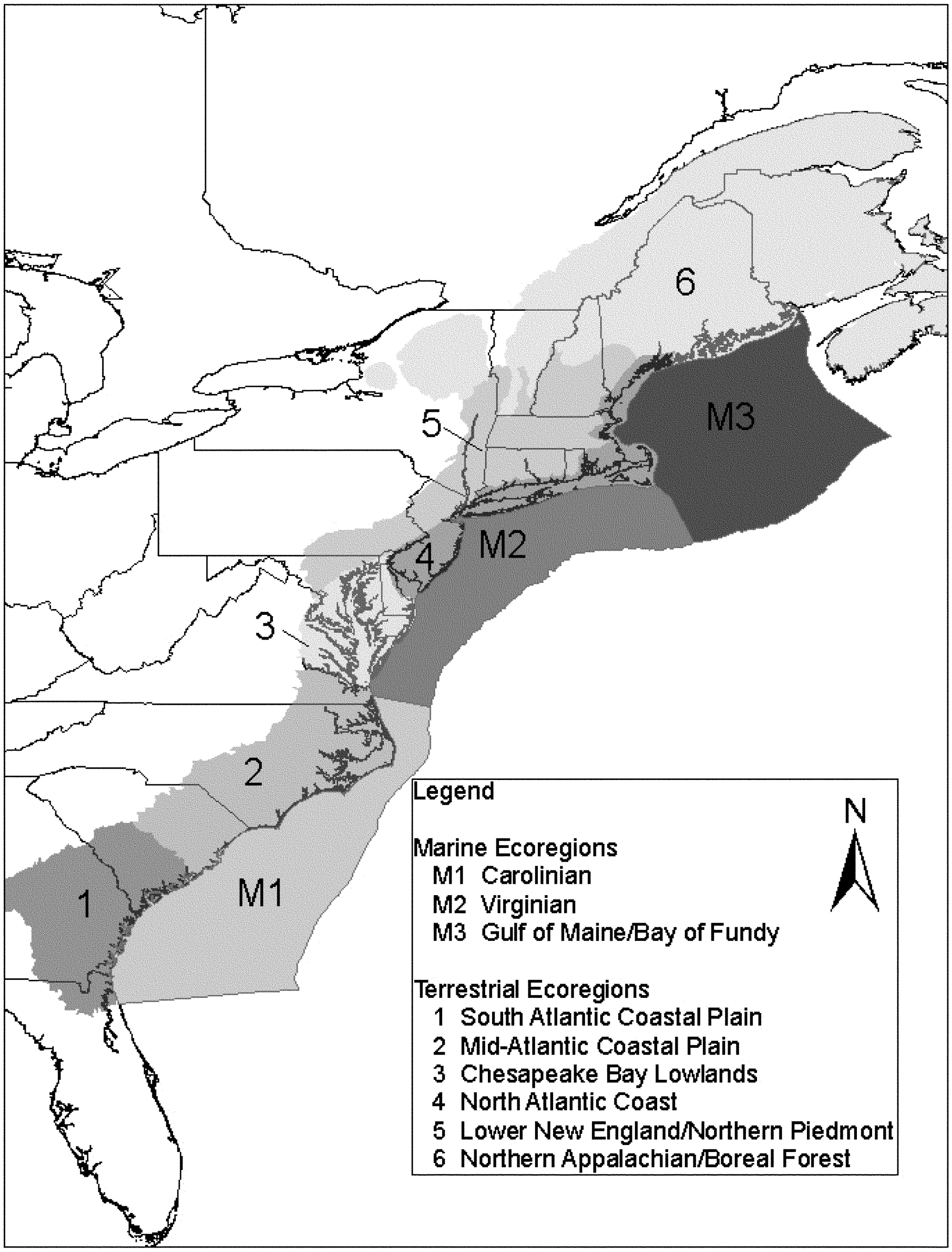

Figure 1: Map of TNC Marine and Terrestrial Ecoregions

TNC descriptions do not include detailed information on the chemical properties of the rivers within each ecoregion, but include an analysis of bedrock and surficial geology type because it relates to water chemistry, hydrologic regime, and substrate. It is well established that waters have different chemical properties (*i.e.,* identities) depending on the geology of where the waters originate. For example, riverine spawning/nursery habitat of the Kennebec River subpopulation occurs within the Northern Appalachian/Boreal Forest ecoregion whose characteristically large expanses of forest, variety of swamps, marshes, bogs, ice scoured riverbanks, salt marshes, and rocky coastal cliffs were influenced by a geological history that includes four glaciation events (TNC, 2008). In contrast, riverine spawning/nursery habitat of Atlantic sturgeon that originate from the Hudson and Delaware Rivers occurs within the Lower New England-Northern Piedmont and North Atlantic Coast ecoregions which are characterized by low mountains, abundant lakes, and limestone valleys inland and generally flat, sandy coastal plains dissected by major tidal river systems near the coast (Barbour, 2000; TNC, 2008). The Chesapeake Bay Lowlands ecoregion, within which riverine spawning/nursery habitat for the James River population grouping of Atlantic sturgeon occurs, presents yet a different landscape based on its geologic history. As glaciers that extended as far south as present day Pennsylvania began to melt, streams and rivers that flowed toward the coast were carved out of the landscape (Pyzik *et al.,* 2004). These past events are seen today in the characteristic features of the Chesapeake Bay Lowlands ecoregion which includes a broad plain to the west of the Bay with generally low slopes and gentle drainage dissected by a series of major rivers—the Patuxent, Potomac, Rappahannock, York and James—as well as a complex and dynamic patchwork of barrier islands, salt marshes, tidal flats and large coastal bays along the Delmarva Peninsula (TNC, 2002 in draft). Riverine spawning/nursery habitat for the two remaining Atlantic sturgeon groupings in the Southeast likewise occur in separate and distinct ecoregions. Therefore, the ecoregion delineations support that the physical and chemical properties of the Atlantic sturgeon spawning rivers are unique to each population grouping. The five discrete U.S. Atlantic sturgeon population segments are "significant" as defined in the DPS policy, given that the spawning rivers for each population segment occur in a unique ecological setting.

Further, because each discrete population segment is genetically distinct and reproduces in a unique ecological setting, the loss of any one of the discrete population segments is likely to create a significant gap in the range of the taxon. Atlantic sturgeon that originate from other discrete population segments are not expected to re-colonize systems except perhaps over a long time frame (*e.g.,* greater than 100 years), given that gene flow is low between the five discrete population segments (Secor and Waldman, 1999) and the geographic distances between spawning rivers of different population segments are relatively large (ASSRT, 2007). Therefore, the loss of any of the discrete population segments would result in a significant gap in the range of Atlantic sturgeon, and negatively impact the species as a whole, given the strong natal homing behavior of the species.

In summary, the five Atlantic sturgeon discrete population segments meet the significance criterion of the DPS policy because they each persist in a unique ecological setting, and the loss of any of these discrete population segments would result in a significant gap in the range of the taxon. As described in the status review report, the SRT concluded that these five population segments of Atlantic sturgeon within the United States (identified above) should be considered significant under the DPS policy guidelines. We, therefore, concur with the SRT's conclusion that five Atlantic sturgeon DPSs occur within the United States. The five DPSs are hereafter referred to as: (1) GOM, (2) NYB, (3) CB, (4) Carolina, and (5) South Atlantic DPSs (Figure 2).

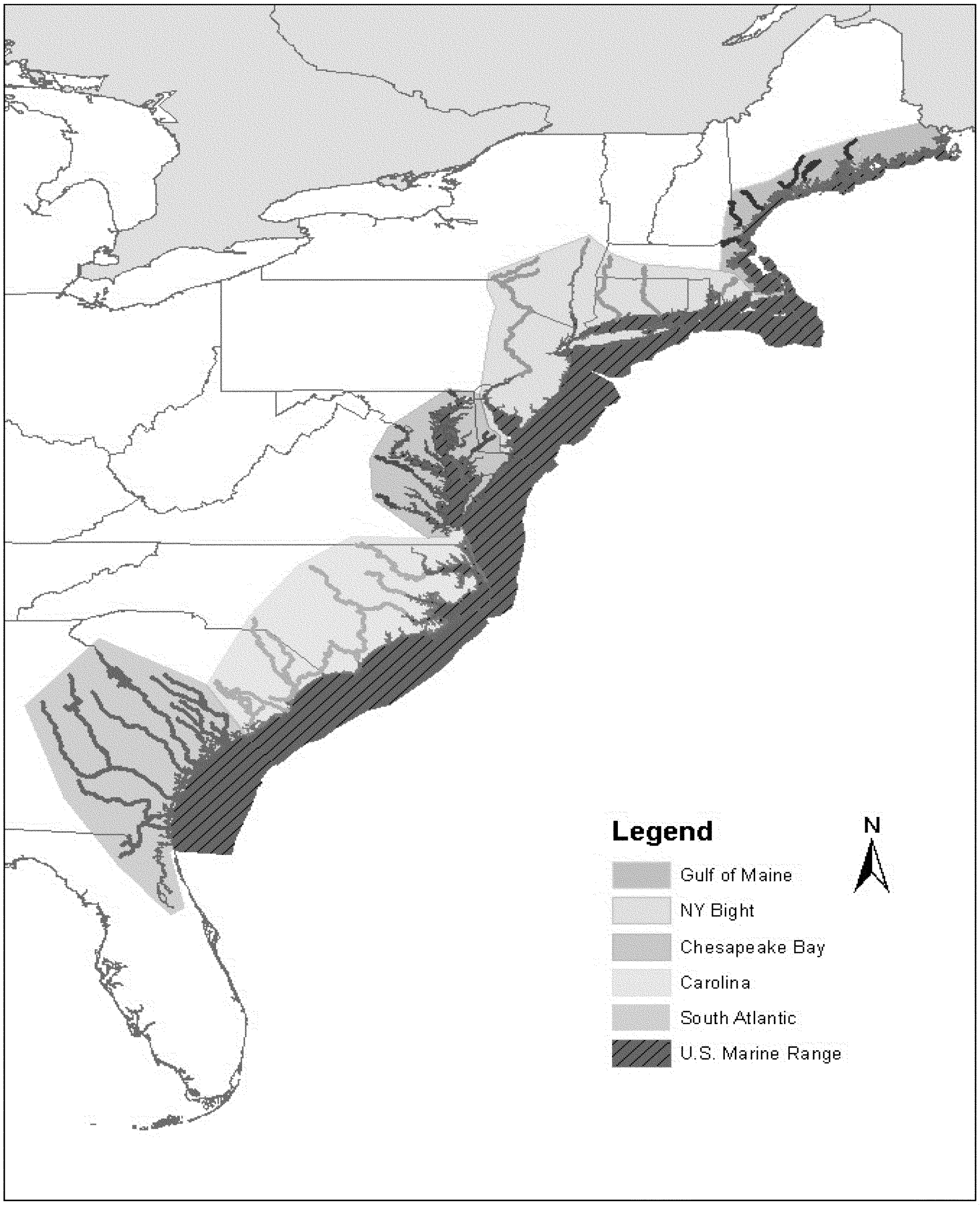

Figure 2: U.S. Atlantic sturgeon DPSs showing rivers (up to the first dam where known) in which the species are known to occur.

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Current Status of the GOM, NYB, and CB DPSs

After completing the DPS analysis, we next considered the current status of the three DPSs that occur within the Northeast Region's jurisdiction, the GOM, NYB, and CB DPSs, as well as the factors affecting each of these Atlantic sturgeon DPSs in relation to the ESA's standards for listing (*see* Analysis of Factors, below). The ESA and its implementing regulations require listing determinations to be based on the current status of the species and the factors presently affecting the species or likely to affect the species in the future.

Many of the activities causing harm to Atlantic sturgeon have occurred for years, even decades. Similarly, some conservation actions have been in place for years (*e.g.,* prohibition on catch and retention of Atlantic sturgeon). The past impacts of human activity on the GOM, NYB, and CB DPSs cannot be particularized in their entirety.

However, to the extent they have manifested themselves at the population level, such past impacts are subsumed in the information presented on their current status, recognizing that the benefits to these Atlantic sturgeon DPSs as a result of conservation activities already implemented may not be evident in the status and trend of the DPS for years, given the relatively late age to maturity for Atlantic sturgeon and depending on the age class(es) affected.

Gulf of Mexico (GOM) DPS

The GOM DPS includes all Atlantic sturgeon whose range occurs in watersheds from the Maine/Canadian border and extending southward to include all associated watersheds draining into the Gulf of Maine as far south as Chatham, MA, as well as wherever these fish occur in coastal bays, estuaries, and the marine environment from the Bay of Fundy, Canada, to the Saint Johns River, FL. Within this range, Atlantic sturgeon have been documented from the following rivers: Penobscot, Kennebec, Androscoggin, Sheepscot, Saco, Piscataqua, and Merrimack. The Kennebec River is currently the only known spawning river for the GOM DPS. Evidence of Atlantic sturgeon spawning in other rivers of the GOM DPS is not available. However, Atlantic sturgeon continue to use these historical spawning rivers and may represent additional spawning groups (ASSRT, 2007). The majority of historical Atlantic sturgeon spawning habitat is accessible in all but the Merrimack River of the GOM DPS. Therefore, the availability of spawning habitat does not appear to be the reason for the lack of observed spawning in other GOM DPS rivers. However, whether Atlantic sturgeon spawning habitat in the GOM DPS is fully functional is difficult to quantify.

Known threats to Atlantic sturgeon of the GOM DPS include effects to riverine habitat (*e.g.,* dredging, water quality) as well as threats that occur throughout their marine range (*e.g.,* fisheries bycatch). There are no current abundance estimates for the GOM DPS of Atlantic sturgeon. The CPUE of subadult Atlantic sturgeon in a multi-filament gillnet survey conducted on the Kennebec River was considerably greater for the period of 1998–2000 (CPUE=7.43) compared to the CPUE for the period 1977–1981 (CPUE = 0.30). The CPUE of adult Atlantic sturgeon showed a slight increase over the same time period (1977–1981 CPUE = 0.12 versus 1998–2000 CPUE = 0.21) (Squiers, 2004). There is also new evidence of Atlantic sturgeon presence in rivers (*e.g.,* the Saco River) where they have not been observed for many years.

New York Bight (NYB) DPS

The NYB DPS includes all Atlantic sturgeon whose range occurs in watersheds that drain into coastal waters, including Long Island Sound, the New York Bight, and Delaware Bay, from Chatham, MA to the Delaware-Maryland border on Fenwick Island, as well as wherever these fish occur in coastal bays, estuaries, and the marine environment from the Bay of Fundy, Canada, to the Saint Johns River, FL. Within this range, Atlantic sturgeon have been documented from the Hudson and Delaware rivers as well as at the mouth of the Connecticut and Taunton rivers, and throughout Long Island Sound. There is evidence to support that spawning occurs in the Hudson and Delaware Rivers. Evidence of Atlantic sturgeon spawning in the Connecticut and Taunton Rivers is not available. However, Atlantic sturgeon continue to use these historical spawning rivers (ASSRT, 2007). The majority of historical spawning habitat is accessible to the NYB DPS. Therefore, the availability of spawning habitat does not appear to be the reason for lack of observed spawning in the Connecticut and Taunton Rivers. However, whether Atlantic sturgeon spawning habitat in these rivers is fully functional is difficult to quantify.

Known threats to Atlantic sturgeon of the NYB DPS include effects to riverine habitat (*e.g.,* dredging, water quality, and vessel strikes) as well as threats that occur throughout their marine range (*e.g.,* fisheries bycatch). The only abundance estimate for Atlantic sturgeon belonging to the NYB DPS is 870 spawning adults per year for the Hudson River subpopulation, based on data collected from 1985–1995 (Kahnle *et al.,* 2007). The accuracy of the estimate may be affected by bias in the reported harvest or estimated exploitation rate for that time period (Kahnle *et al.,* 2007). Underreporting of harvest would have led to underestimates of stock size, while underestimates of exploitation rates would have resulted in overestimates of stock size (Kahnle *et al.,* 2007). In addition, the current number of spawning adults may be higher given that the estimate is based on the time period prior to the moratorium on fishing for and retention of Atlantic sturgeon.

There is no abundance estimate for the Delaware River subpopulation. Delaware's Department of Natural Resources and Environmental Control (DNREC) has been conducting surveys for Atlantic sturgeon since 1991 (DNREC, 2009). Atlantic sturgeon are a Delaware endangered species (state-listed).

CB DPS

The CB DPS includes all Atlantic sturgeon whose range occurs in watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, VA, as well as wherever these fish occur in coastal bays, estuaries, and the marine environment from the Bay of Fundy, Canada, to the Saint Johns River, FL. Within this range, Atlantic sturgeon have been documented from the James, York, Potomac, Rappahannock, Pocomoke, Choptank, Little Choptank, Patapsco, Nanticoke, Honga, and South rivers as well as the Susquehanna Flats. Historical evidence suggests that several of these, including the James, York, Potomac, Susquehanna, and Rappahannock Rivers, were Atlantic sturgeon spawning rivers. However, the James River is currently the only known spawning river for the CB DPS. Evidence of Atlantic sturgeon spawning in other rivers of the CB DPS is not available, although spawning is suspected to occur in the York based on genetics data and anecdotal reports. The majority of historical Atlantic sturgeon spawning habitat is accessible, but it is unknown whether it is fully functional.

Known threats to Atlantic sturgeon of the CB DPS include effects to riverine habitat (*e.g.,* dredging, water quality, vessel strikes) as well as threats that occur throughout their marine range (*e.g.,* fisheries bycatch). There are no current abundance estimates for the CB DPS. The Maryland Reward Program has resulted in the documentation of over 1,133 wild Atlantic sturgeon since 1996. The Virginia Atlantic sturgeon reward program in the Chesapeake Bay documented and measured 295 Atlantic sturgeon in 1997 and 1998 (Spells, 2007). However, since sturgeon from multiple DPSs occur in the Chesapeake Bay, it is unlikely that all of the sturgeon captured in either reward program originated from the CB DPS.

Analysis of Factors Affecting the Three Northeast Region DPSs of Atlantic Sturgeon

A species shall be listed if the Secretary of Commerce determines, on the basis of the best scientific and commercial data available after conducting a review of the species' status, that the species is in danger of extinction throughout all or a significant portion of its range (*i.e.,* "endangered") or is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (*i.e.,* "threatened") because of any one or a combination of the following factors: (1) The present or threatened destruction, modification, or curtailment of its habitat or range; (2) over utilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; or (5) other natural or manmade factors affecting its continued existence.

The SRT took a multi-step approach for each DPS to answer whether there were: (1) Sufficient data to conclude whether a DPS is threatened or endangered; (2) sufficient data to conclude that a DPS was not threatened or endangered; or (3) insufficient data to allow a full assessment of the populations within a DPS. The SRT identified the threats specific to Atlantic sturgeon and then used a semi-quantitative approach to assess the overall effect of those threats to each DPS (ASSRT, 2007; Patrick and Damon-Randall, 2008).

The ESA does not define what timeframe corresponds with the phrase "within the foreseeable future" in its definition of the term "threatened." Therefore, before beginning the analysis of the Section 4(a)(1) factors, it was necessary for the SRT to define the timeframe (Patrick and Damon-Randall, 2008). Following the example of a past status review team (*Acropora* Biological Review Team, 2005), the Atlantic sturgeon SRT determined that the appropriate period of time would: (1) Depend on the particular kinds of threats; (2) consider the life history characteristics of the species; (3) consider specific habitat requirements for the species; and (4) allow for the conservation and recovery of the species and the ecosystems upon which it depends (ASSRT, 2007; Patrick and Damon-Randall, 2008). Based on these, the SRT agreed that 20 years would be the appropriate timeframe for defining "the foreseeable future" for Atlantic sturgeon (ASSRT, 2007; Patrick and Damon-Randall, 2008). The SRT also concluded that 20 years is an appropriate timeframe for determining the status of a species, as it was not too far into the future that qualitative analysis would prove to be ineffective or unreliable, it allowed sufficient time (10+ years) to determine the productivity of Atlantic sturgeon subpopulations using standardized protocols (Sweka *et al.,* 2006), and it is the approximate age of maturity for Atlantic sturgeon or is approximately equal to one generation (Scott and Crossman, 1973; Smith *et al.,* 1982; Young *et al.,* 1998).

The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

The SRT identified barriers (*i.e.,* dams, tidal turbines), dredging, and water quality (*e.g.,* dissolved oxygen levels, water temperature, and contaminants) as threats that affect Atlantic sturgeon habitat or range. The SRT did not specifically consider global climate change. Since completion of the SRT report, additional information has become available on the effects of global climate change in the Northeast and Mid-Atlantic where habitat for the GOM, NYB, and CB DPSs occurs.

As noted in the status review report, dams for hydropower generation, flood control, and navigation have the potential to affect Atlantic sturgeon by impeding access to spawning and foraging habitat, modifying free-flowing rivers to reservoirs, and altering downstream flows and temperatures. Turbines for power generation could, similarly, impede access to spawning and foraging habitat but are also known to injure and kill sturgeon as a result of direct contact with the turbine blades. Environmental impacts of dredging include direct removal or burial of organisms, elevated turbidity or siltation, contaminant resuspension, noise or disturbance, alterations to hydrodynamic regime and physical habitat, and loss of riparian habitat (Chytalo, 1996; Winger *et al.,* 2000). Water quality can be affected by many activities such as industrial activities, forestry, agriculture, land development and urbanization that can result in discharges of pollutants, changes in water temperature and dissolved oxygen levels, alteration of water flow, and the addition of nutrients or sediment from erosion. Any of these can affect sturgeon at various life stages depending on the extent of the threat and the life stage affected. There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities—commonly referred to as "global warming." Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures.

Dams

The SRT used GIS tools and dam location data collected by Oakley (2005) to determine the number of miles of available habitat in rivers where Atlantic sturgeon historically spawned. As previously described, within the GOM DPS, Atlantic sturgeon are known to spawn in the Kennebec River. The Penobscot, Sheepscot, Androscoggin, and Merrimack Rivers are known to have supported spawning in the past (ASSRT, 2007). Atlantic sturgeon occur in the Saco and Piscataqua Rivers, although there is no information on historical or current spawning activity for Atlantic sturgeon in these rivers (ASSRT, 2007; J. Sulikowski, UNE, pers. comm., 2009).

Historically, the upstream migration of Atlantic sturgeon in the Kennebec River was limited to Waterville, ME, which is the location of Ticonic Falls (river kilometer (rkm) 98) (NMFS and USFWS, 1998). The construction of Edwards Dam in 1837, downstream of the Ticonic Falls, denied Atlantic sturgeon access to historical habitat in the Kennebec River until 1999 when the dam was removed. Since its removal, access to 100 percent of historical habitat has been restored. In the Androscoggin River, the Brunswick Hydroelectric Dam is located at the head-of-tide near the site of the natural falls. The location of historical spawning grounds on the Androscoggin is unknown, but it is unlikely that Atlantic sturgeon could navigate the natural falls located at Brunswick Dam (NMFS and USFWS, 1998). Therefore, the dam is unlikely to have limited access of Atlantic sturgeon to their spawning habitat. Similarly, Atlantic sturgeon upstream migration within the Sheepscot River is thought to have been historically limited to the lower river (rkm 32) just below the first dam on the river (rkm 35); therefore, 100 percent of the historical habitat (based on river kilometers) is available to Atlantic sturgeon in the Sheepscot.

In contrast to the aforementioned rivers, access to Atlantic sturgeon spawning habitat is impeded on the Penobscot River. Historically, the falls at Milford, rkm 71, were likely the first natural obstacle to Atlantic sturgeon migration on the Penobscot River (L. Flagg, MEDMR, pers. comm., 1998). In 1833, the Veazie Dam was constructed on the Penobscot River at rkm 56, blocking 21 percent of Atlantic sturgeon habitat. In 1875, the Treats Falls Bangor Dam was built five kilometers downstream of the Veazie, which also impeded migration upstream (ASSRT, 2007). However, this dam was breached in 1977 (ASSRT, 2007). Therefore, 79 percent of Atlantic sturgeon habitat is currently accessible on the Penobscot (ASSRT, 2007). In 2008, the Penobscot River Restoration Trust, a non-profit corporation, exercised its option to purchase the Veazie and two other dams on the Penobscot (ASSRT, 2007). In doing so, the Trust has the right to, in part, decommission or remove the Veazie Dam, thus reopening miles of habitat for Atlantic sturgeon and other diadromous species (ASSRT, 2007). However, funds for the removal need to be generated and permits need to be secured, and it remains uncertain whether all of the goals will be achieved. If Atlantic sturgeon were able to ascend the falls at Milford, they could have migrated without obstruction to Mattaseunk (rkm 171) (ASSRT, 2007). However, evidence is lacking to say with certainty that Atlantic sturgeon were able to ascend the falls at Milford.

Information on Atlantic sturgeon use of the Saco River in Maine became available after completion of the status review report. The last focused study of the Saco River was almost 30 years ago, and continued use of the river by Atlantic sturgeon was uncertain at the time of the status review report. However, Atlantic sturgeon have been captured during routine trawl sampling in the river during 2008 and 2009 as part of a 2-year monitoring project of the Saco River/Estuary. Tagging and tracking of the captured fish has shown that Atlantic sturgeon are making use of the river up to the Cataract Dam (J. Sulikowski, UNE, pers. comm., 2009), the first dam on the river at approximately rkm 6 (Atlantic Salmon Commission, 1983). There are several dams on the Saco River known to have blocked fish passage for species such as Atlantic salmon, shad, and alewives (MEDMR, 1994). The effect of such dams on the Atlantic sturgeon that currently use the river is unknown. Likewise, there are several dams on the Piscataqua River, and the effect of such dams on the Atlantic sturgeon that currently use the river is unknown.

Within the GOM DPS, access to historical spawning habitat is most severely impacted in the Merrimack River (ASSRT, 2007). Hoover (1938) identified Amoskeag Falls (rkm 116) as the historical limit for Atlantic sturgeon in the Merrimack River. In the 1800s, construction of the Essex Dam in Lawrence, MA (rkm 49) blocked the migration of Atlantic sturgeon to 58 percent of its historically available habitat (Oakley, 2003; ASSRT, 2007). Tidal influence extends to rkm 35; however, in the summer months when river discharge is lowest, the salt wedge extends upriver, resulting in approximately 19 km of tidal freshwater and 9 km of freshwater habitat (Keiffer and Kynard, 1993). Based on a detailed description by Keiffer and Kynard (1993), the accessible portions of the Merrimack seem to be suitable for Atlantic sturgeon spawning and nursery habitat. Nevertheless, the presence of the dam means that only 42 percent of historical Atlantic sturgeon habitat is currently available (ASSRT, 2007).

Within the NYB DPS, there is evidence of Atlantic sturgeon spawning in the Hudson and Delaware Rivers (ASSRT, 2007). Historical records indicate that Atlantic sturgeon spawned in the Taunton River at least until the turn of the century (ASSRT, 2007), and also occurred in the Connecticut River (Judd, 1905; Murawski and Pacheco, 1977; Secor, 2002; ASSRT, 2007). By 1898, the overall New England harvest of Atlantic sturgeon was quite low, 36 mt, and only occurred in Maine, Massachusetts, and Connecticut (Secor, 2002). There is no recent evidence (within the last 15 years) to confirm that spawning currently occurs in either the Taunton or Connecticut Rivers (ASSRT, 2007). Atlantic sturgeon are present in both rivers, and likely represent sturgeon originating from other spawning rivers along the coast.

In general, Atlantic sturgeon access to historical or spawning habitat believed to be historical is relatively unimpeded on all four of these NYB DPS rivers. The first impediment to migrating Atlantic sturgeon on the Hudson River is the Federal Dam located at Troy, NY (ASSRT, 2007). This dam location is upstream of Catskill (rkm 204), which is the northern extent of Atlantic sturgeon spawning and nursery habitat (Kahnle *et al.,* 1998). Therefore, 100 percent of Atlantic sturgeon habitat is still available on the Hudson (ASSRT, 2007). Similarly, 100 percent of Atlantic sturgeon habitat is believed to be accessible on the Delaware River where 140 rkm of Atlantic sturgeon habitat are available extending from Delaware Bay to the fall line at Trenton, NJ with no dams present (ASSRT, 2007). Historical upstream migration of Atlantic sturgeon in the Taunton River is unknown. However, Atlantic sturgeon have access to 89 percent of the river downstream of the Town River Pond Dam (ASSRT, 2007). Similarly, it is not clear how far up the Connecticut River Atlantic sturgeon historically migrated. In all but low flow years, it is likely that Atlantic sturgeon could pass the Enfield Rapids prior to dam construction (Enfield Dam), which occurred in three stages between 1829 and 1881 (Judd, 1905). The falls at South Hadley, MA, which is now the site of the Holyoke Dam, are considered the upstream limit of sturgeon in this system; however, there is one historical record of an Atlantic sturgeon sighted as far upstream as Hadley, MA (24 rkm upstream from South Hadley) (ASSRT, 2007). Also, in 2006 an Atlantic sturgeon was taken in the fish lift at the Holyoke Dam (R. Murray, HG&E, pers. comm., 2006). Since the Enfield Dam has been breached, an additional 90 km of habitat are available, and depending on the interpretation of historical spawning grounds, either 100 percent (Holyoke Dam, South Hadley, MA), or 86 percent (Hadley, MA) of historical Atlantic sturgeon habitat is available (ASSRT, 2007).

For the CB DPS, there is evidence that Atlantic sturgeon currently spawn in the James River (ASSRT, 2007). The observed presence of YOY and adult sturgeon in the York River suggests that spawning may still occur there (Musick *et al.,* 1994; K. Place, Commercial Fisherman, pers. comm., 2006; ASSRT, 2007). The Susquehanna, Potomac, Rappahannock, and Nanticoke Rivers also supported Atlantic sturgeon spawning in the past, but there is no conclusive evidence that spawning still occurs in any of these rivers (ASSRT, 2007). Based on the review by Oakley, 100 percent of Atlantic sturgeon habitat is currently accessible in these rivers (ASSRT, 2007). Although dams are present, most are located upriver of where spawning is expected to have historically occurred. For example, four dams were constructed from 1904–1932 on the Susquehanna River, but none of these dams are suspected to have impeded Atlantic sturgeon spawning habitat as the lowermost dam (Conowingo) is located above the suspected historical spawning grounds (Steve Minkkinen, USFWS, pers. comm., 2006). The Embrey Dam was built in 1910 above the fall line of the Rappahannock River and may have blocked the upstream migration of Atlantic sturgeon (ASSRT, 2007). This dam was breached in 2004 and 100 percent of historical Atlantic sturgeon habitat is believed to be accessible (ASSRT, 2007).

Dredging

Dredging and filling operations can impact important features of Atlantic sturgeon habitat because they disturb benthic fauna, eliminate deep holes, and alter rock substrates necessary for spawning (Smith and Clugston, 1997). Deposition of dredge sediment has been shown to affect the distribution of Atlantic sturgeon (Hatin *et al.,* 2007). Dredging can also result in direct takes (killing and injuring) of Atlantic sturgeon. Such takes have the potential to affect the range of Atlantic sturgeon if the takings contribute to the extirpation of a DPS.

Dickerson (2006) summarized observed takings of Gulf, shortnose, and

Atlantic sturgeon from dredging activities conducted by the Army Corps of Engineers (ACOE) in the United States; overall 24 sturgeon (2 Gulf, 11 shortnose, and 11 Atlantic sturgeon) were observed during the years of 1990–2005. Of the 24 sturgeon captured, 15 (62.5 percent) were reported as dead. The ASSRT calculated a minimum take of 0.6 Atlantic sturgeon per year based on hopper dredge takes since 1995 and given that dredging efforts were relatively similar among years (ACOE, 2006). Both of these are considered minimum estimates since observed takes of Atlantic sturgeon are documented incidental to observer coverage of dredging activities for other, already listed, ESA-species (*e.g.* shortnose sturgeon and sea turtles). Given that Atlantic sturgeon do not have the same temporal and spatial distribution as these ESA-listed species, it is likely that Atlantic sturgeon takes occur during unobserved dredging operations.

Dredging projects on the Kennebec River in the GOM DPS are known to have captured Atlantic sturgeon. Dredging has also been proposed for the Penobscot Harbor of the Penobscot River (ASSRT, 2007). Capture of Atlantic sturgeon is likely to occur if dredging takes place at times when Atlantic sturgeon are present in the area. NMFS can currently request, but cannot require, dredge operations to be modified to minimize capture and injury of Atlantic sturgeon.

Within the NYB DPS, the commercial shipping channel of the Hudson River is maintained at a depth of 9.75 m (at mean low water) for nearly the entire length of the river to the Port of Albany. However, the section between Haverstraw Bay and Catskill (approximately rkm 122) is naturally deep and does not require dredging (D. Mann-Klager, FWS, pers. comm., 1998).

The navigation channel in the Delaware River similarly undergoes maintenance dredging from the mouth of Delaware Bay to just north of Trenton, NJ (ASSRT, 2007). Seasonal restrictions on when this work can occur have been imposed by the Delaware River Fish and Wildlife Management Cooperative to reduce impacts from dredging on diadromous species (ASSRT, 2007). Nevertheless, dredge gear used in the Delaware is known to injure or kill Atlantic sturgeon (ASSRT, 2007). There are also new proposed dredge activities in the Delaware River. In 2006, Crown Landing, LLC, was approved by the Federal Energy Regulatory Commission (FERC) to construct and operate a liquefied natural gas (LNG) import terminal on the Delaware River near Logan, New Jersey (rkm 126). The construction of the LNG terminal would require the hydraulic dredging of 1.24 million m^3 in the first year of construction followed by maintenance dredging of 67,000–97,000 m^3/year. Dredge spoil will be deposited in an upland disposal site, and dredging will be limited to the months of August through December. The dredging operations proposed for construction and maintenance of the LNG terminal would occur, in part, directly in suspected historical Atlantic sturgeon spawning habitat (Fox, 2006; ASSRT, 2007). However, construction of the terminal has not yet begun, and it is uncertain whether it will proceed since approval from the State of Delaware has not been secured (Examiner.com, 2009).

Since completion of the SRT report, we have received information on the Delaware River Main Channel Deepening project, which calls for the deepening of the existing channel from 40 to 45 feet (12.2 to 13.7 meters) from Philadelphia Harbor, PA, to the mouth of the Delaware Bay. This project will require dredging the channel with hydraulic and hopper dredges and blasting approximately 77,000 cubic yards (58,914 cubic meters) of rock near Marcus Hook, PA. While the seasonal restrictions imposed by the Delaware River Fish and Wildlife Management Cooperative may help to reduce or prevent direct take of important resident fish species (primarily the federally endangered shortnose sturgeon and other species of diadromous fishes), there is still the potential for direct impacts of this project on Atlantic sturgeon as they may be found in the project area throughout the year. There is the potential for indirect effects as well, such as changes in hydrology of the river, which may affect possible spawning habitat (*e.g.,* salt water intruding further into the river). The location of spawning habitat for Atlantic sturgeon in the Delaware River has not been confirmed (ASSRT, 2007).

For Atlantic sturgeon belonging to the CB DPS, the most significant impacts to spawning habitat likely occurred in 1843 and 1854 in the James River when granite outcropping consisting of large and small boulders was removed and the river was dredged to improve ship navigation (Holton and Walsh, 1995; Bushnoe *et al.,* 2005). Similarly, rock was removed from Drewry's Island Channel in 1878 to improve navigation (Holton and Walsh, 1995). These granite outcroppings and boulder matrices are the types of habitats that are believed to be ideal spawning habitats for Atlantic sturgeon (Bushnoe *et al.,* 2005). Based on commercial landings (Bushnoe *et al.,* 2005), the James River likely supported the largest subpopulation in the Chesapeake Bay in the 1800s.

Dredging continues to pose a threat to Atlantic sturgeon in the James River. There are dredging projects underway to deepen and widen the shipping terminal near Richmond on the James River, and the river undergoes maintenance dredging on almost an annual basis to allow commercial ocean-going vessels to reach the Richmond terminal (C. Hager, VIMS, pers. comm., 2005; S. Powell, ACOE, pers. comm., 2009). Since 1998, six new permits have been issued for dredging within the James River, and an additional 24 maintenance projects have been approved (L. Gillingham, VMRC, pers. comm., 2005). The Commonwealth of Virginia does impose a dredging moratorium during the anadromous spawning season (C. Hager, VIMS, pers. comm., 2005). The ACOE has received a waiver to dredge during this moratorium in very limited circumstances such as to conduct a study to assess the effects of dredging on sturgeon (S. Powell and S. Cameron, ACOE, pers. comm., 2009).

Turbines

The placement of turbine structures to generate power in rivers used by Atlantic sturgeon could, potentially, damage or destroy bottom habitat. However, the more likely effect of turbines is injury and death of Atlantic sturgeon as a result of being struck by the turbine blades. Such takes have the potential to affect the range of Atlantic sturgeon if the takings contribute to the extirpation of a DPS.

Seventeen hydrokinetic projects proposed for both the GOM (9) and NYB (8) DPSs have received preliminary permits from FERC, with many more projects being proposed. There are two tidal power projects currently in operation along the range of Atlantic sturgeon. The Annapolis River (Nova Scotia, Canada) tidal power plant, built in 1982, was constructed as a demonstration site for marine Straflo turbines and consists of a rock-filled dam housing the turbine and sluice gates (M. Dadswell, Arcadia University, pers. comm., 2006). The negative impacts of the Annapolis tidal turbine on Atlantic sturgeon (150–200 cm TL) appear to be great, as the probability of lethal strike from the turbine ranges between 40 and 80 percent (M. Dadswell, Arcadia University, pers. comm., 2006; ASSRT, 2007), and at least three severed, gravid females have been observed below the power plant (Dadswell and Rulifson, 1994). In summer 2009, nine severed Atlantic sturgeon carcasses were documented on beaches near the Annapolis project (*http://annapolisroyalheritage.blogspot.com/2009/09/atlantic-sturgeon.html*). Although the cause of mortality could not be confirmed, the injuries are consistent with blade strikes from the tidal turbines. Since this power plant occurs within the marine range of Atlantic sturgeon that originate from the GOM, NYB, and CB DPSs, fish originating from these DPSs could also be struck and killed or injured. One marine turbine project is underway within the United States in the East River, New York (Angelo, 2005; Verdant Power webpage, 2009). Although no impacts to wildlife have been reported, the project is still in the early stages. Verdant Power recently completed Phase 2 of the project, which involved installation and operation of six full-scale turbines in an array at the project site in the East River (Verdant Power webpage, 2009). Phase 3 of the project will entail placement of 30 turbines in the east branch of the river and additional turbines in the west branch if the company is able to acquire a license from FERC (Verdant Power webpage, 2009). The energy company, Verdant Power, has plans to expand the project to up to 300 turbines to be located within a 1-mile section of the river near Roosevelt Island (Angelo, 2005).

Water Quality

The Northeast Coast region, which includes the coastal waters and watersheds of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia, is the most densely populated coastal region in the United States (EPA, 2008). Therefore, it is not surprising that water quality for the GOM, NYB, and CB DPSs continues to be an issue likely affecting Atlantic sturgeon despite many positive actions (*e.g.,* implementation of the Clean Water Act). Contaminants, including toxic metals, polychlorinated aromatic hydrocarbons (PAHs), organophosphate and organochlorine pesticides, polychlorinated biphenyls (PCBs), and other chlorinated hydrocarbon compounds can have substantial deleterious effects on aquatic life. Effects from these elements and compounds on fish include production of acute lesions, growth retardation, and reproductive impairment (Cooper, 1989; Sinderman, 1994). The coastal environment is also impacted by coastal development and urbanization that result in storm water discharges, non-point source pollution, and erosion. Secor (1995) noted a correlation between low abundances of sturgeon during this century and decreasing water quality caused by increased nutrient loading and increased spatial and temporal frequency of hypoxic conditions. The SRT considered all of this information as well as the second edition of the National Coastal Condition Report (EPA, 2004), and concluded that water quality posed a moderate to moderately low risk that the GOM, NYB, and CB DPSs were likely to become endangered within the foreseeable future. Since completion of the SRT report, the EPA has released the third National Coastal Condition Report (EPA, 2008). That report is considered here to aid in assessing the level of threat water quality poses to the GOM, NYB, and CB DPSs.

Within the GOM DPS, water quality of its rivers and estuaries was severely degraded as a result of many activities, including agricultural and forestry practices, industrialization, and land development. As late as 1994, the Androscoggin River was still considered one of the most polluted rivers in the United States (EWG, 2005; Lichter *et al.,* 2006). However, water quality in the Androscoggin River has been improving (Lichter *et al.,* 2006). Likewise, the Penobscot River went through a period of very poor water quality (Hatch, 1971; Davies and Tsomides, 1999; Courtemanch *et al.,* 2009). Pollutants such as mercury and dioxin persist in the river, but dioxin levels in fish are showing improvement with a drop from 7.6 parts per trillion in 1984 to less than 0.1 parts per trillion in 2004 (MEDEP, 2005). In addition, increasing numbers of shortnose sturgeon are being found in the river (G. Zydelwski, ME DMR, pers. comm., 2009). Shortnose sturgeon and Atlantic sturgeon are believed to have similar sensitivities to pollutants (Dwyer *et al.,* 2000). Therefore, increasing numbers of shortnose sturgeon in the Penobscot River suggest that water quality in the river is also suitable for supporting Atlantic sturgeon.

In 2003, the Merrimack River was the subject of a watershed assessment conducted by the ACOE and municipalities along the river (ASSRT, 2007). The study noted that the lower basin of the river was highly urbanized with high levels of point and non-point source pollution (USACOE, 2003; ASSRT, 2007). The study also noted impaired dissolved oxygen levels and pH levels (ASSRT, 2007). The Merrimack River watershed in New Hampshire was identified as a mercury hot spot within the region (Evers *et al.,* 2007; ASSRT, 2007). However, despite these water quality assessment results, sampling studies indicate that the shortnose sturgeon population in the river has increased over the last decade. Likewise, anecdotal information indicates that more Atlantic sturgeon are using the mouth of the river now than in years past.

Despite the persistence of contaminants in rivers and increasing land development, many rivers and watersheds within the range of the GOM DPS have demonstrated improvement in water quality (EPA, 2008). In general, the most recent (third edition) EPA Coastal Condition Report identified that water quality was good to fair for waters north of Cape Cod (EPA, 2008).

Rivers and watersheds in the NYB DPS have been similarly affected by industrialization, agriculture, and urbanization that occurred since European colonization. Water quality in the Taunton River has slightly improved since 1970 (Taunton River Journal, 2006; ASSRT, 2007). However, the river still suffers from low dissolved oxygen concentrations in the summer and high ammonia-nitrogen levels (Taunton River Journal, 2006; ASSRT, 2007). Treated wastewater from several municipalities is added to the river daily, the majority of which is produced from a single facility in one city (ASSRT, 2007). There are currently no fish consumption advisories in effect for the Taunton River (ASSRT, 2007).

Water quality on the Connecticut River has improved dramatically in the last 40 years (ASSRT, 2007). It is now swimmable and fishable with some downstream exceptions (T. Savoy, CTDEP, pers. comm., 2006). As a result of the operations of a manufactured gas plant that was located adjacent to the river, there are large, discrete coal tar deposits that occupy an estimated 32.5 acres (13.16 hectares) below the Holyoke Dam. Coal tar leachate has been suspected of impairing sturgeon reproductive success. Kocan *et al.* (1993, 1996) conducted a laboratory study to investigate the survival of shortnose sturgeon eggs and larvae exposed to PAHs, a by-product of coal distillation. Only 5 percent 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. A remediation project was initiated in 2002 to begin removing some of the coal tar deposits from the river. Between 2002 and 2006, 11,714 cubic yards (8,962.5 cubic meters) of coal tar and associated sediments were removed. In

2006, information that was obtained through the removal process and through diver surveys confirmed that the extent of the deposits was much greater than initial estimates. Studies are being conducted to determine if the weathered, hard tar that is present in much of the area is less toxic and mobile than the soft tar and therefore, does not pose the same risk. According to the Massachusetts Department of Environmental Protection, a substantial number of borings were taken in 2008 to identify locations and depths of submerged tar.

Population expansion beginning in the early 1900s in the Hudson River valley increased sewage output to the river, and sewage decomposition produced several areas of inadequate oxygen (oxygen blocks) in the river. Best documented was the oxygen block present in the Albany pool, located north of the Atlantic sturgeon's spawning and nursery habitat (Kahnle *et al.,* 1998). Other oxygen blocks occurred at certain times in the southern stretch of the river from the Tappan Zee Bridge south through New York Harbor (Brosnan and O'Shea, 1997; Kahnle *et al.,* 1998). Improvements to sewage treatment eliminated the problem near Albany by the late 1970s and near New York City by the middle to late 1980s (Kahnle *et al.,* 1998). PCB levels were high throughout much of the river over the last several decades. In recent years, PCB concentrations have declined to acceptable levels according to EPA guidelines, but continual monitoring is needed to document the fate of PCB contamination in the river (Sloan *et al.,* 2005). The shortnose sturgeon population in the Hudson River has increased significantly (Bain *et al.,* 2007) in the last several decades, suggesting that these improvements in water quality have resulted in more suitable habitat conditions for the species and, likely, better habitat conditions for Atlantic sturgeon in the Hudson River as well.

Until recently, poor water quality has been a significant factor affecting fish utilizing the upper tidal portion of the Delaware River estuary. As recent as the early 1970s, dissolved oxygen levels between Wilmington and Philadelphia were routinely below levels that could support aquatic life from late spring to early fall (ASSRT, 2007). Water quality has improved, however, to the extent that dissolved oxygen levels have not dropped below the state's minimum standards at any point during the year since 1990 (R. Green, Delaware DNREC, pers. comm., 1998). As has been observed in other rivers (*e.g.,* Penobscot and Hudson Rivers), the biological status of shortnose sturgeon in the Delaware River appears to be improving and suggests that water quality has improved for Atlantic sturgeon that occur in the Delaware River as well. For example, a portion of the Roebling-Trenton stretch of the river is an EPA Superfund site due to the presence of the Roebling Steel plant and contamination associated with plant operations; the EPA has been considering ways to remove or cap the contamination in the river caused by the plant operations.

The most recent (third edition) EPA Coastal Condition Report identified that water quality was fair overall for waters south of Cape Cod through Delaware (EPA, 2008). However, sampled sites in Massachusetts and Rhode Island were generally scored as good while waters from Connecticut to Delaware received fair and poor ratings (EPA, 2008). In particular, the report noted that most of the Northeast Coast sites with poor water quality ratings were concentrated in a few estuarine systems, including New York/New Jersey Harbor, some tributaries of the Delaware Bay, and the Delaware River (EPA, 2008).

With respect to the CB DPS, the period of Atlantic sturgeon population decline and low abundance in the Chesapeake Bay corresponds to a period of poor water quality caused by increased nutrient loading and increased frequency of hypoxia (Officer *et al.,* 1984; Mackiernan, 1987; Kemp *et al.,* 1992; Cooper and Brush, 1993). The Bay is especially vulnerable to the effects of nutrients due to its large surface area to volume ratio, relatively low exchange rates, and strong vertical stratification during the spring and summer months (ASSRT, 2007). The EPAs Third Coastal Condition Report identified the water quality for the Chesapeake Bay and immediate vicinity (to the Virginia—North Carolina border) as fair to poor (EPA, 2008). In particular, the western and northern tributaries of the Chesapeake Bay were rated as poor (EPA, 2008). The extensive watersheds of this historically unglaciated area funnel nutrients, sediment, and organic material into secluded, poorly flushed estuaries that are more susceptible to eutrophication (EPA, 2008).

Using a multivariable bioenergetics and survival model, Niklitschek and Secor (2005) demonstrated that within the Chesapeake Bay, a combination of low dissolved oxygen, water temperature, and salinity restricts available Atlantic sturgeon habitat to 0–35 percent of the Bay's modeled surface area during the summer. However, they further demonstrated that achieving the EPA's new dissolved oxygen criteria for the Chesapeake Bay would increase Atlantic sturgeon available habitat by 13 percent per year (Niklitschek and Secor, 2005).

In addition to water quality, one of the limiting habitat requirements for the CB DPS of Atlantic sturgeon may be the availability of clean, hard substrate for attachment of demersal, adhesive eggs (Bushnoe *et al.,* 2005; C. Hager, VIMS, pers. comm., 2005). In the Chesapeake Bay watershed, 18th and 19th century agricultural clear cutting (Miller, 1986) contributed large sediment loads that presumably have buried or reduced most sturgeon spawning habitats (reviewed in Bushnoe *et al.,* 2005).

Despite these water quality and sediment issues, Atlantic sturgeon that were stocked in the Bay had very high survival rates, suggesting that the sturgeon are able to adjust to conditions in the Bay or move out of the Bay (*e.g.,* into the rivers draining into the Bay) where water quality is better. In addition, Atlantic sturgeon that originate from other DPSs are often caught in the Bay and documented in the reward program; indicating that the current water quality is not preventing fish from moving into, and foraging in, the Bay.

Climate Change

Although the impacts of global climate change are uncertain, researchers anticipate that the frequency and intensity of droughts and floods will change across the nation (CBS, 2006). The latest report from the Intergovernmental Panel on Climate Change (IPCC) predicts that higher water temperatures and changes in extreme weather events, including floods and droughts, are projected to affect water quality and exacerbate many forms of water pollution, including sediments, nutrients, dissolved organic carbon, pathogens, pesticides, and salt, as well as thermal pollution, with possible negative impacts on ecosystems, human health, and water system reliability and operating costs. The resulting changes in water quality (temperature, salinity, dissolved oxygen, contaminants, etc.) in rivers and coastal waters inhabited by Atlantic sturgeon will likely affect those subpopulations. Effects are expected to be more severe for those subpopulations that occur at the southern extreme of the sturgeon's range, and in areas that are already subject to poor water quality as a result of eutrophication. In a simulation of the effects of water temperature on available Atlantic sturgeon habitat, Niklitschek and Secor (2005) found that a 1 °C increase of water temperature in the Chesapeake

Bay would reduce available sturgeon habitat by 65 percent.

In summary, with the exception of the Merrimack River, dams do not appear to limit Atlantic sturgeon access to spawning habitat. However, it should be noted that accessibility does not equate to functionality. Therefore, while historical spawning habitat may still be available, some of the habitat may no longer be suitable spawning habitat. In particular, water quality, while showing signs of improvement, continues to rate only fair to poor in areas of the NYB DPS and CB DPS. Dredging is known to have removed structures in the James River that are typically associated with Atlantic sturgeon spawning habitat. Nutrient loading and eutrophication of the Chesapeake Bay is expected to get worse with temperature changes and other effects associated with climate change. The SRT concluded that, cumulatively, dams, dredging, turbines, and water quality posed a moderate risk to the GOM, NYB, and CB DPSs. Of the threats to habitat that were considered, water quality was of greatest concern in terms of its contribution to the risk of endangerment for each DPS, overall. Based on the information provided by the SRT as well as information on climate change that was not considered by the SRT, and new information from the EPA on water quality, we concur that water quality is the greatest of the threats affecting the habitat or range of the GOM, NYB, and CB DPSs.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

As previously described, there is no directed commercial or recreational fishery for Atlantic sturgeon in the U.S. Although capture of Atlantic sturgeon on recreational fishing gear (*e.g.,* rod and reel) has occasionally occurred (ASSRT, 2007; P. Linthicum, pers. comm.), in general, recreational fishing gear is not conducive to catching Atlantic sturgeon.

Canadian fisheries for Atlantic sturgeon occur in the Saint Lawrence and Saint John Rivers. Since Atlantic sturgeon of U.S. origin are not expected to occur in areas of the Saint Lawrence and Saint John where the fisheries occur, the Canadian commercial fishery for Atlantic sturgeon is unlikely to capture sturgeon of U.S. origin.

The available information supports that the GOM, NYB, and CB DPSs are not overutilized as a result of educational or scientific purposes. There is no known use of Atlantic sturgeon for educational purposes other than, possibly, limited display in commercial aquaria. Atlantic sturgeon are the subject of scientific research in the wild and in hatcheries, and may be incidentally caught during research for other species such as shortnose sturgeon or assessment of commercial fish stocks. The SRT (2007) reviewed recent and ongoing research studies (from approximately 1988 to 2006) for Atlantic sturgeon in NMFS' Northeast Region. Overall, hundreds of fish have been captured and released and less than 10 mortalities have occurred (ASSRT, 2007). Scientific research of ESA-listed species such as shortnose sturgeon must comply with the permit requirements of the ESA, including measures to minimize the likelihood of injury and death (*e.g.,* short tow times or soak times for collection gear, handling protocols). These measures also minimize the likelihood of harm to Atlantic sturgeon when they are also present. Trawl surveys to assess the status of commercial fish stocks occur throughout the Northeast Region. The surveys typically use short tow times that help to minimize mortality and injuries. Atlantic sturgeon have been caught during such research operations, but there have been no mortalities and all fish were released in good condition (*i.e.,* no apparent injuries) (B. Kramer, NEFSC, pers. comm., 2006).

While directed fisheries for Atlantic sturgeon are prohibited in U.S. waters, Atlantic sturgeon are incidentally caught in other U.S. fisheries. The SRT reviewed information on the commercial bycatch of Atlantic sturgeon in Northeast waters from: (a) Estimates based on NMFS sea sampling/observer data (Stein *et al.,* 2004); (b) data collected as part of Delaware's tagging studies (Shirey *et al.,* 1997); and (c) recapture data reported in the USFWS Atlantic Coast Sturgeon Tagging Database (Eyler *et al.,* 2004). Additional, new information on Atlantic sturgeon bycatch in U.S. sink gillnet and otter trawl fisheries has become available since completion of the SRT report (ASMFC TC, 2007). At the request of the ASMFC, NMFS' Northeast Fisheries Science Center estimated the total bycatch of Atlantic sturgeon in sink gillnet and otter trawl gear based on observer data collected on a portion of commercial fishing trips from Cape Hatteras, NC, through Maine for 2001–2006 (ASMFC TC, 2007). For sink gillnet gear, Atlantic sturgeon bycatch ranged between 2,752 and 7,904 sturgeon annually, averaging about 5,000 sturgeon per year (ASMFC TC, 2007). Atlantic sturgeon bycatch in otter trawl gear similarly ranged between 2,167 and 7,210 sturgeon with an average of about 3,800 fish per year (ASMFC TC, 2007). However, bycatch mortality was markedly different between the two gear types. For sink gillnet fisheries, the estimated annual mortality ranged from 352 to 1,286 Atlantic sturgeon, with an average mortality of 649 sturgeon per year, or 13.8 percent of the annual Atlantic sturgeon bycatch in sink gillnet gear (ASMFC TC, 2007). The total number of Atlantic sturgeon killed in otter trawl gear could not be estimated because of the low number of observed mortalities, indicating a low mortality rate (ASMFC TC, 2007).

Approximately 15 to 19 percent of observed Atlantic sturgeon bycatch in sink gillnet and otter trawl gear in 2001 to 2006 occurred in coastal marine waters north of Chatham, MA (ASMFC TC, 2007). However, since Atlantic sturgeon of different DPSs mix in the marine environment, it is likely that sturgeon other than those belonging to the GOM DPS were caught. Likewise, sturgeon that originate from the GOM DPS are at risk of capture in sink gillnet and otter trawl gear throughout the marine range of the species.

In addition to fisheries occurring in coastal waters, there are limited gill net fisheries for menhaden, alewives, blueback herring, sea herring, and mackerel in the estuarial complex of the Kennebec and Androscoggin Rivers (ASSRT, 2007). State regulations prohibit the use of purse, drag, and stop seines, and gill nets with greater than 87.5 mm stretched mesh (ASSRT, 2007). Fixed or anchored nets must be tended continuously and hauled in and emptied every 2 hours (ASSRT, 2007). There has been no reported or observed bycatch of Atlantic sturgeon in these fisheries.

Approximately 39 to 55 percent of observed Atlantic sturgeon bycatch in sink gillnet and otter trawl gear for 2001 to 2006 occurred in coastal marine waters south of Chatham, MA and north of the Delaware-Maryland border (ASMFC TC, 2007). As described above, since Atlantic sturgeon of different DPSs mix in the marine environment, it is likely that sturgeon other than those belonging to the NYB DPS were caught in this area. Genetic analyses of tissue samples from captured fish have shown that approximately 12 percent of the fish captured in the New York Bight did not belong to the NYB DPS (T. King, unpublished, 2007). Likewise, sturgeon that originate from the NYB DPS are at risk of capture in sink gillnet and otter trawl gear throughout the marine range of the species. Genetic analyses of samples from Atlantic sturgeon caught in Mid-Atlantic sink gillnet gear revealed that the majority of fish originated from the Hudson River (Waldman *et al.,* 1996a; Secor, 2007).

Within the riverine range of the NYB DPS, the use of gillnet gear in the Taunton River, MA, is restricted to nets of no more than 100 feet in length (2.54 m) and nets must be tended at all times (ASSRT, 2007). No overnight sets are allowed (K. Creighton, MA FEW, 2006; ASSRT, 2007). Connecticut imposed a commercial harvest moratorium for Atlantic sturgeon in 1997 (ASSRT, 2007). However, bycatch is known to take place in the commercial shad fishery that operates in the lower Connecticut River from April to June in large mesh (14 cm minimum stretched mesh) gill nets (ASSRT, 2007). Likewise, New York implemented a harvest moratorium for Atlantic sturgeon in 1996, but Atlantic sturgeon bycatch occurs in a shad gill net fishery on the Hudson River (ASSRT, 2007). However, New York State Department of Environmental Conservation (NY DEC) recently proposed to close all American shad fisheries in the Hudson River due to poor stock condition. Regulations to close the fisheries for shad are expected to be implemented by spring of 2010, and would effectively eliminate bycatch of Atlantic sturgeon (K. Hattala, NY DEC, pers. comm., 2009).

Several fisheries using gillnet gear occur in the Delaware Bay, including the striped bass, shad, white perch, Atlantic menhaden, and weakfish fisheries (ASSRT, 2007). The majority of these operate in March and April; bycatch mortality of Atlantic sturgeon during this period is typically low (C. Shirey, DNREC, pers. comm., 2005). For example, of the estimated 85 to 99 Atlantic sturgeon incidentally captured in the Delaware Bay anchored gillnet fisheries for 2002 through 2003, none of the captures resulted in mortality (ASMFC Atlantic Sturgeon Plan Review Team Report, 2004, 2005).

With respect to the CB DPS, the NEFSC analysis indicated that coastal waters south of the Chesapeake Bay to Cape Hatteras, NC, had the second highest number of observed Atlantic sturgeon captures in sink gillnet gear for 2001–2006 (ASMFC TC, 2007). While it is likely that the captured sturgeon originated from more than one DPS (Waldman *et al.,* 1996a; Secor, 2007), the data suggest that fisheries resulting in high levels of Atlantic sturgeon bycatch occur in close proximity to waters used by sturgeon belonging to the CB DPS. Interviews with local fishermen in 2007 indicated that a gillnet fishery for dogfish was known to incidentally catch sturgeon, and that fishery occurred off Chincoteague Island, VA, where more than 30 dead Atlantic sturgeon were found (Virginia Marine Police and Virginia Marine Resources Commission, pers. comm.). The spiny dogfish fishery is managed under a Federal FMP as well as an ASMFC interstate FMP. However, access to the fishery is not limited, and directed effort in the fishery is expected to increase as stock rebuilding objectives are met (ASMFC, 2009). A monkfish fishery using large mesh gillnet gear also occurs in Federal waters off Virginia as well as other Mid-Atlantic and New England states. Atlantic sturgeon entanglements in gear used in the monkfish fishery have been observed in Mid-Atlantic and New England waters (ASMFC, 2007).

In addition to fisheries occurring in marine waters, numerous fisheries operate throughout the Chesapeake Bay (ASSRT, 2007). Juvenile and subadult Atlantic sturgeon are routinely taken as bycatch throughout the Chesapeake Bay in a variety of fishing gears (ASSRT, 2007). The mortality of Atlantic sturgeon bycatch in most of these fisheries is unknown, although low rates of bycatch mortality were reported for the striped bass gill net fishery and the shad fishery within the Bay (Hager, 2006). Of the hundreds of sturgeon held for examination in the Maryland and Virginia reward programs, only a few fish were determined to be in poor physical condition, although it is important to note that the program was designed to examine live specimens for the reward to be granted (J. Skjeveland and A. Spells, FWS, pers. comm., 1998).

In summary, overutilization of Atlantic sturgeon for commercial purposes was likely the primary factor in the historical decline of the GOM, NYB, and CB DPSs. A moratorium on the possession and retention of Atlantic sturgeon for the past 10 years has effectively terminated any directed harvest of Atlantic sturgeon. However, bycatch in Federal and state regulated fisheries continues to occur. Atlantic sturgeon populations can withstand only low rates of anthropogenic (*e.g.,* fishing, bycatch) mortality (ASMFC TC, 2007). Kahnle *et al.* (2007) estimated that sustainable fishing rates on adult Atlantic sturgeon are 5 percent per year, and sustainable fishing rates for sub-adults are lower still (Boreman, 1997; ASMFC, 1998). Thus, the ASMFC TC (2007) concluded that even small rates of bycatch mortality (<5 percent) on sturgeon subpopulations could retard or curtail recovery. The best available information supports that bycatch of Atlantic sturgeon in Federal and state regulated fisheries acts as a significant threat on the GOM, NYB, and CB DPSs because it results in direct mortality. Fisheries known to incidentally catch Atlantic sturgeon occur throughout the marine range of the species and in some riverine waters as well. Therefore, adult and subadult age classes of each DPS are at risk of injury or death resulting from entanglement and/or capture in fishing gear wherever they occur.

Disease or Predation

Very little is known about natural predators of Atlantic sturgeon. The presence of bony scutes is likely an effective adaptation for minimizing predation of sturgeon greater than 25 mm TL (Gadomski and Parsley, 2005; ASSRT, 2007). Documented predators of sturgeon species (*Acipenser* sp.), in general, include sea lampreys, gar, striped bass, common carp, northern pikeminnow, channel catfish, smallmouth bass, walleye, fallfish, grey seal, and sea lion (Scott and Crossman, 1973; Dadswell *et al.,* 1984; Miller and Beckman, 1996; Kynard and Horgan, 2002; Gadomski and Parsley, 2005; Fernandes, 2006; Wurfel and Norman, 2006). Seal predation on shortnose sturgeon in the Penobscot River has been documented (Fernandes, 2008). Seven shortnose sturgeon carcasses found in the Kennebec River in August 2009 also bore wounds consistent with seal predation (A. Lictenwalner, UME, pers. comm., 2009). Although seal predation of Atlantic sturgeon has not been documented, Atlantic sturgeon that are of comparable size to shortnose (*e.g.,* subadult Atlantic sturgeon) may also be susceptible to seal predation.

The presence of introduced flathead catfish has been confirmed in the Delaware and Susquehanna River systems of the NYB and CB DPSs, respectively (Horwitz *et al.,* 2004; Brown *et al.,* 2005). However, there are no indications that the presence of flathead catfish in the Cape Fear River, NC, and Altamaha River, GA (where flatheads have been present for many years) is negatively impacting Atlantic sturgeon in those rivers (ASSRT, 2007).

Disease organisms commonly occur among wild fish populations, but under favorable environmental conditions, these organisms are not expected to cause population-threatening epidemics. There are no known diseases currently affecting any of the Atlantic sturgeon DPSs. A die-off of sturgeon, 13 shortnose and two Atlantic sturgeon, was reported for Sagadahoc Bay, ME, in July 2009, at the same time as a red tide event for the region. The dinoflagellate associated with the red tide event, *Alexandrium fundyense,* is known to produce saxitoxin, which can cause paralytic shellfish poisoning when consumed in sufficient quantity.

Stomach content analysis from the necropsied sturgeon revealed saxitoxin levels of several hundred nanograms per gram (S. Fire, NOAA, pers. comm., 2009). However, saxitoxin cannot be confirmed as the cause of death of the sturgeon, given the lack of information on saxitoxin presence in sturgeon tissues.

There is concern that non-indigenous sturgeon pathogens could be introduced to wild Atlantic sturgeon, most likely through aquaculture operations. Fungal infections and various types of bacteria have been noted to have various effects on hatchery Atlantic sturgeon. Due to the threat of impacts to wild populations, the ASMFC recommends requiring any sturgeon aquaculture operation to be certified as disease-free, thereby reducing the risk of the spread of disease from hatchery origin fish. The aquarium industry is another possible source for transfer of non-indigenous pathogens or non-indigenous species from one geographic area to another, primarily through release of aquaria fish into public waters. With millions of aquaria fish sold to individuals annually, it is unlikely that such activity could ever be effectively regulated. Definitive evidence that aquaria fish could be blamed for transmitting a non-indigenous pathogen to wild fish (sturgeon) populations would be very difficult to collect (J. Coll and J. Thoesen, USFWS, pers. comm., 1998).

Disease and predation are not presently significant threats on the GOM, NYB, or CB DPSs. While there is new evidence of seal predation on shortnose sturgeon in the Penobscot and Kennebec Rivers of the GOM DPS (Fernandes, 2008; A. Lictenwalner, UME, pers. comm., 2009), the number of mortalities is believed to be low and thus, this is a localized threat affecting a small number of fish. Likewise, we would expect that any seal predation of Atlantic sturgeon, if it is occurring, would also be low, given that Atlantic sturgeon spend less time in the rivers/estuaries relative to shortnose sturgeon. There is also new evidence of the presence of saxitoxin in sturgeon tissues. However, saxitoxin presence cannot yet be associated as a cause of injury or mortality for shortnose or Atlantic sturgeon.

Overall, the SRT concluded that there was a “low risk” that the GOM, NYB, or CB DPS was likely to become endangered within the foreseeable future as a result of disease or predation. Although there is some new information regarding disease and predation of shortnose sturgeon for waters within the range of the GOM DPS of Atlantic sturgeon, the new information does not support an increased risk that the GOM DPS of Atlantic sturgeon is likely to become endangered within the foreseeable future as a result of disease or predation.

Inadequacy of Existing Regulatory Mechanisms

As a wide-ranging anadromous species, Atlantic sturgeon are subject to numerous Federal (U.S. and Canadian), state and provincial, and inter-jurisdictional laws, regulations, and agency activities. These regulatory mechanisms are described in detail in the status review report (*see* Section 3.4), and those that impact Atlantic sturgeon the most are highlighted here.

Current regulatory mechanisms have effectively removed threats from legal, directed harvest in the United States. As previously described, the ASMFC manages Atlantic sturgeon through an interstate fisheries management plan that was developed in 1990 (Taub, 1990). The moratorium prohibiting directed catch of Atlantic sturgeon was developed as Amendment 1 to the FMP. The Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA), authorized under the terms of the ASMFC Compact, as amended (Pub. L. 103–206), provides the Secretary of Commerce with the authority to implement regulations in the EEZ, in the absence of an approved Magnuson-Stevens FMP, that are compatible to ASMFC FMPs. It was under this authority that, in 1999, NMFS implemented regulations that prohibit the retention and landing of Atlantic sturgeon bycatch from federally regulated fisheries. NMFS has discretion over the management of federally regulated fisheries and is required to address bycatch for each federally regulated fishery. Therefore, while there are currently no fishery specific regulations in place that address Atlantic sturgeon bycatch, NMFS has the authority and discretion to implement such measures, and has previously used its authority to implement measures to reduce bycatch of protected species in federally-regulated fisheries.

Some fisheries that occur within state waters are also known or suspected of taking Atlantic sturgeon as bycatch. Maine’s regulations prohibit the use of purse, drag, and stop seines, and gill nets with greater than 87.5 mm stretched mesh (ASSRT, 2007). Fixed or anchored nets have to be tended continuously and hauled in and emptied every 2 hours (ASSRT, 2007). As described above, there has been no reported or observed bycatch of Atlantic sturgeon in the limited gill net fisheries for menhaden, alewives, blueback herring, sea herring, and mackerel in the estuarial complex of the Kennebec and Androscoggin Rivers (ASSRT, 2007). However, the level of observer coverage or reporting effort is unknown.

Atlantic sturgeon are also known to be taken as bycatch in the Connecticut and Hudson River shad fisheries (ASSRT, 2007). Current Connecticut regulations appear to be inadequate for addressing this bycatch. In New York, however, the NY DEC closed all shad fisheries in the Hudson River effective March 17, 2010 (NY DEC press release, March 17, 2010), thus, eliminating Atlantic sturgeon bycatch associated with shad fisheries.

Gillnet fisheries for numerous fish species occur in the Chesapeake Bay. Low rates of sturgeon bycatch mortality were reported for the striped bass gill net fishery and the shad staked gill net fishery (Hager, 2006; ASSRT, 2007), although estimates of bycatch in these fisheries as well as other fisheries in the Bay are not available. Since completion of the status review report, Virginia has closed the directed fishery for American shad to allow rebuilding of the stock. Virginia also has various time and gear restrictions for the use of gillnet gear in its tidal waters, including prohibitions on the use of staked or anchored gillnet gear in portions of the James and Rappannock Rivers from April 1 through May 31 (VA MRC Summary of Regulations, 2009), that are likely to benefit Atlantic sturgeon by reducing the likelihood of sturgeon bycatch. Similarly, regulations implemented by NMFS (69 FR 24997, May 5, 2004; 71 FR 36024, June 23, 2006) to reduce sea turtle interactions with pound net gear in the Bay and portions of the surrounding rivers (*e.g.,* James, York, and Rappahannock Rivers) likely reduce the chance that Atlantic sturgeon will be caught in the gear.

Due to existing state and Federal laws, water quality and other habitat conditions have improved in many rivers (EPA, 2008). As described above, dredging is a threat for the GOM, NYB, and CB DPSs of Atlantic sturgeon. Currently, there are no specific regulations requiring action(s) to reduce effects of dredging on Atlantic sturgeon. However, NMFS has the authority and discretion to implement such measures or require modification of dredging activities if Atlantic sturgeon are listed under the ESA.

In summary, State and Federal agencies are actively employing a variety of legal authorities to implement proactive restoration activities for Atlantic sturgeon, and coordination of these efforts is being furnished through the ASMFC. Most states within the riverine and estuarine range of the GOM, NYB, and CB DPSs of Atlantic sturgeon have regulations for their inshore gillnet fisheries that reduce the likelihood of Atlantic sturgeon bycatch mortality in the nets. NMFS has the authority and discretion to implement measures necessary to reduce bycatch of Atlantic sturgeon in federally regulated fisheries, and we expect that such measures would yield significant benefits for Atlantic sturgeon. However, NMFS has not implemented any bycatch reduction measures specifically for Atlantic sturgeon, and existing bycatch reduction measures are inadequate for reducing bycatch of Atlantic sturgeon in federally regulated fisheries. NMFS also has the authority and discretion to require measures to reduce the effects of in-water projects (*e.g.,* dredging, tidal turbine projects) on ESA-listed species. Such measures afford some benefit to Atlantic sturgeon at times and in areas where the ESA-listed species is also present. However, currently, NMFS does not have the authority or discretion to require action to reduce the effects of in-water projects specifically for Atlantic sturgeon. Therefore, Atlantic sturgeon are afforded no protection from the effects of in-water projects if an ESA-listed species is not present. There are no measures to reduce or minimize vessel strikes (discussed in Other Natural or Manmade Factors Affecting the Species' Continued Existence section below) of Atlantic sturgeon, and we currently have limited authority and discretion by which to regulate vessel activities in areas where Atlantic sturgeon occur.

Other Natural or Manmade Factors Affecting the Species Continued Existence

The SRT considered several manmade factors that may affect Atlantic sturgeon, including impingement and entrainment, vessel strikes, and artificial propagation. Along the range of Atlantic sturgeon, most, if not all, subpopulations are at risk of possible entrainment or impingement in water withdrawal intakes for commercial uses, municipal water supply facilities, and agricultural irrigation intakes. Based on the behavior of captive larval Atlantic sturgeon (Kynard and Horgan, 2002), Atlantic sturgeon larvae may be able to avoid intake structures in most cases, since migration is active and occurs near the bottom. Effluence from power plant facilities also has the potential to affect the Atlantic sturgeon DPSs. The release of heated water can benefit sturgeon by providing a thermal refuge during the winter months, but drastic changes in water temperature have the potential to cause mortality. To date, there have been no known Atlantic sturgeon mortalities as a result of effluent discharge of heated water.

Two surveys have been conducted that provide information on the impacts of water withdrawal on Atlantic sturgeon originating from the NYB DPS: (1) Hudson River Utility Surveys, and (2) Delaware River Salem Power Plant survey. The Hudson River has six power plants located between rkm 34–74, which overlap with known nursery grounds for Atlantic sturgeon larvae and early juveniles located at rkm 43–100. Of the six power plants located in this area, the Danskammer, Roseton, Lovett, and Indian Point pose the greatest risk to Atlantic sturgeon, as the Bowline Point power plant is located farther downriver and withdraws water from a collection pond. Intensive surveys (24 hr/day, 4 to 7 days/week, and 10–12 weeks/year during the spring) conducted from 1972–1998 examining entrainment and impingement of fish species reported only 8 entrained sturgeon (larvae) and 63 impinged shortnose sturgeon (majority 200–700 mm) (Applied Science Associates, 1999). Entrained sturgeon were documented only at the Danskammer Point Plant where four shortnose larvae and four unidentified sturgeon yolk sac larvae were observed during the spring in 1983 and 1984. Impingement of sturgeon occurred most often at the Danskammer Point Plant, averaging 4.2–5.2 impinged fish per year, followed by Indian Point (1.5–2.3 fish/year), Roseton (1.5–1.8 fish/year), Bowline Point (0–0.9 fish/year) and Lovett Point (0 fish per year). During the period of 1989 to 1996, five shortnose sturgeon were impinged (0.6/year) from the Roseton and Danskammer plants. However, since 2000 when operational and physical changes were made at these two plants, no impinged Atlantic or shortnose sturgeon have been observed. Bowline Point and Lovett reported zero impingements during this period. Sampling did not occur at Indian Point after 1990 (Shortnose Sturgeon Status Review, in draft).

The Salem Nuclear Generating Station located on the Delaware River also has the potential to take sturgeon species via impingement or entrainment. The trash racks at the Station are required to be inspected every 2 hours from June 1 through October 15. The racks are cleaned three times per week from May 1 to May 31 and October 16 through November 15, and are required to be cleaned daily from June 1 to October 15. Observations are made specifically for sturgeon species during this time. During the remaining months, the trash racks are inspected daily for debris load and cleaned as necessary. From 1978 to 2007, 18 shortnose sturgeon were collected at the cooling water system intake. These fish were all juveniles greater than 400 mm TL. While shortnose sturgeon have been observed at the intakes at the Station, no Atlantic sturgeon have been observed.

Vessel strikes of Atlantic sturgeon have been documented in particular areas. Atlantic sturgeon that occur in locations that support large ports and have relatively narrow waterways seem to be more prone to vessel strikes (*e.g.,* Delaware and James Rivers). Twenty-nine mortalities believed to be the result of vessel strikes were documented in the Delaware River from 2004 to 2008 (Kahnle *et al.,* 2005; Murphy, 2006). At least 13 of these fish were large adults. Given the time of year in which the fish were observed (predominantly May through July, with two in August), it is likely that many of the adults were migrating through the river to the spawning grounds. Based on the external injuries observed, it is suspected that these strikes are from ocean going vessels and not smaller boats, although at least one boater reported hitting a large sturgeon with his small craft (C. Shirey, DNREC, pers. comm., 2005). Recreational vessels are known to have struck and killed shortnose sturgeon in the Kennebec River (G. Wipplehauser, ME DMR, pers. comm., 2009). Therefore, it is likely that Atlantic sturgeon can also suffer mortal injuries when struck by recreational vessels.

In the James River, 11 Atlantic sturgeon were reported to have been struck by vessels from 2005 through 2007 (A. Spells, FWS, pers. comm., 2007). Of the six mortalities, two were mature males (approximate lengths of 154–185 cm fork length (FL)); the other four carcasses were in an advanced state of decay and could not be sexed. However, each of the four was at least as large as the two mature males with one about 215 cm long and another appearing to have been much larger (only a section of the larger fish was retrieved as it had been severed more than once). The propeller marks present on the six fish examined indicated that the wounds were inflicted by both large and small vessels (A. Spells, FWS, pers. comm., 2007). One fish exceeding 154 cm in length had been cut completely in two. Other sources suggest an even higher rate of interaction with at least 16 Atlantic sturgeon mortalities reported for a short reach of the James River during 2007–2008 (Balazik, unpublished, in Richardson *et al.,* 2009).

Artificial propagation of Atlantic sturgeon for use in restoration of extirpated subpopulations or recovery of severely depleted wild subpopulations has the potential to be both a threat to the species and a tool for recovery. In 1991, the FWS Northeast Fisheries Center (NEFC) in Lamar, Pennsylvania began a program to capture, transport, spawn, and culture Atlantic sturgeon. This program was in response to recommendations by the ASMFC in the Atlantic Sturgeon FMP (Taub, 1990) and Special Report No. 22: *Recommendation Concerning the Culture and Stocking of Atlantic Sturgeon* (ASMFC, 1992). The first successful spawn at NEFC was achieved in 1993 using ripe Hudson River broodstock captured by commercial fishermen. Approximately 175 individuals from that year class and others are currently being maintained at NEFC for use in a future broodstock. Subsequent propagation attempts in 1994, 1995, 1996, and 1998 were also successful with as many as 160,000 fry being hatched in one year. The work at Lamar resulted in the publication of the Culture Manual for the Atlantic sturgeon (Mohler, 2004). Since NEFC's first successful spawning in 1993, many requests have been made for excess progeny both inside and outside of the Department of the Interior. These requests were filled only under the condition that a study plan be submitted to NEFC for review by the Center Director and biologists. Study plans were required to include provisions that escapement of cultured sturgeon into the wild would be prevented except where experimental stockings were conducted consistent with Federal and state regulations, and they should include a rigorous evaluation component. Accordingly, over 29,000 artificially propagated juvenile sturgeon have been shipped to 20 different organizations including Federal and state agencies, universities, public aquaria, and independent researchers.

In 1996, the Maryland Department of Natural Resources (MD DNR), FWS, and the University of Maryland-Chesapeake Biological Laboratory stocked the Nanticoke River with 3,300 hatchery-origin juveniles that were obtained from the NEFC. The stocked fish demonstrated good growth and survivability with a 14 percent recapture rate over several years (MD DNR, 2007). MD DNR then began to rear sturgeon with the intention of developing a captive spawning population for use in restoring subpopulations in Maryland. The MD DNR program has been developed using the culture and stocking guidance provided by ASMFC (2006). Approximately 50 fish are currently maintained in the captive brood population.

In summary, vessel strikes are a significant threat affecting the NYB and CB DPSs. Currently, no state or Federal regulations exist to reduce or minimize the likelihood of vessel strikes for Atlantic sturgeon. Artificial propagation and impingement/entrainment of Atlantic sturgeon have a low impact on the GOM, NYB, and CB DPSs and are, therefore, minor threats to each of the three DPSs.

Current Protective Efforts

Current conservation efforts underway to protect and recover Atlantic sturgeon must be evaluated according to the Policy for Evaluation of Conservation Efforts (PECE) and pursuant to section 4(b)(1)(A) of the ESA. The PECE is designed to guide determinations on whether any conservation efforts that have been recently adopted or implemented, but not yet proven to be successful, will result in recovering the species to the point at which listing is not warranted or contribute to forming a basis for listing a species as threatened rather than endangered (68 FR 15101; March 28, 2003). The purpose of PECE is to ensure consistent and adequate evaluation of future or recently implemented conservation efforts identified in conservation agreements, conservation plans, management plans, and similar documents when making listing decisions. The policy is expected to facilitate the development by states and other entities of conservation efforts that sufficiently improve a species' status so as to make listing the species as threatened or endangered unnecessary.

The PECE established two basic criteria: (1) The certainty that the conservation efforts will be implemented and, (2) the certainty that the efforts will be effective. Satisfaction of the criteria for implementation and effectiveness establishes a given protective effort as a candidate for consideration, but does not mean that an effort will ultimately change the risk assessment for the species. Overall, the PECE analysis ascertains whether the formalized conservation effort improves the status of the species at the time a listing determination is made.

The SRT analyzed several conservation efforts potentially affecting Atlantic sturgeon throughout its range. The 1998 Amendment to the ASMFC Atlantic Sturgeon FMP strengthens conservation efforts by formalizing the closure of the directed fishery, and by banning possession of bycatch, eliminating any incentive to retain Atlantic sturgeon. However, bycatch is known to occur in several fisheries (ASMFC TC, 2007), and it is widely accepted that bycatch is underreported (PECE Implementation criterion 5). With respect to its effectiveness, contrary to information available in 1998 when the Amendment was approved, Atlantic sturgeon bycatch mortality is a primary threat affecting the recovery of Atlantic sturgeon, despite actions taken by the states and NMFS to prohibit directed fishing and retention of Atlantic sturgeon. Therefore, there is considerable uncertainty that the Atlantic Sturgeon FMP will be effective in meeting its conservation goals (PECE Effectiveness criterion 1). In addition, there are limited resources for assessing current abundance of spawning females for each of the DPSs. Therefore, PECE effectiveness criterion 5 is not being met.

For the reasons provided above, there is no certainty of implementation and effectiveness of the intended ASMFC FMP conservation effort for the GOM, NYB, or CB DPSs of Atlantic sturgeon.

Multi-State Conservation Program

Three states, Maine, New Hampshire, and Massachusetts, have applied for and have received funding under a new Proactive Species Conservation Program grant. The project, entitled "Multi-State Collaborative to Develop and Implement a Conservation Program for Three Anadromous Fish Species of Concern in the Gulf of Maine," includes proposed research on Atlantic sturgeon within the Kennebec River. Specifically, project participants will: (1) Use acoustic biotelemetry (deploy acoustic arrays) to identify essential Atlantic sturgeon habitat in the Kennebec River/Androscoggin River complex; (2) conduct a mark-and-recapture study using PIT tags to estimate subpopulation size and external Carlin tags to investigate movements beyond the estuary; (3) investigate non-traditional population estimation methods because of spawning periodicity of adult sturgeon; and, (4) obtain tissue samples for sturgeon to conduct genetic analysis and determine stock structure.

The Atlantic sturgeon research component of the Multi-State Conservation Program is expected to provide new information on the GOM DPS of Atlantic sturgeon that could inform management decisions for future conservation efforts. However, the program, including the proposed research for Atlantic sturgeon, does not specifically describe the threats to the Atlantic sturgeon subpopulations in question, and does not address how those threats would be reduced or eliminated (PECE Effectiveness criteria 1–6). Therefore, there is no certainty of implementation and effectiveness of a formalized conservation effort for the Penobscot River subpopulation of Atlantic sturgeon, or for the GOM DPS to which it belongs, as a result of the plan.

Penobscot River Restoration Project (PRRP)

The PRRP is the result of many years of negotiations between Pennsylvania Power and Light (PPL), U.S. Department of the Interior (*e.g.,* FWS, Bureau of Indian Affairs, National Park Service), Penobscot Indian Nation, the State of Maine (*e.g.,* Maine State Planning Office, Inland Fisheries and Wildlife, MDMR), and several non-governmental organizations (NGOs; Atlantic Salmon Federation, American Rivers, Trout Unlimited, Natural Resources Council of Maine, among others). If implemented, the PRRP would lead to the removal of the two lowermost mainstem dams on the Penobscot River (Veazie and Great Works) and would decommission the Howland Dam and construct a nature-like fishway around it. As a result, portions of historical habitat once available to Atlantic sturgeon of the GOM DPS would be reopened. While the necessary funding has been committed by the government and other private donors to achieve the purchase of the dams, a significant amount of money still must be acquired in order for the parties to exercise the option to decommission and remove the Veazie and Great Works dams as well as to construct a nature like fishway for the Howland Dam. Staffing, funding level, funding source, and other resources necessary to fully implement the PRRP are not identified at this time. Therefore, currently, the PRRP does not satisfy criteria one and seven in the certainty of implementation of the PECE. Permitting and regulatory requirements are also uncertain at this stage because they are contingent upon the ability of the parties to raise the full amount of funds necessary, FERC approval of the Trust's permit to surrender the dams, and completion of required environmental review. Thus, the PRRP does not satisfy criterion four of the PECE, which requires that all authorizations (*e.g.,* permits, land owner permission) necessary to implement the conservation effort are identified and that there is a high certainty that the parties to the agreement will obtain all necessary authorizations. Therefore, it is not possible to state at this time with a high level of certainty that this project will be fully implemented.

Hudson River Estuary Management Action Plan

A Hudson River Estuary Management Action Plan was adopted by the NYDEC in May 1996. The goal of this Plan is to protect, restore, and enhance the productivity and diversity of natural resources of the Hudson River estuary to sustain a wide array of present and future human benefits. Multiple projects have been initiated as a response to this Plan. These include: (1) Coastal sampling; (2) juvenile Atlantic sturgeon sonic tracking project; (3) broodstock sonic tagging and PIT tagging to determine broodstock movements and spawning locations; and (4) New York long-term juvenile abundance survey.

The research projects carried out under the Hudson River Estuary Management Action Plan are expected to significantly increase our knowledge of Atlantic sturgeon from the NYB DPS. Such information could help to inform management decisions for future conservation efforts. However, the Plan does not specifically describe the threats to the Hudson River sturgeon subpopulation, and does not reduce or eliminate those threats (PECE Effectiveness criteria 1–6). Therefore, there is no certainty of implementation and effectiveness of a formalized conservation effort for the Hudson River subpopulation of Atlantic sturgeon, or for the NYB DPS to which it belongs, as a result of the plan.

James River Atlantic Sturgeon Restoration Plan

In 2005, private and FWS partners began work to create a James River Atlantic Sturgeon Restoration Plan. The plan outlines several restoration goals to help preserve and recover the James River Atlantic sturgeon subpopulation. These goals include: (1) Identify essential habitats, assess subpopulation status, and refine life history investigations in the James River; (2) protect the subpopulation of James River Atlantic sturgeon and its habitat; (3) coordinate and facilitate exchange of information on James River Atlantic sturgeon conservation and restoration activities; and (4) implement the restoration program. The plan also describes several milestones for reaching these goals. Those of most interest to this review include: (1) Identifying essential habitats and protecting them using regulatory and/or incentive programs; (2) developing and implementing standardized population sampling and monitoring programs; (3) developing population models; (4) developing an experimental culture of James River Atlantic sturgeon; (5) reducing or eliminating incidental mortality; (6) identifying and eliminating known or potentially harmful chemical contaminants that impede the recovery of James River sturgeon; (7) maintaining genetic integrity and diversity of the wild and hatchery-reared stocks; and (8) designating and funding a James River Atlantic sturgeon restoration lead office.

Portions of the plan have already been implemented, including the collection of YOY and adult tissue samples for genetic analysis; electronic tracking of sturgeon to determine preferred habitat use and spawning locations; collecting spine samples to establish age distributions; and establishing a long-term YOY index survey (A. Spells, FWS, pers. comm., 2007). All of these are expected to provide new information on the CB DPS of Atlantic sturgeon that could inform management decisions for future conservation efforts. However, the plan has not been formally approved by regulatory agencies. Therefore, at this time, it is uncertain whether the plan, including necessary regulatory action, funding, and permitting (PECE Implementation criterion 1, 2, 4, and 6–8) will be fully implemented. Information to demonstrate the certainty that the conservation effort will be effective is also lacking (PECE Effectiveness criterion 1–6). Therefore, there is no certainty of implementation and effectiveness of a formalized conservation effort for the James River subpopulation of Atlantic sturgeon, or for the CB DPS of Atlantic sturgeon to which it belongs, as a result of the plan.

Summary of Protective Efforts

Various agencies, groups, and individuals are carrying out a number of efforts aimed at protecting and conserving Atlantic sturgeon belonging to the GOM, NYB, and CB DPSs. These actions are directed at reducing threats faced by Atlantic sturgeon and/or gaining additional knowledge of specific Atlantic sturgeon subpopulations. Such actions could contribute to the recovery of the GOM, NYB, and CB DPSs of Atlantic sturgeon in the future. However, there is still considerable uncertainty regarding the implementation and effectiveness of these efforts, and the extent to which any would reduce the threats to the GOM, NYB, or CB DPSs that are the cause of their (proposed) listing. Therefore, we have determined that none of these protective efforts currently contribute to making it unnecessary to list the GOM, NYB, or CB DPSs of Atlantic sturgeon.

Finding for GOM DPS

As stated previously, the range of the GOM DPS is described as watersheds from the Maine/Canadian border and extending southward to include all associated watersheds draining into the Gulf of Maine as far south as Chatham, MA, as well as all marine waters, including coastal bays and estuaries, from the Bay of Fundy, Canada, to the Saint Johns River, FL (Figure 3).

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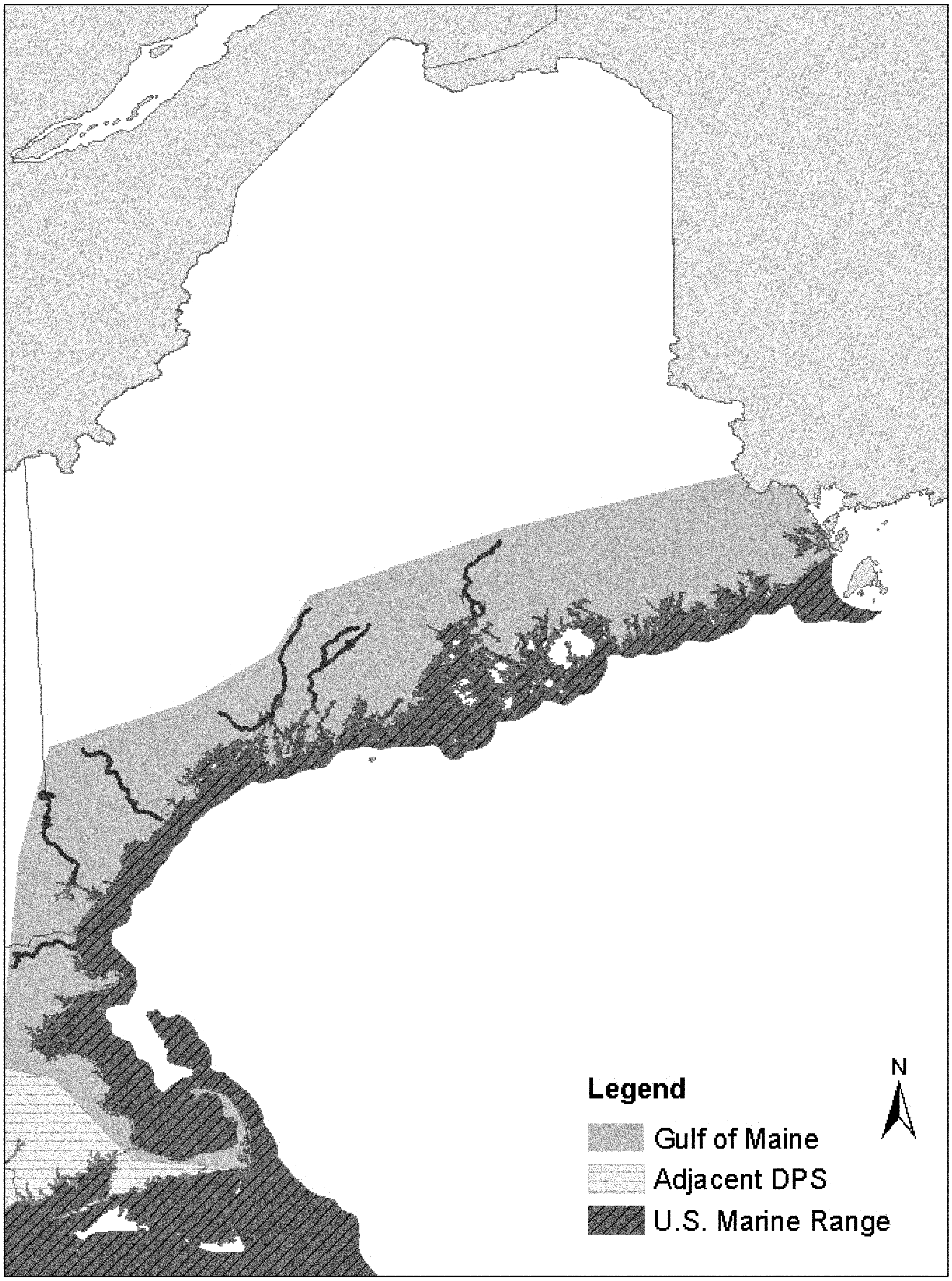

Figure 3: GOM DPS showing rivers (up to the first dam where known) in which the species is known to occur, and a portion of the marine range for the DPS. Shading denotes the general area in which other rivers used by Atlantic sturgeon belonging to the GOM DPS may occur.

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There are no current abundance estimates for the GOM DPS of Atlantic sturgeon. The Kennebec River is currently the only known spawning river for the GOM DPS. The CPUE of subadult Atlantic sturgeon in a multi-filament gillnet survey conducted on the Kennebec River was considerably greater for the period of 1998–2000

(CPUE = 7.43) compared to the CPUE for the period 1977–1981 (CPUE = 0.30). The CPUE of adult Atlantic sturgeon showed a slight increase over the same time period (1977–1981 CPUE = 0.12 versus 1998–2000 CPUE = 0.21) (Squiers, 2004).

Evidence of Atlantic sturgeon spawning in other rivers of the GOM DPS is not available. However, Atlantic sturgeon continue to use these historical spawning rivers and may represent additional spawning groups (ASSRT, 2007). There is also new evidence of Atlantic sturgeon presence in rivers (*e.g.,* the Saco River) where they have not been observed for many years.

The majority of historical Atlantic sturgeon spawning habitat is accessible in all but the Merrimack River of the GOM DPS. Whether Atlantic sturgeon spawning habitat in the GOM DPS is fully functional is difficult to quantify. In terms of threats to habitat, the SRT identified water quality and dredging as threats. While measures do not currently exist to minimize or reduce the impacts of dredging specifically for Atlantic sturgeon, the regulatory mechanisms do exist that would allow the development of such measures.

The SRT ranked bycatch as a primary threat for the GOM DPS of Atlantic sturgeon since it poses an immediate risk of death for the fish, and specific regulatory measures to remove or reduce Atlantic sturgeon bycatch have not been implemented. Subadult and adult Atlantic sturgeon of the GOM DPS may be incidentally caught in fisheries that occur throughout their marine range. Many of the fisheries that result in bycatch of Atlantic sturgeon, including the monkfish gillnet fishery, are federally regulated through FMPs. NMFS is required to reduce bycatch of federally managed fisheries. Therefore, while measures to specifically reduce bycatch of Atlantic sturgeon are not in place, the regulatory mechanisms that would allow the development of such measures do exist.

The SRT considered the factors of section 4(a)(1) of the ESA and concluded that there was a moderate risk (34–50 percent chance) that the GOM DPS of Atlantic sturgeon would become endangered over the next 20 years. However, when considering this information as well as those efforts being made to protect the species, the SRT concluded that there were insufficient data to make a recommendation as to whether listing was warranted.

Since completion of the status review report, we have received new information on Atlantic sturgeon bycatch (ASMFC, 2007) and water quality of the watersheds within the range of the GOM DPS (EPA, 2008). While the new estimates of Atlantic sturgeon bycatch are comparable to those considered by the SRT from Stein *et al.* (2004), new analyses suggest that the level of bycatch mortality is not sustainable for the GOM DPS in the long term (ASMFC, 2007).

With respect to water quality, despite the persistence of contaminants and increasing land development, many rivers and watersheds within the range of the GOM DPS have demonstrated improvement in water quality (EPA, 2008). The most recent EPA Coastal Condition Report identified water quality for coastal waters north of Cape Cod as, generally, fair to good (EPA, 2008).

We further considered what effect low abundance may be having on the GOM DPS. According to DeMaster *et al.* (2004), factors that tend to decrease population growth rates at low levels of abundance result in a process known as "depensation." Depensation occurs, for example, when: (1) It is more difficult for individuals to find mates at low levels of abundance; (2) there is a loss of average fitness because the gene pool tends to be smaller at low levels of abundance; or (3) the species is more vulnerable to catastrophic events because a species is likely to be composed of only one or a few populations at low levels of abundance. When depensatory factors prevail, even with the elimination of anthropogenic threats, the species tends toward extinction.

As described above, there is no abundance estimate for the GOM DPS. Based on information available from Atlantic sturgeon subpopulations of other DPSs, the SRT (2007) suggested that there may be less than 300 spawning adults per year for the Kennebec River subpopulation in the GOM DPS. Presuming that the SRT's assumption is correct and that the current total population abundance is low, we considered whether depensation is currently occurring for the GOM DPS of Atlantic sturgeon. We concluded that it is unlikely that the GOM DPS is currently experiencing depensation given that Atlantic sturgeon of the GOM DPS are being observed in increasing numbers (*e.g.,* in the Kennebec and the Merrimack River estuary) and in areas of the GOM DPS where they have not been observed for many years (*e.g.,* the Saco River). Such observations are uncharacteristic of a subpopulation that is being affected by depensation. In addition, we concluded that Atlantic sturgeon are less susceptible to depensation in comparison to many other species given certain life history characteristics. For example, female Atlantic sturgeon produce a large number of eggs per spawning year (400,000–4 million and potentially as many as 7–8 million; Smith *et al.,* 1982; Van Eenennaam *et al.* 1996; Van Eenennaam and Doroshov, 1998; Dadswell, 2006). Each reproductively active male Atlantic sturgeon is capable of fertilizing the eggs of multiple females within a spawning year and, as a result of natal homing, spawning adults are cued to areas where they can expect to find "mates." These characteristics help to ensure that successful reproduction can still occur even at low levels of abundance. Furthermore, Atlantic sturgeon of a single DPS are temporally and spatially separated depending on age class and reproductive condition. For example, males spawn every 1 to 2 years and females every 3 to 5 years. Spawning occurs over weeks with reproductively active females making relatively short spawning runs, thus minimizing their exposure to catastrophic events that might occur in the spawning rivers. Subadults and non-spawning adults range across a wide area of the marine environment while YOY and juveniles occur in the estuaries of their natal river. These characteristic range and habitat patterns reduce the likelihood that a single catastrophic event (*e.g.,* a flood, drought, red-tide event) would kill or injure a sufficient number of sturgeon across a single or all age classes such that the DPS would become extinct.

We also considered whether the spatial structure of the GOM DPS has been degraded to the extent that the viability of the population is threatened. According to the NMFS report, "Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units" (2000), "a population's spatial structure is made up of both the geographic distribution of individuals in the population and the processes that generate that distribution. A population's spatial structure depends fundamentally on habitat quality, spatial configuration, and dynamics as well as the dispersal characteristics of individuals in the population. As one example of how a degraded spatial structure can threaten the viability of a population, consider a population divided into subpopulations. A population with a high subpopulation extinction rate can persist only if new subpopulations are founded at a rate equal to the rate at which subpopulations naturally go extinct. If human activity interferes with the formation of new subpopulations by restricting straying patterns or destroying habitat patches suitable for colonization, the population will ultimately go extinct as subpopulations blink out one by one. However, there will be a time lag between the disruption of spatial processes and reductions in the abundance or productivity of the population because abundance will not necessarily decline until subpopulations start going extinct.” Based on the best available information, human activity is not restricting straying patterns for Atlantic sturgeon belonging to the GOM DPS or destroying patches suitable for colonization. To the contrary, Atlantic sturgeon of the GOM DPS are being observed in increasing numbers (*e.g.,* in the Merrimack River estuary) and in areas (*e.g.,* the Saco River) where they have not been observed for many years.

In summary, based on the information contained in the status review report and new information on bycatch of Atlantic sturgeon as well as water quality for the watersheds of the GOM DPS, we concur with the SRT that bycatch, water quality, and dredging are the threats affecting the GOM DPS of Atlantic sturgeon. The SRT determined that there was a moderate risk (34–50 percent chance) that the GOM DPS of Atlantic sturgeon would become endangered over the next 20 years. Since completion of the status review report, fish have been documented in rivers where they were previously not reported to occur or where they were suspected of having been extirpated. The new information on water quality (EPA, 2008) indicates that water quality has improved. The new information on bycatch (ASMFC TC, 2007), however, supports that bycatch is having a greater impact on Atlantic sturgeon than that considered by the SRT. Age to maturity for Atlantic sturgeon of the GOM DPS is unknown. However, age at maturity is 11 to 21 years for Atlantic sturgeon originating from the Hudson River (Young *et al.,* 1998), and 22 to 34 years for Atlantic sturgeon that originate from the Saint Lawrence River (Scott and Crossman, 1973). Age at maturity for Atlantic sturgeon of the GOM DPS likely fall within these values given that Atlantic sturgeon subpopulations exhibit clinal variation with faster growth and earlier age to maturity for those that originate from more southern waters, and slower growth and later age to maturity for those that originate from more northern waters. Since there is only one (known) spawning group for the GOM DPS, loss of the spawning group would result in extinction of the DPS.

Given these considerations, including the original determination by the SRT, the best available information indicates the DPS is likely to become an endangered species within the foreseeable future (*i.e.,* a greater than 50 percent chance of becoming endangered over the next 20 years) throughout all or a significant portion of its range due to bycatch, water quality, and dredging. There are several indications of potential for improvement in the status of the DPS, including the following: There have been and continue to be improvements in water quality; regulatory mechanisms to address bycatch exist and could be effectively implemented to reduce associated mortalities; the effects of dredging have been and continue to be addressed for shortnose sturgeon and, therefore, provide indirect benefits for Atlantic sturgeon utilizing the same areas; and there are some indications of increased spatial distribution of Atlantic sturgeon in some areas of the DPS (*e.g.,* use of the Saco River and increased use of the Merrimack River estuary). However, given the on-going threats to the GOM DPS, we conclude that listing as threatened is warranted for the GOM DPS of Atlantic sturgeon.

Finding for NYB DPS

As stated previously, the range of the NYB DPS is described as watersheds that drain into coastal waters, including Long Island Sound, the New York Bight, and Delaware Bay, from Chatham, MA, to the Delaware-Maryland border on Fenwick Island, as well as all marine waters, including coastal bays and estuaries, from the Bay of Fundy, Canada, to the Saint Johns River, FL (Figure 4).

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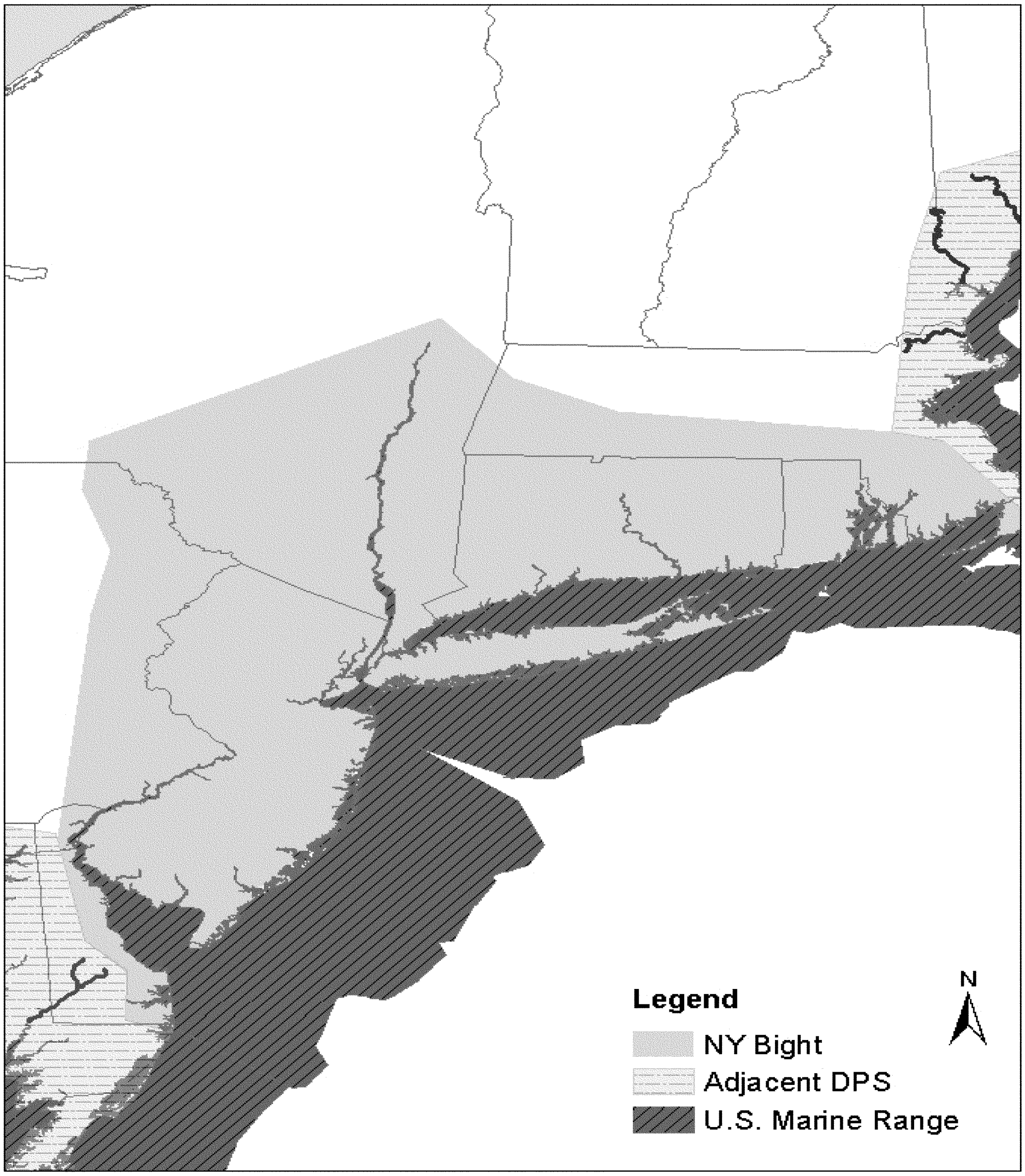

Figure 4: NYB DPS showing rivers (up to the first dam where known) in which the species is known to occur, and a portion of the marine range. Shading denotes the general area in which other rivers used by Atlantic sturgeon belonging to the NYB DPS may occur.

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The only abundance estimate for Atlantic sturgeon belonging to the NYB DPS is 870 spawning adults per year for the Hudson River subpopulation (Kahnle *et al.,* 2007). However, the estimate is based on data collected from 1985–1995 and may underestimate current conditions (Kahnle *et al.,* 2007). Data collected from the Hudson River cannot be used to estimate the total number of adults in the subpopulation 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.

In addition to the Hudson River, Atlantic sturgeon are known to spawn in the Delaware River. Since 1991, more than 2,000 Atlantic sturgeon have been captured and tagged (DNREC, 2009) in the Delaware River. Evidence of Atlantic sturgeon spawning in the Taunton and Connecticut rivers of the NYB DPS is not available. However, Atlantic sturgeon continue to use these rivers (ASSRT, 2007).

The majority of historical Atlantic sturgeon spawning habitat for the NYB DPS is accessible. Whether Atlantic sturgeon spawning habitat in the NYB DPS is fully functional is difficult to quantify. In terms of threats to habitat, the SRT identified water quality and dredging, and in terms of threats affecting the Delaware River subpopulation of the DPS directly, the SRT identified vessel strikes. While contaminants persist, the SRT noted several studies and reports indicating improvements in water quality within the Hudson, Delaware, Taunton, and Connecticut Rivers. Measures do not currently exist to remove or reduce the impacts of dredging and vessel strikes for Atlantic sturgeon. However, the regulatory mechanisms do exist that would allow the development of such measures.

The SRT ranked bycatch as the primary threat for the NYB DPS of Atlantic sturgeon since it poses an immediate risk of death for the fish, and specific regulatory measures to remove or reduce Atlantic sturgeon bycatch have not been implemented. Subadult and adult Atlantic sturgeon of the NYB DPS may be incidentally caught in fisheries that occur throughout their marine range. Many of the fisheries that result in bycatch of Atlantic sturgeon, including the monkfish gillnet fishery, are federally regulated through FMPs. NMFS is required to reduce bycatch of federally managed fisheries. Therefore, while measures to specifically reduce bycatch of Atlantic sturgeon are not in place, the regulatory mechanisms that would allow the development of such measures do exist.

The SRT considered the factors in section 4(a)(1) of the ESA and concluded that there was a moderate (34–50 percent chance) to moderately high risk (greater than 50 percent chance) that the NYB DPS would become endangered over the next 20 years.

Since completion of the status review report, we have received new information on Atlantic sturgeon bycatch (ASMFC, 2007) and water quality for the watersheds within the NYB DPS (EPA, 2008). While the new estimates of Atlantic sturgeon bycatch are comparable to those considered by the SRT from Stein *et al.* (2004), new analyses suggest that the level of bycatch mortality is not sustainable for the NYB DPS in the long term (ASMFC, 2007). With respect to water quality, the most recent EPA Coastal Condition Report identified that coastal water quality was fair overall for waters south of Cape Cod through Delaware (EPA, 2008). However, sampled sites in Massachusetts and Rhode Island were generally scored as good while waters from Connecticut to Delaware received fair and poor ratings (EPA, 2008). In particular, the report noted that most of the Northeast Coast sites that were rated as poor for water quality were concentrated in a few estuarine systems, including New York/New Jersey Harbor, some tributaries of the Delaware Bay, and the Delaware River (EPA, 2008).

Significant increases in abundance and distribution of shortnose sturgeon within the Hudson and Delaware Rivers suggest that improvements in water quality have resulted in benefits to the species. Available evidence further suggests that existing water quality in these rivers and surrounding estuaries is not impeding reproduction of shortnose sturgeon that occur there.

We further considered what effect low abundance may be having on the NYB DPS, and whether the NYB DPS is currently experiencing depensation. As described above, the estimate of 870 spawning adults per year for the Hudson River subpopulation is based on data collected from 1985–1995 (Kahnle *et al.,* 2007). The SRT (2007) suggested that there may be less than 300 spawning adults per year for the Delaware subpopulation of the NYB DPS. We concluded that it is unlikely that the Hudson River subpopulation of the NYB DPS is currently experiencing depensation given the available population estimate which suggests an adult spawning population of close to 1,000 sturgeon. We were unable to make a conclusion as to whether depensation is likely occurring for the Delaware subpopulation of the NYB DPS. Evidence of age-0 fish in the Delaware River in 2009 indicates that spawning continues to occur in that river. Ongoing studies may help to elucidate the abundance and/or trend in abundance of this subpopulation. However, that information is not yet available. As described in the finding for the GOM DPS, we have concluded that certain Atlantic sturgeon life history characteristics help to reduce the likelihood that depensation will occur. Thus, we expect that depensation for Atlantic sturgeon would occur at a lower level of abundance in comparison to a species that did not share these characteristics.

We also considered whether the spatial structure of the NYB DPS has been degraded to the extent that the viability of the population is threatened. Based on the best available information, human activity is not restricting straying patterns for Atlantic sturgeon belonging to the Hudson River subpopulation of the NYB DPS. It is unclear, however, to what extent human activity is restricting straying patterns of sturgeon belonging to the Delaware subpopulation of the NYB DPS, given the very limited information on abundance and the known threats affecting this subpopulation (*i.e.,* bycatch, water quality, dredging and vessel strikes).

In summary, based on the information contained in the status review report and new information on bycatch of Atlantic sturgeon and water quality for the watersheds of the NYB DPS, we concur with the SRT that bycatch, water quality, dredging, and vessel strikes act as significant threats affecting the NYB DPS of Atlantic sturgeon. The SRT determined that there was a moderate (34–50 percent chance) to moderately high risk (greater than 50 percent chance) that the NYB DPS would become endangered over the next 20 years. The new information on water quality for the area covered by the NYB DPS (EPA, 2008) is similar to that considered by the SRT for the status report. The new information on bycatch (ASMFC TC, 2007), however, supports that bycatch is having a greater impact on Atlantic sturgeon than that considered by the SRT. Additionally, since completion of the status review report, a dredging project to deepen the Delaware shipping channel in an area where Atlantic sturgeon is suspected to occur has been proposed and is in the process of attaining necessary approvals. Age to maturity for NYB DPS Atlantic sturgeon is 11 to 21 years (Young *et al.,* 1998; DNREC, 2009). Given that there are two spawning groups for the NYB DPS, loss of one spawning group will not result in the immediate extinction of the NYB DPS. Nevertheless, the loss of either spawning group would result in loss of spatial structure for the DPS as well as numbers of fish to support spawning. Therefore, both spawning groups are essential to the DPS.

Given these considerations, we find that the best available information does support that the NYB DPS is in danger of extinction throughout all or a significant portion of its range. There are several indications of potential for improvement in the status of the DPS, including the following: Regulatory mechanisms to address bycatch exist and could be effectively implemented to reduce associated mortalities; and the effects of dredging have been and continue to be addressed for shortnose sturgeon and, therefore, provide indirect benefits for Atlantic sturgeon where these species co-occur. However, given the ongoing threats to the NYB DPS, we conclude that listing as endangered is warranted for the NYB DPS of Atlantic sturgeon.

Finding for CB DPS

As stated previously, the range of the CB DPS is described as watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, VA, as well as all marine waters, including coastal bays and estuaries, from the Bay of Fundy, Canada, to the Saint Johns River, FL (Figure 5).

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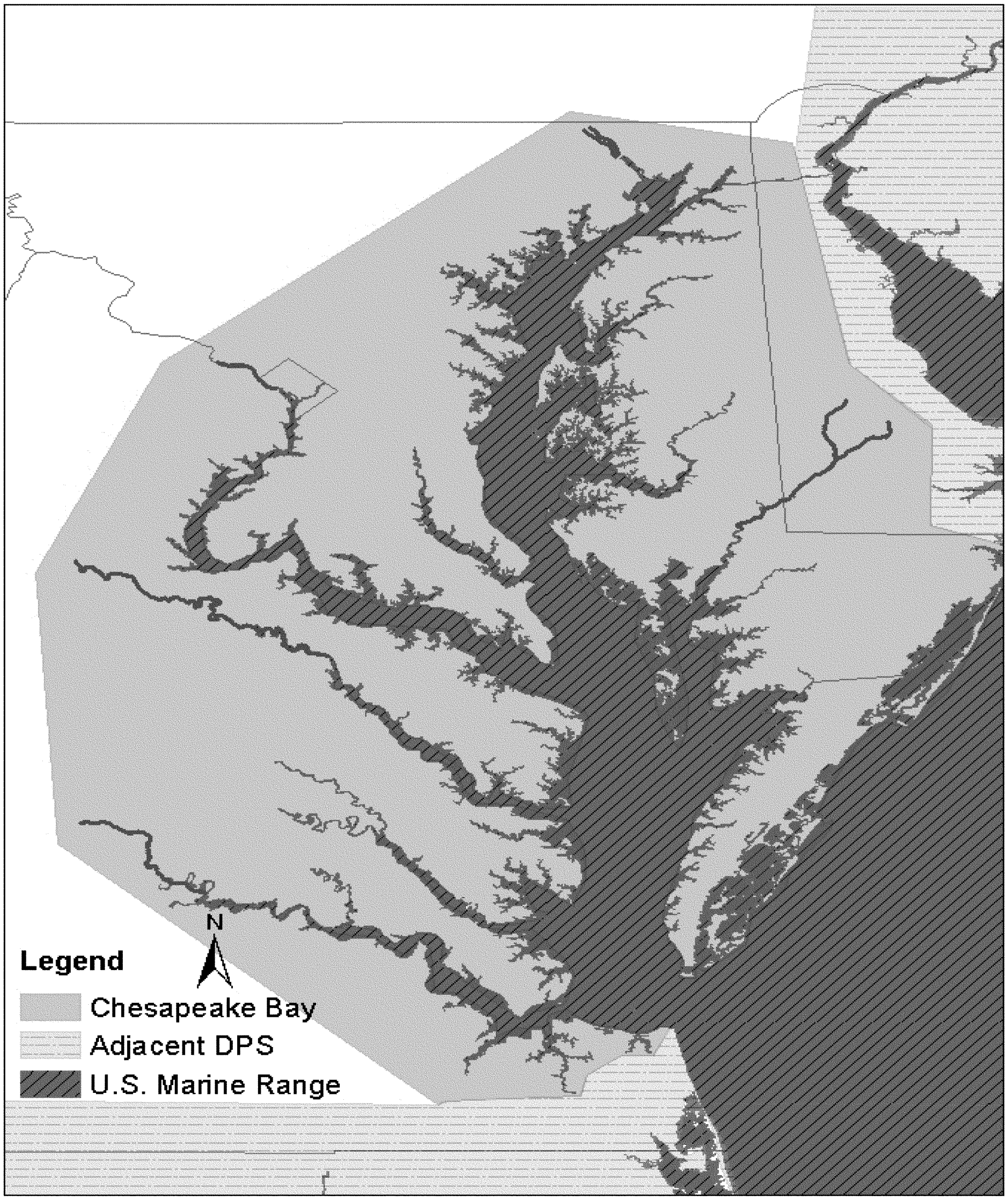

Figure 5: CB DPS showing rivers (up to the first dam where known) in which the species is known to occur, and a portion of the marine range for the DPS. Shading denotes the general area in which other rivers used by Atlantic sturgeon belonging to the CB DPS may occur.

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There are no current abundance estimates for the CB DPS. As previously stated, the FWS has been funding the Maryland Reward Program since 1996; this program has resulted in the documentation of over 1,133 wild Atlantic sturgeon. Virginia also instituted an Atlantic sturgeon reward program in the Chesapeake Bay in 1997 and 1998 (Spells, 2007). This reward program documented and measured 295 Atlantic sturgeon. However, since sturgeon from multiple DPSs occur in the Chesapeake Bay, it is unlikely that all of the sturgeon captured originated from the CB DPS.

Atlantic sturgeon of the CB DPS are known to spawn in the James River. Clear evidence of Atlantic sturgeon spawning in other rivers of the CB DPS is not available. However, Atlantic sturgeon continue to use these rivers, and may represent additional spawning groups (ASSRT, 2007). In particular, commercial fishers have regularly reported observations of YOY or age-1 juveniles in the York River over the past few years (K. Place, Commercial Fisherman, pers. comm., 2006). Analyses of samples collected from Atlantic sturgeon juveniles in the James and York Rivers also demonstrated genetic differences between the sampled groups. The observations and genetic results suggest that spawning may be occurring in the York River.

The majority of historical Atlantic sturgeon spawning habitat for the CB DPS is accessible. Although dams are present, most are located upriver of where spawning is expected to have historically occurred. Whether Atlantic sturgeon spawning habitat in the CB DPS is fully functional is difficult to quantify. In terms of threats to habitat, the SRT identified water quality and dredging, and in terms of direct threats to the CB DPS, the SRT identified vessel strikes. Initiatives have been called for to address the condition of the Chesapeake Bay (Executive Order, May 12, 2009; NOAA's Chesapeake Bay Protection and Restoration Final Strategy, 2010). Niklitschek and Secor (2005) demonstrated that achieving the EPA's dissolved oxygen criteria for the Chesapeake Bay would increase Atlantic sturgeon available habitat by 13 percent per year (Niklitschek and Secor, 2005). Measures do not currently exist to remove or reduce the impacts of dredging and vessel strikes specifically for Atlantic sturgeon. However, the regulatory mechanisms that would allow the development of such measures do exist.

The SRT ranked bycatch as a primary threat for the CB DPS of Atlantic sturgeon because it poses an immediate risk of death for the fish, and specific regulatory measures to remove or reduce Atlantic sturgeon bycatch have not been implemented. Subadult and adult Atlantic sturgeon of the CB DPS may be incidentally caught in fisheries that occur throughout their marine range. Many of the fisheries that result in bycatch of Atlantic sturgeon, including the monkfish gillnet fishery, are federally regulated through FMPs. NMFS is required to reduce bycatch in federally managed fisheries. Therefore, while measures to specifically reduce bycatch of Atlantic sturgeon are not in place, the regulatory mechanisms that would allow the development of such measures do exist.

The SRT considered the factors in section 4(a)(1) of the ESA and concluded that there was a moderately high risk (greater than 50 percent chance) that the CB DPS would become endangered over the next 20 years.

Since completion of the status review report, we have received new information on the bycatch of Atlantics sturgeon (ASMFC, 2007) and water quality of the watersheds within the CB DPS (EPA, 2008). While the new estimates of Atlantic sturgeon bycatch are comparable to those considered by the SRT from Stein *et al.* (2004), new analyses suggest that the level of bycatch mortality is not sustainable for the CB DPS in the long term (ASMFC, 2007). With respect to water quality, the most recent EPA Coastal Condition Report identified water quality as fair to poor for the Chesapeake Bay and immediate vicinity (to the Virginia-North Carolina border) (EPA, 2008). In particular, the western and northern tributaries of the Chesapeake Bay were rated as poor (EPA, 2008). The Bay is especially vulnerable to the effects of nutrients due to its large surface area to volume ratio, relatively low exchange rates, and strong vertical stratification during the spring and summer months (ASSRT, 2007). The extensive watersheds of this historically unglaciated area funnel nutrients, sediment, and organic material into secluded, poorly flushed estuaries that are more susceptible to eutrophication (EPA, 2008).

We further considered what effect low abundance may be having on the CB DPS, and whether the CB DPS is currently experiencing depensation. As described above, there is no abundance estimate for the CB DPS. Based on information available from Atlantic sturgeon subpopulations of other DPSs, the SRT (2007) suggested that there may be less than 300 spawning adults per year for the CB DPS. Presuming that the SRT's assumption is correct and assuming that the current total population abundance is low, we considered whether the CB DPS is currently experiencing depensation. We concluded that it is unlikely that the CB DPS is currently experiencing depensation, given that increasing numbers of Atlantic sturgeon belonging to the CB DPS are being observed (Garman and Balazik, unpub. data in Richardson *et al.,* 2009). Such observations are uncharacteristic of a population that is experiencing depensation. In addition, as described in the finding for the GOM DPS, we have concluded that certain Atlantic sturgeon life history characteristics help to reduce the likelihood that depensation will occur. Thus, we expect that depensation for Atlantic sturgeon would occur at a lower level of abundance in comparison to species that did not share these characteristics.

We also considered whether the spatial structure of the CB DPS has been degraded to the extent that the viability of the population is threatened. Observations of increased numbers of juvenile and adult Atlantic sturgeon suggest that human activity is not significantly restricting straying patterns for Atlantic sturgeon belonging to the CB DPS. However, the evidence is not conclusive, given the very limited information on abundance and distribution of Atlantic sturgeon in the tributaries to the Bay, and the known threats affecting the DPS (*i.e.,* bycatch, water quality, dredging, and vessel strikes).

In summary, based on the information contained in the status review report and new information on bycatch of Atlantic sturgeon and water quality for the watersheds of the CB DPS, we concur with the SRT that bycatch, water quality, dredging, and vessel strikes act as significant threats affecting the CB DPS of Atlantic sturgeon. The SRT determined that there was a moderately high risk (greater than 50 percent chance) that the CB DPS would become endangered over the next 20 years. The new information on water quality for the area covered by the CB DPS (EPA, 2008) is similar to that considered by the SRT for the status review report. In addition, the new information on bycatch (ASMFC TC, 2007) supports that bycatch is having a greater impact on Atlantic sturgeon than that considered by the SRT. Age at maturity for Atlantic sturgeon originating from the Chesapeake Bay DPS is unknown. However, age at maturity is 5 to 19 years for Atlantic sturgeon originating from South Carolina rivers (Smith *et al.,* 1982), and 11 to 21 years for Atlantic sturgeon originating from the Hudson River (Young *et al.,* 1998). Age at maturity for Atlantic sturgeon of the CB DPS likely fall within these values given that Atlantic sturgeon subpopulations exhibit clinal variation with faster growth and earlier age to maturity for those that originate from more southern waters, and slower growth and later age to maturity for those that originate from more northern waters. Since there is only one (known) spawning river for the CB DPS, loss of that spawning group would result in extinction of the DPS.

Given these considerations, we find that the best available information does support that the CB DPS is in danger of extinction throughout all or a significant portion of its range. There are several indications of potential for improvement in the status of the DPS, including the following: Regulatory mechanisms to address bycatch exist and could be effectively implemented to reduce associated mortalities; and the effects of dredging have been and continue to be addressed for shortnose sturgeon and, therefore, provide indirect benefits for Atlantic sturgeon where these species co-occur. However, given the ongoing threats to the CB DPS, we conclude that listing as endangered is warranted for the CB DPS of Atlantic sturgeon.

Role of Peer Review

In December 2004, the Office of Management and Budget (OMB) issued a Final Information Quality Bulletin for Peer Review establishing minimum peer review standards, a transparent process for public disclosure of peer review planning, and opportunities for public participation. The OMB Bulletin, implemented under the Information Quality Act (Pub. L. 106–554), is intended to enhance the quality and credibility of the Federal government's scientific information, and applies to influential or highly influential scientific information disseminated on or after June 16, 2005. To satisfy our requirements under the OMB Bulletin, the Atlantic sturgeon status review report was peer reviewed by six experts in the field, with their substantive comments incorporated in the final status review report.

On July 1, 1994, the NMFS and USFWS published a series of policies regarding listings under the ESA, including a policy for peer review of scientific data (59 FR 34270). The intent of the peer review policy is to ensure that listings are based on the best scientific and commercial data available. Prior to a final listing, NMFS will solicit the expert opinions of three qualified specialists selected from the academic and scientific community, Federal and State agencies, and the private sector on listing recommendations to ensure the best biological and commercial information is being used in the decisionmaking process, as well as to ensure that reviews by recognized experts are incorporated into the review process of rulemakings developed in accordance with the requirements of the ESA.

Effects of Listing

Conservation measures provided for species listed as endangered or threatened under the ESA include recovery actions (16 U.S.C. 1533(f)), critical habitat designations, Federal agency consultation requirements (16 U.S.C. 1536), and prohibitions on taking (16 U.S.C. 1538). Recognition of the species' plight through listing promotes conservation actions by Federal and state agencies, private groups, and individuals. Should the proposed listings be made final, a recovery program would be implemented, and critical habitat may be designated. Federal, state, and the private sectors will need to cooperate to conserve listed Atlantic sturgeon and the ecosystems upon which they depend.

Critical habitat is defined in section 3 of the ESA (16 U.S.C. 1532(3)) as: (1) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the ESA, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by a species at the time it is listed upon a determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures needed to bring the species to the point at which listing under the ESA is no longer necessary. Section 4(a)(3)(a) of the ESA (16 U.S.C. 1533(a)(3)(A)) requires that, to the extent prudent and determinable, critical habitat be designated concurrently with the listing of a species. If we determine that it is prudent and determinable, we will publish a proposed designation of critical habitat for Atlantic sturgeon in a separate rule. Public input on features and areas that may meet the definition of critical habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs is invited.

Identifying the DPS(s) Potentially Affected by an Action During Section 7 Consultation

The GOM, NYB, and CB DPSs are distinguished based on genetic data and spawning locations. However, extensive mixing of the populations occurs in coastal waters. Therefore, the distributions of the DPSs outside of natal waters generally overlap with one another, and with fish from Southeast river populations. This presents a challenge in conducting ESA section 7 consultations because fish from any DPS could potentially be affected by a proposed project. Project location alone will likely not inform the section 7 biologist as to which populations to consider in the analysis of a project's potential direct and indirect effects on Atlantic sturgeon and their habitat. This will be especially problematic for projects where take could occur because it is critical to know which Atlantic sturgeon population(s) to include in the jeopardy analysis. One conservative, but potentially cumbersome, method would be to analyze the total anticipated take from a proposed project as if all Atlantic sturgeon came from a single DPS and repeat the jeopardy analysis for each DPS the taken individuals could have come from. However, recently funded research may shed some light on the composition of mixed stocks of Atlantic sturgeon, relative to their rivers of origin, in locations along the East Coast. The specific purpose of the study is to evaluate the vulnerability to coastal bycatch of Hudson River Atlantic sturgeon, thought to be the largest stock contributing to coastal aggregations from the Bay of Fundy to Georgia. However, the mixed stock analysis will also allow NMFS to better estimate a project's effects on different components of a mixed stock of Atlantic sturgeon in coastal waters or estuaries other than where they were spawned. Results from the study are expected in February 2011. Genetic mixed stock analysis, such as proposed in this study, requires a high degree of resolution among stocks contributing to mixed aggregations and characterization of most potential contributory stocks. Fortunately, almost all extant populations, at least those with reasonable population sizes, have been characterized in previous genetic studies, though some additional populations will be characterized in this study. Genetic testing of mixed stocks will be conducted in eight coastal locales in both the Northeast and Southeast Regions. Coastal fisheries and sites were selected based on sample availabilities, bycatch concerns, and specific biological questions (*i.e.,* real uncertainty as to stock origins of the coastal aggregation). We are specifically seeking public input on the mixing of fish from different DPSs in parts of their ranges, particularly in the marine environment.

Identification of Those Activities That Would Constitute a Violation of Section 9 of the ESA

On July 1, 1994, we and USFWS published a policy to identify, to the maximum extent possible, those activities that would or would not constitute a violation of section 9 of the ESA (59 FR 34272). The intent of this policy is to increase public awareness of the effect of this listing on proposed and ongoing activities within the species' range. We will identify, to the extent known at the time of the final rule, specific activities that will not be considered likely to result in violation of section 9, as well as activities that will be considered likely to result in violation. Activities that we believe could result in violation of section 9 prohibitions against "take" of the Atlantic sturgeon in the NYB and CB DPSs include, but are not limited to, the following: (1) Bycatch associated with commercial and recreational fisheries; (2) poaching of individuals for meat or caviar; (3) marine vessel strikes; (4) destruction of riverine, estuarine, and marine habitat through such activities as agricultural and urban development, commercial activities, diversion of water for hydropower and public consumption, and dredge and fill operations; (5) impingement and entrainment in water control structures; (6) unauthorized collecting or handling of the species (permits to conduct these activities are available for purposes of scientific research or to enhance the propagation or survival of the DPSs); (7) releasing a captive Atlantic sturgeon into the wild; and (8) harming captive Atlantic sturgeon by, among other things, injuring or killing them through veterinary care, research, or breeding activities outside the bounds of normal animal husbandry practices. We intend to undergo a rulemaking process under section 4(d) to issue protective regulations for the GOM DPS, which is being proposed as threatened under the ESA, and it is likely that these same activities would result in violation of take prohibitions that we may extend to the GOM DPS in such a section 4(d) rule.

We believe that, based on the best available information, the following actions will not result in a violation of section 9: (1) Possession of Atlantic sturgeon acquired lawfully by permit issued by NMFS pursuant to section 10 of the ESA, or by the terms of an incidental take statement in a biological opinion pursuant to section 7 of the ESA; (2) Federally approved projects that involve activities such as agriculture, managed fisheries, road construction, discharge of fill material, stream channelization, or diversion for which consultation under section 7 of the ESA has been completed, and when such activity is conducted in accordance with any terms and conditions given by NMFS in an incidental take statement in a biological opinion pursuant to section 7 of the ESA; (3) continued possession of live Atlantic sturgeon that were in captivity or in a controlled environment (*e.g.,* in aquaria) at the time of this listing, so long as the prohibitions under an ESA section 9(a)(1) are not violated. If listed, NMFS will provide contact information for facilities to submit information on Atlantic sturgeon in their possession, to establish their claim of possession; and (4) provision of care for live Atlantic sturgeon that were in captivity at the time of this listing.

Section 9(b)(1) of the ESA provides a narrow exemption for animals held in captivity at the time of listing: Those animals are not subject to the import/export prohibition or to protective regulations adopted by the Secretary, so long as the holding of the species in captivity, before and after listing, is not in the course of a commercial activity; however, 180 days after listing, there is a rebuttable presumption that the exemption does not apply. Thus, in order to apply this exemption, the burden of proof for confirming the status of animals held in captivity prior to listing lies with the holder. The section 9(b)(1) exemption for captive wildlife would not apply to any progeny of the captive animals that may be produced post-listing.

References Cited

A complete list of the references used in this proposed rule is available upon request (*see* **ADDRESSES**).

Classification

National Environmental Policy Act

The 1982 amendments to the ESA, in section 4(b)(1)(A), restrict the information that may be considered when assessing species for listing. Based on this limitation of criteria for a listing decision and the opinion in *Pacific Legal Foundation* v. *Andrus,* 675 F. 2d 825 (6th Cir. 1981), NMFS has concluded that ESA listing actions are not subject to the environmental assessment requirements of the National Environmental Policy Act (NEPA). (*See* NOAA Administrative Order 216–6.)

Executive Order 12866, Regulatory Flexibility Act and Paperwork Reduction Act

As noted in the Conference Report on the 1982 amendments to the ESA, economic impacts cannot be considered when assessing the status of a species. Therefore, the economic analysis requirements of the Regulatory Flexibility Act are not applicable to the listing process. In addition, this proposed rule is exempt from review under Executive Order 12866. This proposed rule does not contain a collection-of-information requirement for the purposes of the Paperwork Reduction Act.

Federalism

E.O. 13132 requires agencies to take into account any federalism impacts of regulations under development. It includes specific consultation directives for situations where a regulation will preempt state law, or impose substantial direct compliance costs on state and local governments (unless required by statute). Pursuant to the Executive Order on Federalism, E.O. 13132, the Assistant Secretary for Legislative and Intergovernmental Affairs will provide notice of the proposed action and request comments from the governors of the states in which the three DPSs proposed to be listed occur.

Environmental Justice

Executive Order 12898 requires that Federal actions address environmental justice in decision-making process. In particular, the environmental effects of the actions should not have a disproportionate effect on minority and low-income communities. The proposed listing determination is not expected to have a disproportionately high effect on minority populations or low-income populations.

Coastal Zone Management Act (16 U.S.C. 1451 et seq.)

Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 requires that all Federal activities that affect any land or water use or natural resource of the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. NMFS has determined that this action is consistent to the maximum extent practicable with the enforceable policies of approved Coastal Zone Management Programs of each of the states within the range of the three DPSs. Letters documenting NMFS' determination, along with the proposed rule, were sent to the coastal zone management program offices in each affected state. A list of the specific state contacts and a copy of the letters are available upon request.

List of Subjects

50 CFR Part 223

Administrative practice and procedure, Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

50 CFR Part 224

Endangered and threatened species, Exports, Imports.

Dated: September 23, 2010.

Eric C. Schwaab,

Assistant Administrator for Fisheries, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR parts 223 and 224 are proposed to be amended as follows:

PART 223—THREATENED MARINE AND ANADROMOUS SPECIES

1. The authority citation for part 223 continues to read as follows:

Authority: 16 U.S.C. 1531–1543; subpart B, § 223.201–202 also issued under 16 U.S.C. 1361 *et seq.;* 16 U.S.C. 5503(d) for § 223.206(d)(9).

2. In § 223.102, paragraph (c)(29) is added to read as follows:

§ 223.102 Enumeration of threatened marine and anadromous species.

* * * * *

Species[1]		Where listed	Citation(s) for listing determination(s)	Citation(s) for critical habitat designation(s)
Common name	Scientific name			
*	*	* * *	*	*
(c) * * *				
(29) Atlantic Sturgeon—Gulf of Maine DPS*.	*Acipenser oxyrinchus oxyrinchus*.	Gulf of Maine Distinct Population Segment. The GOM DPS includes the following: All anadromous Atlantic sturgeon whose range occurs in watersheds from the Maine/Canadian border and extending southward to include all associated watersheds draining into the Gulf of Maine as far south as Chatham, MA, as well as wherever these fish occur in coastal bays and estuaries and the marine environment. Within this range, Atlantic sturgeon have been documented from the following rivers: Penobscot, Kennebec, Androscoggin, Sheepscot, Saco, Piscataqua, and Merrimack. The marine range of Atlantic sturgeon from the GOM DPS extends from the Bay of Fundy, Canada to the Saint Johns River, FL. The GOM DPS also includes Atlantic sturgeon held in captivity (*e.g.,* hatcheries, scientific institutions) and which are identified as fish belonging to the GOM DPS based on genetics analyses, previously applied tags, previously applied marks, or documentation to verify that the fish originated from (hatched in) a river within the range of the GOM DPS, or is the progeny of any fish that originated from a river within the range of the GOM DPS.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	
*	*	* * *	*	*

[1] Species includes taxonomic species, subspecies, distinct population segments (DPSs) (for a policy statement, *see* 61 FR 4722, February 7, 1996), and evolutionarily significant units (ESUs) (for a policy statement, *see* 56 FR 58612, November 20, 1991).

* * * * *

PART 224—ENDANGERED MARINE AND ANADROMOUS SPECIES

3. The authority citation for part 224 continues to read as follows:

Authority: 16 U.S.C. 1531–1543 and 16 U.S.C. 1361 *et seq.*

4. In § 224.101(a), amend the table by adding entries for Atlantic Sturgeon–New York Bight DPS, and Atlantic Sturgeon–Chesapeake Bay DPS at the end of the table to read as follows:

§ 224.101 Enumeration of endangered marine and anadromous species

* * * * *

(a) * * *

Species[1]		Where listed	Citation(s) for listing determination(s)	Citation(s) for critical habitat designation(s)
Common name	Scientific name			
*	*	* * *	*	*
Atlantic Sturgeon—New York Bight DPS.	*Acipenser oxyrinchus oxyrinchus*.	New York Bight Distinct Population Segment. The NYB DPS includes the following: All anadromous Atlantic sturgeon whose range occurs in the watersheds that drain into coastal waters, including Long Island Sound, the New York Bight, and Delaware Bay, from Chatham, MA to the Delaware-Maryland border on Fenwick Island. Within this range, Atlantic sturgeon have been documented from the Hudson and Delaware rivers as well as at the mouth of the Connecticut and Taunton rivers, and throughout Long Island Sound. The marine range of Atlantic sturgeon from the NYB DPS extends from the Bay of Fundy, Canada to the Saint Johns River, FL. The NYB DPS also includes Atlantic sturgeon held in captivity (*e.g.,* hatcheries, scientific institutions) and which are identified as fish belonging to the NYB DPS based on genetics analyses, previously applied tags, previously applied marks, or documentation to verify that the fish originated from (hatched in) a river within the range of the NYB DPS, or is the progeny of any fish that originated from a river within the range of the NYB DPS.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	NA
Atlantic Sturgeon—Chesapeake Bay DPS.	*Acipenser oxyrinchus oxyrinchus*.	Chesapeake Bay Distinct Population Segment. The CB DPS includes the following: All anadromous Atlantic sturgeon whose range occurs in the watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, VA, as well as wherever these fish occur in coastal bays and estuaries and the marine environment. Within this range, Atlantic sturgeon have been documented from the James, York, Potomac, Rappahannock, Pocomoke, Choptank, Little Choptank, Patapsco, Nanticoke, Honga, and South rivers as well as the Susquehanna Flats. The marine range of Atlantic sturgeon from the CB DPS extends from the Bay of Fundy, Canada to the Saint Johns River, FL. The CB DPS also includes Atlantic sturgeon held in captivity (*e.g.,* hatcheries, scientific institutions) and which are identified as fish belonging to the CB DPS based on genetics analyses, previously applied tags, previously applied marks, or documentation to verify that the fish originated from (hatched in) a river within the range of the CB DPS, or is the progeny of any fish that originated from a river within the range of the CB DPS.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	NA

[1] Species includes taxonomic species, subspecies, distinct population segments (DPSs) (for a policy statement, *see* 61 FR 4722, February 7, 1996), and evolutionarily significant units (ESUs) (for a policy statement, *see* 56 FR 58612, November 20, 1991).

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[FR Doc. 2010–24459 Filed 10–5–10; 8:45 am]

BILLING CODE 3510–22–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 224

RIN 0648–XN50

[Docket No. 090219208–9210–01]

Endangered and Threatened Wildlife and Plants; Proposed Listings for Two Distinct Population Segments of Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus) in the Southeast

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments.

SUMMARY: In 2007, a Status Review Team (SRT) consisting of Federal biologists from NMFS, U.S. Geological Survey (USGS), and U.S. Fish and Wildlife Service (USFWS) completed a status review report on Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the United States. We, NMFS, have reviewed this status review report and all other best available information to determine if listing Atlantic sturgeon under the Endangered Species Act (ESA) as either threatened or endangered is warranted. The SRT recommended that Atlantic sturgeon in the United States be divided into the following five distinct population segments (DPSs): Gulf of Maine; New York Bight; Chesapeake Bay; Carolina; and South Atlantic, and we agree with this DPS structure. After reviewing the available information on the Carolina and South Atlantic DPSs, the two DPSs located within the NMFS Southeast Region, we have determined that listing these two DPSs as endangered is warranted. Therefore, we propose to list these two DPSs as endangered under the ESA. We have published a separate listing determination for the DPSs within the NMFS Northeast Region in today's **Federal Register.**

DATES: Comments on this proposed rule must be received by January 4, 2011. At least one public hearing will be held in a central location for each DPS; notice of the location(s) and time(s) of the hearing(s) will be subsequently published in the **Federal Register** not less than 15 days before the hearing is held.

ADDRESSES: You may submit comments, identified by the XRIN 0648–XN50, by any of the following methods:

- *Electronic Submissions:* Submit all electronic public comments via the Federal eRulemaking Portal *http//www.regulations.gov.* Follow the instructions for submitting comments.
- *Mail or hand-delivery:* Assistant Regional Administrator for Protected Resources, NMFS, Southeast Regional Office, 263 13th Avenue South, St. Petersburg, FL 33701.
- *Facsimile (fax) to:* 727–824–5309.

Instructions: All comments received are considered part of the public record and will generally be posted to *http://www.regulations.gov.* All Personal Identifying Information (*i.e.,* name, address, etc.) voluntarily submitted may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information. We will accept anonymous comments (enter "n/a" in the required fields if you wish to remain anonymous). Please provide electronic attachments using Microsoft Word, Excel, WordPerfect, or Adobe PDF file formats only. This proposed rule, the list of references, and the status review report are also available electronically at the NMFS Web site at *http://sero.nmfs.noaa.gov/pr/sturgeon.htm.*

FOR FURTHER INFORMATION CONTACT: Kelly Shotts, NMFS, Southeast Regional Office (727) 824–5312 or Marta Nammack, NMFS, Office of Protected Resources (301) 713–1401.

SUPPLEMENTARY INFORMATION:

Public Comments Solicited

We intend that any final action resulting from this proposal will be as accurate as possible and informed by the best available scientific and commercial information. Therefore, we request comments or information from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule. We particularly seek comments concerning:

(1) The abundance of Atlantic sturgeon in the various river systems in the Carolina and South Atlantic DPSs;

(2) The mixing of fish from different DPSs in parts of their ranges, particularly in the marine environment;

(3) Information concerning the viability of and/or threats to Atlantic sturgeon in the Carolina and South Atlantic DPSs; and

(4) Efforts being made to protect Atlantic sturgeon in the Carolina and South Atlantic DPSs.

Public Hearings

One public hearing will be held in a central location for each DPS. We will schedule the public hearings on this proposal and announce the dates, times, and locations of those hearings, as well as how to obtain reasonable accommodations for disabilities, in the **Federal Register** and local newspapers at least 15 days before the first hearing.

Background

Initiation of the Status Review

We first identified Atlantic sturgeon as a candidate species in 1991. On June 2, 1997, NMFS and USFWS (collectively, the Services) received a petition from the Biodiversity Legal Foundation requesting that we list Atlantic sturgeon in the United States, where it continues to exist, as threatened or endangered and designate critical habitat within a reasonable period of time following the listing. A notice was published in the **Federal Register** on October 17, 1997, stating that the Services had determined substantial information existed indicating the petitioned action may be warranted (62 FR 54018). In 1998, after completing a comprehensive status review, the Services published a 12-month determination in the **Federal Register** announcing that listing was not warranted at that time (63 FR 50187; September 21, 1998). We retained Atlantic sturgeon on the candidate species list (and subsequently transferred it to the Species of Concern List (69 FR 19975; April 15, 2004)). Concurrently, the Atlantic States Marine Fisheries Commission (ASMFC) completed Amendment 1 to the 1990 Atlantic Sturgeon Fishery Management Plan (FMP) that imposed a 20- to 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.*), we followed this action by closing the Exclusive Economic Zone (EEZ) to Atlantic sturgeon retention. In 2003, we sponsored a workshop in Raleigh, North Carolina, with USFWS and ASMFC entitled, "The Status and Management of Atlantic Sturgeon," to discuss the status of sturgeon along the Atlantic Coast and determine what obstacles, if any, were impeding their recovery (Kahnle *et al.,* 2005). The workshop revealed mixed results in regards to the status of Atlantic sturgeon populations, despite the coastwide fishing