SOUTHERN ENVIRONMENTAL LAW CENTER

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April 26, 2018

Mr. Trey Glenn, Regional Administrator
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, GA 30303-3104

Re: North Carolina's April 9, 2018 Request for Approval of Modifications to the Water-Quality Classification for the Lower Cape Fear River

Dear Mr. Glenn:

Recently, we learned that the North Carolina Department of Environmental Quality has asked the U.S. Environmental Protection Agency to approve a revised water-quality standard reclassifying the Lower Cape Fear River as a "swamp water."[1] The reclassification defies both federal law and observable facts. On behalf of Cape Fear River Watch and Waterkeeper Alliance, we accordingly urge the EPA to deny the Department's request.

For nearly two decades, the Lower Cape Fear River—a fifteen-mile stretch of tidal salt water flowing southward past Wilmington—has been stuck on North Carolina's 303(d) list.[2] At the time of its original listing, in 1998, the waterway was

[1] North Carolina Department of Environmental Quality, Request for Approval of Modifications to North Carolina's Surface Water Quality Classifications (Apr. 9, 2018) ("Request for Approval").

[2] *See* North Carolina Department of Environment and Natural Resources, Report of Proceedings on the Proposed Reclassification of a Cape Fear River Segment (2015) ("Report of Proceedings"), at 1, *available at* https://ncdenr.s3.amazonaws.com/s3fs-public/Environmental%20Management%20Commission/EMC%20Meetings/2015/September/Report_of_Proceedings_for_Cape_Fear_River_Proposal%20%281%29.pdf (last visited Apr. 26, 2018); 2014 North Carolina 303(d) List (Dec. 19, 2014) ("2014 303(d) List"), at 2-4, *available at* https://ncdenr.s3.amazonaws.com/s3fs-public/Water%20Quality/Planning/TMDL/303d/2014/2014_303dlist.pdf (last visited Apr. 26, 2018).

primarily burdened by low levels of dissolved oxygen—a problem the Department of Environmental Quality attributed, in part, to nonpoint "ag" and "urban runoff" pollution.[3] In the intervening years, however, the river has acquired additional problems, including arsenic, copper, nickel, and acidity.[4]

The appearance of the Lower Cape Fear River on North Carolina's 303(d) list, as you know, required the preparation of a "total maximum daily load."[5] Indeed, the need for a TMDL was long acknowledged by state regulators and members of industry. Within two years of the listing, the Department of Environmental Quality and the regulated community were "meeting on a regular basis to discuss the modeling approach and investigate funding sources for … [a] TMDL addressing low dissolved oxygen" in the Lower Cape Fear.[6] Work on the TMDL reportedly continued for more than a decade, with little apparent progress. And then someone had an idea.

On March 5, 2014, the Lower Cape Fear River Program wrote the Department of Environmental Quality to ask that the "portions of the Lower Cape Fear River Estuary … that [we]re … classified as Class SC Waters be reclassified to include the supplemental Swamp (Sw) classification."[7] According to the Program—a self-described "coalition of citizens groups, industry, business, local, regional, and state government, and the university community"—a "swamp" designation "would recognize the influence of natural drainage from riverine wetland and salt marsh systems that are ubiquitous throughout the Lower Cape Fear River, Northeast Cape Fear River and Black River watersheds on water quality conditions in the river."[8] It would shift the blame, in other words, from the region's polluters to the river's "natural conditions"—

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[3] 1998 North Carolina 303(d) List (May 15, 1998), at T-6 (noting that 5,000 of the estuary's 7,500 acres were impaired as a result of low dissolved-oxygen levels, and that 5,561 of the estuary's acres were burdened by nonpoint pollution, including "ag" and "urban runoff"), *available at* https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/1998%20303d%20list.pdf (last visited Apr. 26, 2018).

[4] 2014 303(d) List at 2-4.

[5] *See* 33 U.S.C. § 1313(d)(1)(C).

[6] 2000 North Carolina 303(d) List (Oct. 2, 2000), at 6, *available at* https://ncdenr.s3.amazonaws.com/s3fs-public/Water%20Quality/Planning/TMDL/303d/2000%20303d%20list.pdf (last visited Apr. 26, 2018).

[7] Report of Proceedings at a-2 (reclassification request).

[8] *Id.* at a-2–a-3.

which would purportedly allow the state's long-promised TMDL to be officially abandoned.[9]

The superficial attraction of declaring the Lower Cape Fear a "swamp" stemmed from a number of provisions within North Carolina's water-quality standards. Under state regulations, the "Class SC" designation establishes a "minimum" level of protection for tidal "saltwaters" along the coast.[10] All "SC" waters must be made "suitable for aquatic life propagation and maintenance of biological integrity, wildlife, and secondary recreation."[11] With respect to dissolved oxygen, these uses are generally translated into a numeric limit of "not less than 5.0 mg/l[.]"[12] In "swamp waters, poorly flushed tidally influenced streams or embayments, … [and] estuarine bottom waters[,]" however, "lower values" are allowed if they are "caused by natural conditions[.]"[13] The "SC" standard for acidity is similarly reduced in "swamp waters."[14] While pH generally must "be normal for the waters in the area, which range between 6.8 and 8.5, … swamp waters may have a pH as low as 4.3 if it is the result of natural conditions[.]"[15]

The Lower Cape Fear River Program premised its reclassification request on these "swamp waters" standards, arguing that the estuary's low dissolved-oxygen levels somehow prove that it's a "swamp."[16] In the words of the Program's petition:

> It … [was] clear from the data collection, modeling and technical analyses [that had been undertaken by the

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[9] *See* 15A NCAC 02B .0220(5) (establishing a "natural conditions" standard for dissolved oxygen in tidal "swamp waters").

[10] 15A NCAC 02B .0101(d)(1).

[11] 15A NCAC 02B .0220(2); s*ee also id.* 02B .0101(d)(1) (noting that Class SC waters are "protected for secondary recreation, fishing, aquatic life including propagation and survival, and wildlife"); *id.* 02B .0220(1) (providing that "[b]est … usages" for Class SC waters "include aquatic life propagation and maintenance of biological integrity (including fishing, fish and functioning Primary Nursery Areas (PNAs)), wildlife, and secondary recreation").

[12] 15A NCAC 02B .0220(5).

[13] *Id.*

[14] 15A NCAC 02B .0220(12).

[15] *Id.*

[16] *See* Report of Proceedings at a-7 (reclassification request).

> coalition] that the DO standard of 5 mg/L for the … [Lower Cape Fear was] not appropriate since it is not achieved a significant portion of the time as a result of natural drainage from riverine wetlands and salt marshes.[17]

"From a regulatory standpoint," the petition argued, "a straightforward way to deal with this issue is to reclassify the area with the supplemental Sw classification."[18]

In electing to grant the Lower Cape Fear River Program's reclassification request, North Carolina officials acted arbitrarily and unlawfully. Most notably, while the Department of Environmental Quality has assured you that "[t]he reclassification … was based on scientific information provided by the requestor[,]"[19] this "information" failed to demonstrate that the river's dissolved-oxygen problem is actually "a result of natural drainage[.]"[20] As the Lower Cape Fear River Program's lead researcher noted in his comments on the reclassification, which are attached to this letter, "[l]ivestock manures as waste inputs were *not even mentioned* in … [the Program's] model!"[21] Given that "[l]ivestock wastes are clearly the largest source of BOD-forcing pollutants in the Cape Fear Basin[,]" it was arbitrary for the model—and the State of North Carolina—to ignore them.[22]

Remarkably, the state's reclassification decision also ignored the very definition of "swamp waters."[23] Under North Carolina law, "[s]wamp waters" are those with "*low velocities* and other natural characteristics which are different from adjacent streams."[24] In granting the Lower Cape Fear River Program's reclassification request, however,

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[17] *Id.*

[18] *Id.*

[19] Request for Approval at 1.

[20] Report of Proceedings at a-7 (reclassification request).

[21] Report of Proceedings at a-105 (comments of Dr. Michael Mallin, a research professor at the University of North Carolina Wilmington) (emphasis in original) (Attachment 1).

[22] *Id.* at a-106.

[23] *See* Report of Proceedings (reclassification request).

[24] 15A NCAC 02B .0101(e)(2) (emphasis added); *see also id.* 02B .0202(62) (stating that "[s]wamp waters mean those waters which are classified by the Environmental Management Commission and which are topographically located so as to generally have very low velocities and other characteristics which are different from adjacent streams draining steeper topography").

state officials made no mention of water velocities in the river.[25] This omission does not seem to have been inadvertent. As Dr. JoAnn Burkholder noted in a lengthy comment letter, which is also attached, the "Mighty Cape Fear" is a "strongly flowing, high-volume river"[26]—one in which the U.S.S. North Carolina, a battleship, is currently "[m]oored in quiet dignity and majesty … across … from downtown Wilmington[.]"[27]

Only three years ago, the EPA confirmed the importance of evaluating a waterbody's "flow regime, channel gradient, and … geomorphology" in a guidance document addressing "natural conditions" criteria.[28] In the words of the agency, "[a]n examination of natural geomorphic factors, such as lack of re-aeration due to the low channel gradient, as well as naturally high biological oxygen demand … from decomposition of riparian vegetation, should be documented to demonstrate that [a waterbody's] low DO is not due to eutrophication or other human-caused impacts."[29] In reclassifying the Lower Cape Fear River as a "swamp water," North Carolina officials failed to undertake this critical analysis.

All told, North Carolina's reclassification of the Lower Cape Fear was nothing more than an attempt to avoid addressing the river's significant water-quality problems. Because such an action cannot be squared with the fundamental purpose of the Clean Water Act—"restor[ing] and maintain[ing] the chemical, physical, and biological integrity of the Nation's waters"—it should be rejected by the EPA.[30]

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[25] *See* Report of Proceedings.

[26] *Id.* at a-112–a-113 (comments of Dr. Burkholder, a professor at North Carolina State University) (Attachment 2).

[27] Welcome to the Battleship North Carolina, http://www.battleshipnc.com/ (last visited Apr. 26, 2018).

[28] *See* Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document (Feb. 2015), at 12, *available at* https://www.epa.gov/sites/production/files/2015-02/documents/natural-conditions-framework-2015.pdf (last visited Apr. 26, 2018).

[29] *Id.*

[30] 33 U.S.C. § 1251(a); *see also* 40 C.F.R. § 131.6(a) (requiring the EPA to ensure that state use designations are "consistent with the provisions of sections 101(a)(2) and 303(c)(2) of the [Clean Water] Act").

North Carolina's reclassification of the Lower Cape Fear River is also at odds with the "antidegradation" requirements of state and federal law.[31] As the EPA has emphasized in its regulations, the Clean Water Act requires that "[e]xisting instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."[32] North Carolina's antidegradation policy accordingly provides that "[e]xisting uses … and the water quality to protect such uses shall be protected by properly classifying surface waters and having standards sufficient to protect these uses."[33] In arbitrarily declaring that the Lower Cape Fear is a "swamp water" with no need for dissolved-oxygen protections, state officials defied these requirements.

The ecological significance of North Carolina's effort to ignore the water-quality problems on the Lower Cape Fear River was recently confirmed by the National Marine Fisheries Service. On August 17, 2017, the agency issued a final rule designating critical habitat for the endangered "Carolina" population of the Atlantic sturgeon.[34] The designation includes all of the Cape Fear waters that North Carolina has deemed a swamp.[35] It also confirms the importance of sustaining "oxygen values that support" sturgeon "[s]pawning[,] … survival[,] … growth, development, and recruitment"—values that are substantially higher than those currently found in the Lower Cape Fear River.[36]

As a result of the recent critical-habitat designation, the EPA must consult with the National Marine Fisheries Service before taking action on North Carolina's

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[31] *See* 15A NCAC 02B .0201 (North Carolina's antidegradation policy); 40 C.F.R. § 131.12(a) (establishing the minimum requirements for state antidegradation policies); *id.* § 131.6(d) (requiring the EPA to ensure that state water-quality standards include "[a]n antidegradation policy consistent with § 131.12").

[32] 40 C.F.R. § 131.12(a)(1).

[33] 15A NCAC 02B .0201(b).

[34] 82 Fed. Reg. 39,160 (Aug. 17, 2017) (Attachment 3).

[35] *See id.* at 39,258.

[36] *Id.* at 39,240 (codified at 50 C.F.R. § 226.225(b)(4)); *see also id.* (noting that "6.0 mg/L dissolved oxygen or greater likely supports juvenile rearing habitat, whereas dissolved oxygen less than 5.0 mg/L for longer than 30 days is less likely to support rearing when water temperature is greater than 25 °C").

request.[37] And as a result of the reclassification's impermissible impacts on water quality in the Lower Cape Fear River, the state's request should be denied.

If you have any questions, do not hesitate to contact us. Thank you for your attention to this matter.

Sincerely,

Mary Maclean Asbill
Senior Attorney

Brooks Rainey Pearson
Staff Attorney

[37] *See* 16 U.S.C. § 1536(a)(2); *see also, e.g.*, National Marine Fisheries Service, Biological Opinion on EPA Approval of Water Quality Standards Under Section 303 of the Clean Water Act (July 29, 2016) (evaluating the impact of Florida's revised water-quality standards on listed species), *available at* https://repository.library.noaa.gov/view/noaa/14795 (last visited Apr. 26, 2018).

Cc: Michael Regan, Secretary, DEQ
Sheila Holman, Assistant Secretary, DEQ
Bill Lane, General Counsel, DEQ
Linda Culpepper, Interim Director, DEQ
Lauren Petter, EPA

Attachment 1

Comments on the Proposed Reclassification of the Lower Cape Fear River

Dr. Michael A. Mallin, Research Professor, Center for Marine Sciences,
University of North Carolina Wilmington

Memo to: NC Division of Water Resources, and NC Environmental Management Commission

From: Dr. Michael A. Mallin, Research Professor, Center for Marine Sciences, University of North Carolina Wilmington, Wilmington, NC, 28409

Date: February 9, 2015

Subject: Comment on the proposed reclassification of the lower Cape Fear River and Estuary to Class Sc-Swamp (Sw) classification.

1) I am very supportive of the statement in the reclassification proposal that states that any further municipal point sources will require the highest level of treatment in North Carolina. I would ask for more specifics regarding industrial discharges – at the least setting some limits on biochemical oxygen demanding agents such as biochemical oxygen demand (BOD), ammonia, total nitrogen (TN) and total phosphorus (TP).

2) An important statement that needs to be clarified is found in the narrative standards where it states that DO should not be less than 5.0 mg/L except that "swamp waters, poorly flushed tidally influenced streams or embayments, or estuarine bottom waters may have lower values if caused by natural conditions" . The issue that requires clarification is who decides, and by what criteria, if such a deviation is caused by "natural" conditions.

3) The proposed CFR reclassification does not adequately address non-point contributions of BOD or nutrients (which lead to BOD increases). If focus on non-point sources potentially contributing to oxygen depletion is continued to be addressed by on-going water quality programs; based on the summer blue-green algal blooms that occurred annually from 2009-2012, this approach has been inadequate and will continue to be inadequate.

4) In the lower Cape Fear River and Estuary, peer-reviewed research published in *Limnology and Oceanography* has demonstrated that BOD is driven by a number of biological and chemical factors (Mallin et al. 2004; Tables 4, 5 and 6) see the following:

- Chlorophyll *a* (the principal measure of algal bloom strength) has been positively correlated with BOD5 in the mainstem river at Lock and Dam #1 ($r = 0.55$, $p = 0.0001$), Browns Creek ($r = 0.45$, $p = 0.007$), Hammond Creek ($r = 0.45$, $p = 0.004$), Great Coharie Creek ($r = 0.51$, $p = 0.001$), Colly Creek ($r = 0.64$, $p = 0.0001$), Barnards Creek ($r = 0.37$, $p = 0.040$), Motts Creek ($r = 0.42$, $p = 0.020$), and Smith Creek ($r = 0.57$, $p = 0.0009$). I note that Browns, Hammond, Barnards and Smith Creeks drain directly into the mainstem river or estuary, while Colly and Great Coharie creeks drain into the lower Black River, a major 5th order tributary of the 6th order Cape Fear River.
- TN has been positively correlated with either BOD5 or BOD20 or both in the 5th-order Northeast Cape Fear River ($r = 0.30$, $p = 0.02$), the Black River ($r = 0.45$, $p = 0.0003$), Hammond Creek ($r = 0.47$, $p = 0.0003$), Six Runs Creek ($r = 0.54$, $p = 0.0005$), Great

Coharie Creek (r = 0.44, p = 0.006), Little Coharie Creek (r = 0.52, p = p = 0.0008), and Colly Creek (r = 0.54, p = 0.0005).

- TP has been positively correlated with either BOD5, BOD20 or both in the Northeast Cape Fear River (r = 0.34, p = 0.008) the Black River (r = 0.33, p = 0.010), Browns Creek (r = 0.40, p = 0.012), Hammond Creek (r = 0.42, p = 0.009), Six Runs Creek (r = 0.49, p = 0.002), Great Coharie Creek (r = 0.66, p = 0.0001), and Colly Creek (r = 0.39, p = 0.015).
- Chlorophyll *a* represents algal blooms, which upon death and decomposition become highly labile sources of BOD. Nutrients drive BOD in two ways: directly and indirectly. A peer-reviewed article in *Ecological Applications* by Mallin et al. (2004) showed that for streams in the Black and Northeast Cape Fear River basins, inputs of dissolved phosphorus directly stimulate BOD5 and BOD20, as well as natural bacteria abundance (the direct driver of BOD). The data also showed that inputs of dissolved nitrogen (nitrate ammonium, and urea) significantly stimulate algal growth, which in turn significantly stimulates BOD. Thus, the correlation between nutrient loading and BOD is not surprising.

5) The proposed reclassification is based on the Bowen (2009) model predicting DO concentrations in the lower Cape Fear River Estuary

- The Bowen model concludes that further reduction of current point sources would have little effect on DO concentrations – I will accept the model's conclusions on that matter.
- But, Bowen's model shows that reducing nutrient, carbon and BOD loads from the incoming rivers, creeks and wetlands by 30% and 70% would <u>increase</u> median DO from 5.6 mg/L to 5.85 and 6.2 mg/L, respectively – and this assumes sediment oxygen demand (SOD) stays the same regardless of reductions! See Bowen (2009) pages 6-4, 6-8, and 6-22 in particular for more on this topic.
- Assuming that such BOD load reduction would similarly reduce SOD, than the model says summer DO violations would decrease from 45% to 22% violations (30% reduction case), down to 7% (with 50% reduction) and down to only 1% violations (70% reduction case).
- I further note that SOD cannot simply be considered "natural" only. A year-long study of several tidal creeks in New Hanover County was published in the peer-reviewed journal *Hydrobiologia* (MacPherson et al. 2007). Results demonstrated that chlorophyll *a* concentrations were positively correlated with SOD ($r = 0.35$, $p < 0.05$), as well as BOD5 ($r = 0.50$, $p < 0.05$).

6) I note that Bowen does not discuss non-point source pollution sources specifically.

7) Yet, non-point runoff plays a major role in the middle to lower basin of the mainstem Cape Fear River, from crop agriculture, urban runoff and some livestock production. In the lower Cape Fear system I note that livestock waste pollution and crop agriculture are the predominant non-point nutrient and BOD sources in the Black and Northeast Cape Fear River basins.

8) Livestock manures as waste inputs were *not even mentioned* in Bowen's model! However, 2012 livestock counts for Brunswick, Pender, Duplin, Sampson, Cumberland

and parts of Bladen and Onslow Counties (Cape Fear lower watershed) are as follows (information for counties that are partially within the basin, Bladen and Onslow, are estimates):

- Hogs: approximately 5,000,000
- Turkeys: approximately 21,500,000
- Broiler chickens: > 122,000,000
- Other chickens: > 870,000
- Cattle: approximately 72,000

(from NCDA website September 2014)

Livestock wastes are clearly the largest source of BOD-forcing pollutants in the Cape Fear Basin – and remain virtually unregulated (i.e. no required streamside buffers, no required control of ammonia off gassing, etc.).

9) Industrialized swine farms (CAFOs) are a source of large-scale chronic nitrogen and phosphorus loading to nearby soils and receiving water bodies, nutrients which have been directly correlated to BOD in the blackwater streams and rivers of the Cape Fear Basin (Mallin et al. 2006). An peer-reviewed analysis by Cahoon et al. (1999) published in *Environmental Science and Technology* found that vast quantities of nitrogen and phosphorus feed are imported into the watershed annually to feed swine, poultry, and cattle in production facilities (CAFOs), which in turn annually load large quantities of nutrients as waste into the watershed. This analysis found that for the Cape Fear River basin alone, CAFOs produce 82,700 tons of nitrogen and 25,950 tons of phosphorus annually into this watershed. Thus, N and P enter the state as animal feed from elsewhere, but much of it leaves the livestock as manure (or carcasses) and enters soils or waters of the Coastal Plain.

10) Finally, swine waste lagoons, as well as lagoons servicing egg-laying poultry CAFOs, produce copious amounts of ammonia to the atmosphere; NC Division of Air Quality estimates a swine ammonia emission factor of 9.21 kg/hog-year. 9.21 x 5,000,000 head of swine = 46,050,000 kg or 46,050 metric tons of ammonia released to the airshed of the Cape Fear River basin (and coastal ocean) <u>per</u> <u>year</u>, much of which comes to earth within 60 miles of the source (Walker et al. 2000; Costanza et al. 2008). Ammonia is well-known in the environmental engineering literature to exert an oxygen demand (nitrogenous BOD) on waters – that is why it is regulated in wastewater discharges (Clark et al. 1977). Efforts need to be made to control this major source of oxygen-demanding wastes to the Cape Fear system as well.

11) Clearly, non-point sources of BOD, nitrogen, and phosphorus entering the waters of the lower Cape Fear River system are very large and lead to reduced dissolved oxygen levels.

I conclude that the proposed reclassification, as it stands, will be inadequate to produce or maintain proper dissolved oxygen concentrations in the lower Cape Fear River and Estuary due to the lack of attention to non-point sources of nutrients and BOD. The source of much of this pollution is industrial livestock production, along with unknown inputs from traditional agriculture, and some urban runoff in the Fayetteville and Wilmington areas. **Any**

proposed reclassification of the lower Cape Fear River and Estuary must include strong language specifically aimed at reducing such non-point sources of pollution.

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Attachment 2

Comments on the Proposed Reclassification of the Lower Cape Fear River

Dr. JoAnn M. Burkholder, William Neal Reynolds Distinguished Professor,
North Carolina State University

Comments on the Proposed Reclassification of the Lower Cape Fear River and Estuary to a Class Sc (Sw) Swamp

Prepared for Waterkeeper Alliance by JoAnn M. Burkholder, Ph.D., March 3, 2015

I. Overview

Since 1998, the lower Cape Fear River Estuary (LCFRE) segment from upstream of Toomers Creek to a line across the river between Lilliput Creek and Snows Cut has been on North Carolina's 303(d) list of officially "impaired" (degraded) waters due to low dissolved oxygen (DO). In 2006, the state added impairment for pH, copper and turbidity to the 303(d) list for this segment. Throughout the past several decades, a subset of regulated point sources (i.e., with wastes mainly discharged to surface waters through one or more pipes) have been the state's focus for water quality improvement. In 2014, the North Carolina Division of Water Resources within the Department of Environment and Natural Resources (NCDENR-DWR) received a request from a group including various point source dischargers to reclassify the LCFRE from Class Sc to Class Sc-Swamp (Sw) (May 2014). The rationale given for the request included two points - first, that a recent modeling effort (Bowen et al. 2009) had assessed the 20 largest point sources in the lower Cape Fear River basin and concluded that the sources have little influence on water-column DO concentrations in the LCFRE; and second, the group asserted that significant reductions in pollutant loading from other sources which they call "background" loads would not achieve attainment for certain periods of the summer. The request specifically stated,

> ...modeling results indicate that [the 20 assessed] point-source discharges have a relatively minor impact on DO levels, and that even significant reductions in background (both natural and nonpoint source) loads would not result in attainment of the current standard for considerable periods of time during the summer. - May (2014)

Based on this request and information, NCDENR-DWR recently proposed to reclassify the LCFRE to a swamp (Sw) based on the misleading claim that, since the LCFRE cannot meet its present DO standard ($\geq$ 5 mg/L) by controlling the 20 identified point sources alone as assessed in Bowen et al.'s (2009) model, a TMDL (total maximum daily load) to achieve the DO standard would be inappropriate. The proposed reclassification of the LCFRE to a swamp is not consistent with sound science or the law for three reasons:

1. The available evidence shows that the major sources of oxygen-demanding materials in the LCFRE are due to pollution from human activities which are subject to regulation and can be controlled. The major sources of oxygen-demanding materials are **not** natural wetland drainage or other natural background sources. Natural wetland drainage appears to add only a fraction of the massive contribution of oxygen-demanding materials, high levels of toxic copper, high turbidity, and many other pollutants that are being contributed by pollution from point sources, other regulated sources and nonpoint sources (see Sections IIID-E of these Comments).

2. Under the Clean Water Act, the required TMDL for the LCFRE must address ***all*** pollution sources, including point sources, other regulated sources, and nonpoint sources, in the watershed (see Section IIID of these Comments). In its proposed action, NCDENR-DWR has *not* considered ~22 NPDES-permitted point sources in the lower Cape Fear basin, or *any* of the ~153 NPDES-permitted point sources in the upper and middle Cape Fear River basin, which contribute to the impaired (degraded) water quality of the LCFRE which is at the receiving, lower end of the basin. NCDENR-DWR *also* failed to consider the impact of the nearly 1,000 industrial-scale swine Animal Feeding Operations as well as an unknown number of industrial-scale poultry Animal Feeding Operations, many of which are Concentrated (Confined) Animal Feeding Operations (CAFOs) and, thus, point sources under the Clean Water Act. These sources were also omitted from specific analysis in the Bowen et al. (2009) model, although many of the industrial facilities are located in the lower basin (see Section IIIE of these Comments). As a scientist, I first approached their inclusion in these Comments by checking the formal definition of CAFOs in the Clean Water Act (Section 502(14)). *CAFOs are formally defined there as point sources.* They are supposed to be regulated using National Pollution Elimination Discharge System (NPDES) permits, as other industrial point sources are regulated. There are about five million swine in the Cape Fear basin. Each swine produces, on average, about four times more sewage than one person (see Section IIIE). Therefore, the swine CAFO point sources, which are predominantly in the lower Cape Fear basin, contribute roughly the same amount of sewage to that relatively small area, *per year*, as 15 million people. Moreover, swine wastes are much richer in oxygen-demanding materials than human sewage. Industrialized poultry production, also massive in the Cape Fear River basin, contributes to oxygen-demanding materials and other water quality degradation of the LCFRE as well (see Section IIIE). Overall, ~175 NPDES-permitted point sources in the Cape Fear River watershed, and nearly 1,000 swine CAFO point sources as well as an unknown number of poultry CAFOs, were not identified and appropriately evaluated by Bowen et al. (2009) and NCDENR-DWR. These sources are not simply "background" as misleadingly characterized in the materials underlying the NCDENR-DWQ Proposal to reclassify the LCFRE and in the Proposal itself. Collectively, and often individually, these facilities are **extreme**, chronic pollution sources of oxygen-demanding materials to the LCFRE. They can be, and should be, addressed through state regulatory programs, the Clean Water Act and a TMDL for the LCFRE.

3. *Significant reductions in the erroneously termed "background" loads* **would** *achieve attainment of the present DO standard in the LCFRE segment.* As explained above, what was misleadingly and inaccurately called "background" in the lower Cape Fear basin includes the point source pollution from ~175 NPDES-permitted point sources in the Cape Fear River watershed, and from nearly 1,000 swine CAFOs and an unknown number of poultry CAFOs. All of these pollution sources were not among the 20 considered by Bowen et al. (2009) as the main point source contribution to the LCFRE. These sources were, at least, tacitly included in Bowen et al.'s (2009) model within a category called "tributary inputs." The model predicts that a reduction of 30% of the "tributary inputs" would result in median DO levels in the LCFRE that exceed 5 mg/L -- that is, higher than the state standard -- and that a

70% reduction in the "tributary inputs" and the internal oxygen demand (below) largely resulting from these inputs would bring the LCFRE into compliance 99% of the time.

If the proposed reclassification occurs, NCDENR-DWR will accomplish a contrived, highly artificial "official change" of a major, strongly flowing estuary of national importance to a "swamp" with no scientific basis. Rather than providing cleanup and protection of the impaired segment -- which has been officially designated as impaired and in need of improved protection for nearly two decades -- this action would allow much more pollution to occur there, in violation of the Clean Water Act. Consequently, NCDENR-DWR's proposed reclassification would jeopardize the designated uses of the LCFRE. The LCFRE should *not* be reclassified as a swamp.

The scientific facts briefly mentioned above, which accurately describe the status of the LCFRE and the pollution affecting it, are explained in detail in the following comments, supported by peer-reviewed science literature and findings from federal agencies such as the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (USEPA).

II. The Mighty Cape Fear River

The Cape Fear River basin, completely contained within North Carolina, is the largest watershed in the state, covering ~16.5% (~9,324 square miles) of total land area. It also contains the largest number of stream miles (6,204) in North Carolina (Lin et al. 2006, Bowen et al. 2009 and references therein). The 26 counties within or overlapping the watershed are expected to grow from 3 million to about 5 million people over the next 20 years.[1] There presently are about 1.7 hogs per person in the Cape Fear basin, and industrialized swine production as well as turkey production in the lower basin are among the most concentrated in the world (Mallin et al. 2003).

The LCFRE is "extremely important... because of its function as a nursery for juvenile fish, crabs, and shrimp . . . The river is also an important natural resource that supports many uses including industry, transportation, recreation, drinking water, and aesthetic enjoyment" (Bowen et al. 2009). On a popular tourism website[2] are quotes such as the following about the LCFRE (emphasis added):

- Hard to review a river! It's *wild, powerful*, beautiful in all seasons....
- Amazing to walk down on the observation area and look at *how fast the river moves through this area*. You can understand how and why it got its name.
- *Cape Fear river current is very swift and strong*.

Thus, casual observers can discern that this segment of the LCFRE is highly river-influenced with strong flow. Bowen et al. (2009, p. 2-4) wrote, "[f]rom a hydrodynamic perspective,

[1] (NDENR) http://www.eenorthcarolina.org/images/River%20Basin%20Images/final_web_capefear.pdf.

[2] (http://www.tripadvisor.com/ShowUserReviews-g49673-d107702-r242913110-Cape_Fear_River-Wilmington_North_Carolina.html#REVIEWS

the Cape Fear has approximately a two-meter [~6-foot] tide range and strong tidal currents (> 0.5 meter per second) in the navigational channel of the open estuary and in the narrower tidal river channels of the three major tributaries (the mainstem freshwater river, and the Northeast Cape Fear and Black Rivers)." The LCFRE system is, in fact, documented in the science literature as strongly flowing down to its confluence with the Atlantic Ocean (e.g. Ensign et al. 2004, Lin et al. 2006, Becker et al. 2010). The strong flow minimizes stagnant areas and helps to add oxygen from the overlying air (Wetzel 2001).

It has been erroneously suggested in the NCDENR-DWQ Proposal and supporting materials that this strongly flowing, high-volume river is so strongly influenced by oxygen-demanding materials from natural drainage of freshwater wetlands and saltmarshes that the LCFRE is "swamp-like" with respect to DO conditions. Slowly flowing blackwater streams with instream wetlands in the Coastal Plain of the southeastern U.S. *can* receive high inputs of DO-demanding materials from the wetlands, and DO can range from 4-6 mg/L (Mallin 2000, Todd et al. 2009, and references therein). However, *such characteristics of slow flow and in-stream wetlands do not characterize most of the LCFRE system.* One area of the estuary north of Wilmington which receives major influx of swine wastes from CAFOs, near the junction of the Cape Fear, Black, and Northeast Cape Fear Rivers, has been described as prone to low DO levels during summer-early fall, but the low DO levels there have been related to *high anthropogenic pollution* along with inputs of natural organic materials (Mallin et al. 2003). Water quality in that area, as throughout the segment, would be greatly improved by reducing the high anthropogenic pollution coming into the segment from the many regulated pollutions sources in the Cape Fear watershed that were inappropriately excluded from consideration or lumped in with background sources in the NCDENR-DWR Proposal and supporting materials.

III. Sources of Water Quality Impairment

A. Historic Background, Assessments, and Erroneous Assertions

Historically, the LCFRE system was considered non-eutrophic because of its rapid flushing (Ensign et al. 2004). In the upper and middle Cape Fear River during 1955-1980, Crawford (1985) noted that DO concentrations at Lock 1 averaged 8.2-8.4 mg/L depending on the data source, and that on only two occasions from 1975 to 1980, DO samples were above 4 mg/L but less than 5 mg/L. Similarly, NCDENR (1999) described the upper portions of the estuary in the 1990s as rarely having sustained low DO levels that caused problems (assumed to refer to problems for aquatic life). The present-day LCFRE, however, is impaired due to major pollution from the upper, middle, and lower watershed (Cahoon et al. 1999, Mallin 2000, Mallin et al. 2003). As a result of declining water quality due to many pollution sources, for the past ~15 years the Cape Fear Estuary has been characterized as moderately eutrophic (= moderately nutrient-polluted; Bricker et al. 1999).

As described by NCDENR (2005),

> The [Cape Fear] watershed (about 9,149 square miles) is the most heavily industrialized in North Carolina with 244 permitted wastewater discharges and (as of 2000) over 1.83 million people residing in the basin....

> Approximately 24% of the land use in the watershed is devoted to agriculture and livestock production.

Historically, post-European settlement, the lower Cape Fear River and Estuary received mostly raw (untreated) or partially treated wastes from the Riegel Paper Corporation (in Wilmington; became Federal Paperboard Company, and then International Paper from 1996 to the present) and the various, relatively small human population centers that developed along it (State Stream Sanitation Committee 1957, CH2MHill 2014a - Technical Memo 1 in May 2014, used to support the request for reclassification of the LCFRE segment). CH2MHill (2014a) described the previous situation as "significant impacts from untreated and poorly treated wastewater under low to moderate flow conditions in the river" prior to improvements in waste treatment. In the mid-1950s on one date (August 30, 1955), low DO (1.3-2 mg/L) and low pH (5-6) were measured in the Northeast Cape Fear and Black Rivers, the two main tributaries to the Cape Fear Estuary other than the mainstem Cape Fear River as mentioned. On two dates (July 23-24, 1956) during moderate flows from these two tributaries and high flow from the mainstem Cape Fear River, DO and pH in the lower river were 2.8-4.9 mg/L and 6.8-7.2, respectively. The interpretation from this sparse information (three dates, ~60 years ago) was that "*under some situations*, swamp drainage conditions *could* significantly influence DO and pH conditions in the river. . .." (emphasis added) (State Stream Sanitation Committee 1957, CH2MHill 2014a).

From there, however, a major "leap" occurred in CH2MHill's (2014a) writing (p.D-15 in May 2014): Riparian wetlands -- that is, natural wetland drainage -- were described, without any other supporting data, as the "significant contributors to the tremendous loads of oxygen-demanding materials." CH2MHill (2014a, p.D-15) secondarily acknowledged that inputs of biochemical oxygen demand (BOD) have also been contributed by raw and partially treated sewage, and from swine wastes, although CH2MHill mistakenly stated that swine wastes only contribute pollution to the LCFRE when cess pits breach. As corrective information, swine wastes *routinely* contaminate the LCFRE (see Section IIIE of these Comments), and researchers have evaluated swine CAFO wastes as a major source of BOD in the LCFRE (e.g. Mallin et al. 1997, 2006; Mallin 2000). Yet, the remainder of CH2MHill's (2014a) writing implicated natural drainage from wetlands as the major contributor of oxygen-demanding materials to the LCFRE. In the 1950s, the Cape Fear basin had less industrialization and fewer point sources (including no CAFOs), but the present reality is far different. As explained above, the Cape Fear River basin is *now* described as the largest, most industrialized watershed in North Carolina (Mallin et al. 2003, NCDENR 2005).

TetraTech (2014 - Technical Memo 2 in May 2014, used to support the request for reclassification) considered BOD loads from three specific point sources, which they erroneously described as contributing about 90% of all point source loads to the LCFRE. In reality, these three point sources contribute only a small fraction of the total point source loads - see Section IIID-E of these Comments. Based on data from the previous 20 years, TetraTech reported a significant downward trend (~23% decrease over time) in oxygen-demanding pollutant loads from the three selected point sources, without a corresponding decrease in water-column DO. The lack of a corresponding decrease in average DO should have been expected, considering that TetraTech *did not* assess ~1,194 other regulated sources in the Cape Fear watershed that are contributing oxygen-demanding materials and other pollution to the LCFRE. Over the same 20-year period in the Cape Fear River basin,

the human population increased by ~0.66 million and swine production increased by ~5 million animals per year (compiled from U.S. Census Bureau data, Burkholder et al. 1997, and Cahoon et al. 1999). Yet, TetraTech (2014) implicated wetlands as the major contributor to oxygen-demanding materials in the the LCFRE. TetraTech stated that the information from its recent analysis supported its previous assessments of the LCFRE (TetraTech 2001, 2003), and erroneously maintained that its assessment supported reclassification of the LCFRE segment to a swamp.

CH2MHill (2014b - Technical Memo 4 in May 2014, used to support the request for reclassification) described an analysis of surface water quality conditions in summer (which was defined as April-October) at main inflows to the Cape Fear River Estuary including the Middle Cape Fear River, the Black River, and the Northeast Cape Fear River. Importantly, *the Northeast Cape Fear River and the Black River stations were* ***erroneously*** *described as characteristic of "water quality as water leaves areas currently classified as swamps."* These segments are classified as swamps, but their present water quality reflects massive pollution, not natural wetland inputs (see Section IIID, p.18 below). During the early to mid-1990s, the relatively small areas of the Northeast Cape Fear and Black River watersheds sustained an influx of more than 800 swine CAFOs with more than 3 million swine produced per year (NCDENR 2005; and F*igures 1 and 2*). They contribute roughly the same amount of wastes as 12 million people, and the wastes are poorly regulated (see Section IIID).

Bowen et al. (2009) tacitly included pollution from swine feeding operations in "tributary inputs" although they were not specifically mentioned. CH2MHill (2014b) and TetraTech (2014) not only failed to mention them (and in CH2MHill 2014a, there was only one, partly inaccurate mention of swine operations as described above), but also omitted them from consideration. All of the other point source contributions from the upper and middle watershed were not considered as well. The omission of CAFO wastes and most other point sources in the watershed from consideration in assessments of oxygen demand in the LCFRE is irrational rather than science-based. The extreme error of omission in those reports is compounded by an equally extreme error of co-mission - repeatedly attributing to natural wetland drainage the massive oxygen-demanding pollution known to be contributed by other sources including CAFOs (e.g. Dewi et al. 1994, Burkholder et al. 2007 and references therein; see Section IIID below). Similarly, NCDENR was described by May (2014, p.D-3) as having stated, erroneously, that "changes in the classification of the LCFRE might be appropriate to recognize the influence of natural drainage from riverine and saltwater marsh systems in the watershed on DO concentration."

There is no basis in fact - no data - supporting major attribution to natural freshwater wetlands and saltmarshes of what CH2MHill (2014a) described as "tremendous" loads of oxygen-demanding materials in the LCFRE, while "overlooking" the massive pollution from ~98% of the point and other regulated sources in the watershed.

B. Processes Influencing DO Conditions, and Available Information for the LCFRE

Several major processes influence water-column DO concentration in rivers (*Figure 3*). Oxygen demand from two general sources controls water-column DO: *external* (incoming)

materials from land-based sources, upstream waters and the overlying airshed, usually referred to as the BOD in the water column, and the "*internal*" oxygen demand from biota respiration and river bottom sediments, usually called the sediment oxygen demand (SOD).

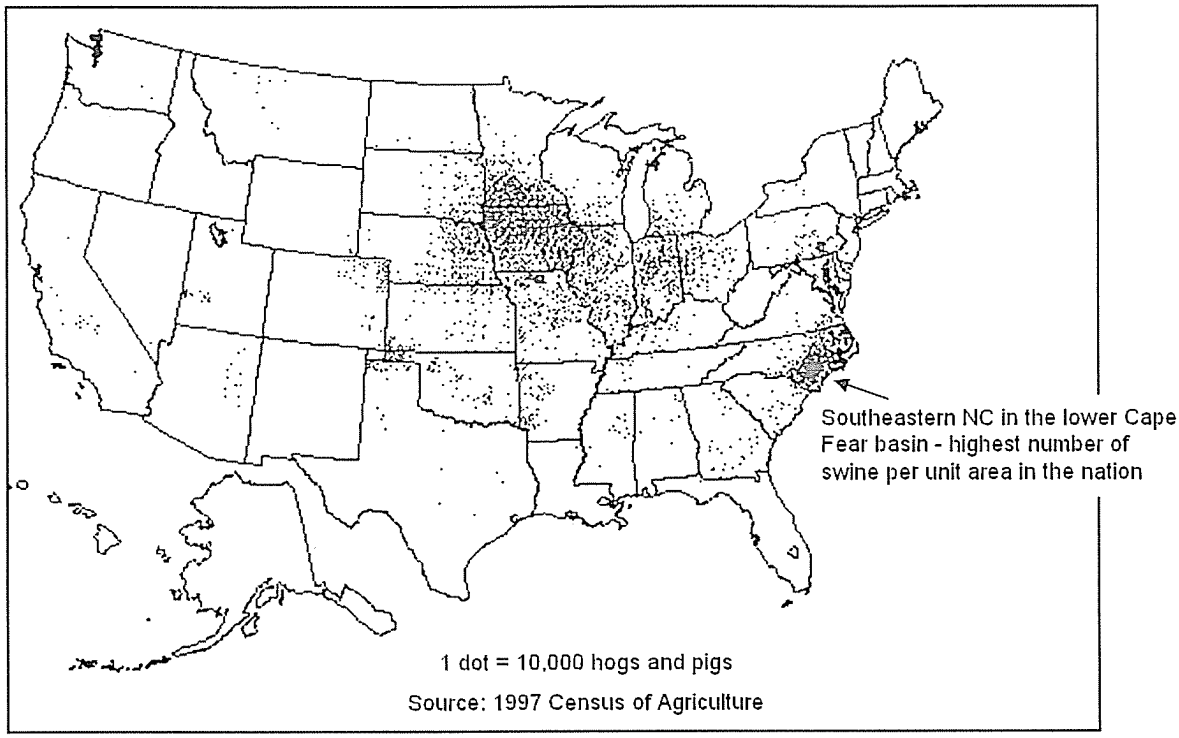

Figure 1. Map showing the number swine in southeastern North Carolina, with most CAFOs in the lower Cape Fear River basin area (source: http://scorecard.goodguide.com/env-releases/aw/nc-riverbasin.tcl?image_id=030300&huc6=030300). This map, produced by the USDA based on 1997, data, is supported by a more recent map, available at http://www.agcensus.usda.gov/Publications/2012/Online_Resources/Ag_Atlas_Maps/Economics/Market_Value_of_Agricultural_Products_Sold/12-M030.php, which shows the value of hogs and pigs sold in 2012 as the percent of the total market value. The highest concentration of swine per unit surface area across the nation is in the lower Cape Fear River basin.

BOD (units, milligrams per liter, mg/L) is the sum of carbonaceous and nitrogenous oxygen demands; it is a measure of the molecular oxygen used in the water column during a specific incubation period, usually 5 days, for the biochemical degradation of organic material (carbona-ceous demand) and the oxygen used to oxidize inorganic material (nitrogenous demand), as well as the amount of oxygen used to reduce forms of nitrogen (Eaton et al.1995, MacPherson 2003).

SOD (units, grams of molecular oxygen per square meter per day, g O_2 /m^2/day) is defined as the rate of DO removal from the water column due to the decomposition of organic matter in the bottom sediments (Hatcher 1986). It consists of biological sediment oxygen demand (usually at the sediment surface, dominated by bacteria that consume organic materials) and chemical sediment oxygen demand (usually ~2 inches down in the sediment, where anaerobic

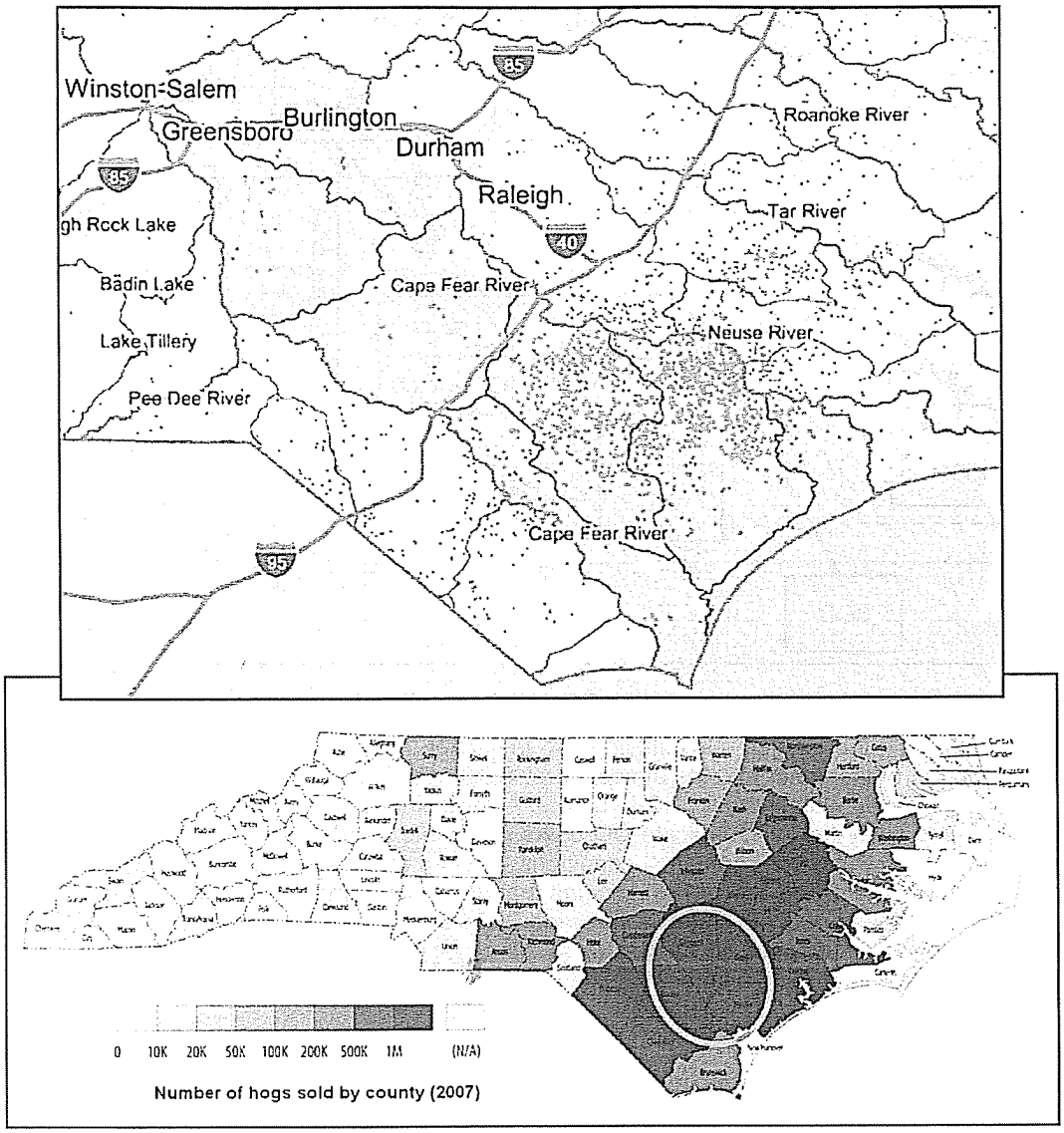

Figure 2. Upper panel - map showing the locations of swine CAFOs in North Carolina, indicating the preponderance of CAFOs in the lower Cape Fear River basin (source: http://scorecard.goodguide.com/env-releases/aw/nc-riverbasin.tcl?image_id=030300&huc6=030300, last accessed in February 2015). Lower panel: Map showing the numbers of hogs sold in North Carolina counties during 2007 (K ≡ thousands, M ≡ millions; U.S. Census data), modified from Learn NC, a program of the University of North Carolina School of Education (available at http://www.learnnc.org/lp/editions/nchist-recent/6257, last accessed in August 2014). The darker area "down east" on the Coastal Plain of the state has, as mentioned, the highest concentration of swine per unit area in the nation (National Hog Farmer 2014.).

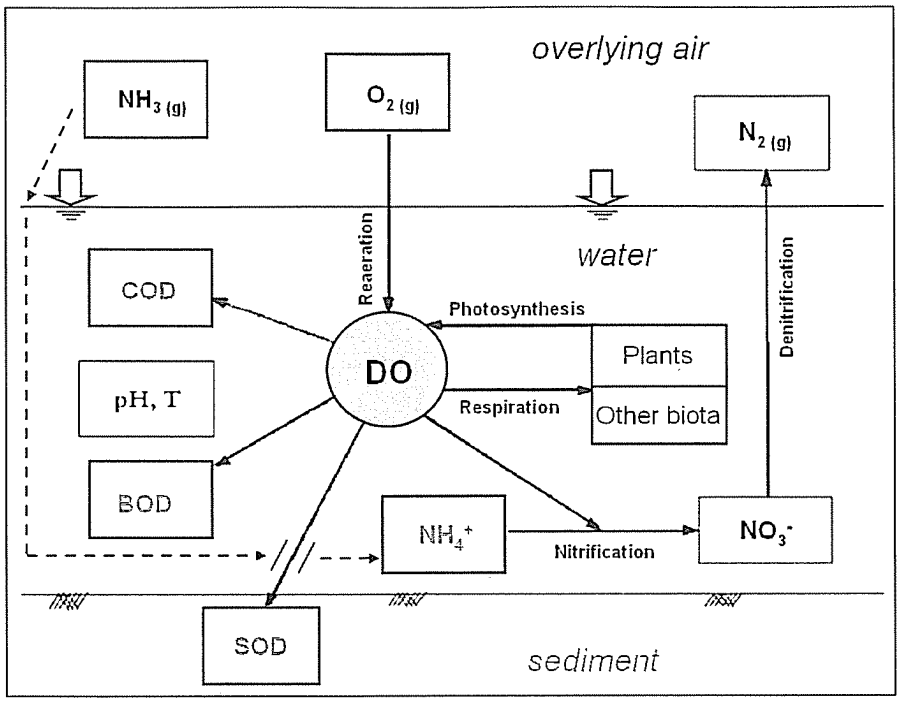

Figure 3. A schematic of the major processes influencing the water-column ("water") DO concentration in rivers: O_2 = the oxygen gas diffusing into the water from the atmosphere; N_2 - the nitrogen gas diffusing out of the water into the atmosphere; COD - the immediate chemical oxygen demand; T - temperature; NH_4^+ - ammonium; NO_3^- - nitrate. Arrows directed toward DO indicate DO sources; arrows directed away from DO indicate DO users (consumers or "sinks"). Parameters in red are oxygen-demanding. Other environmental conditions that can affect DO are represented by pH and temperature (T). The dashed-line arrow indicates that ammonia from the overlying airshed, largely contributed in southeastern North Carolina by swine CAFOs (Walker et al. 2000, Aneja et al. 2003), is mostly ionized to ammonium in neutral to alkaline waters and becomes a source of nitrogenous oxygen demand in forming nitrate. Modified from Cox (2003).

anaerobic bacteria degrade organic matter in a process that produces reduced ions that react with oxygen when they diffuse upward to an oxidized area (Walker and Snodgrass 1986).

The organic materials contributing to SOD can come from outside the system (such as leaf litter or settling of organic particles from human or animal wastes), or from within the system (such as decomposing algae). SOD is positively related to the amount of organic carbon content (i.e., bioavailable organic materials) in the sediment (MacPherson 2003 and references therein). Basically, the rate at which the sediment community consumes oxygen indicates whether the sediment area is degraded by too much organic matter (Massachusetts Water Resources Authority 2002). Once organic material reaches the bottom sediments of the river segment, SOD is influenced by two different processes: the rate at which oxygen diffuses into the sediments and is consumed there, and the rate at which reduced organic substances move into the water column and are then oxidized (Bowie et al. 1985, Todd et al. 2009).

Thus, SOD is the combination of the respiration of bottom-dwelling organisms in the sediment from decomposition of organic matter, and chemical oxidation of reduced substances in the sediment (Todd et al. 2009, and references therein). SOD can create oxygen deficits by reducing the amount of available oxygen in the overlying water (Seiki et al. 1994), and it can be a significant percentage of the total oxygen consumed in a given river or estuary (Caldwell and Doyle 1995). SOD rates serve as proxies for the effects of pollution on the biological activity of the bottom (benthic) community; for example, a nutrient-polluted system generally has an increased demand for oxygen (Natural Research Council 2000). Extreme levels of SOD (~20 $g/m^2/day$) can occur from oxygen consumption by animal wastes or sewage materials that settled out to the bottom (Davis 1950). Reduction in the amount of incoming organic materials from such pollution can lower the SOD as the system recovers (see Massachusetts Water Resources Authority 2002).

The sophisticated three-dimensional, Environmental Fluid Dynamics Code model used by Bowen et al. (2009) requires extensive information for the many factors needed to construct (parameterize) it for a specific river segment (Hamrick 1992; Bowen et al. 2009 - see p.v, Table 1, and Figure 2 in that document). Adequate measurements from the LCFRE for many of these factors were/are not available, and they vary considerably from river to river (Hamrick 1992, Todd et al. 2009, and references therein). The required missing or sparse (inadequate) information includes oxygen fluxes between the water column and the bottom sediment of the river. The information was instead "prescribed" (estimated, or taken from general literature not specific to the LCFRE) (Bowen et al. 2009, p.2-1). Bowen et al.'s (2009) model development revealed that, as in many if not most lower rivers along coastlands, SOD has an especially significant impact on DO concentrations. *SOD varies by as much as three orders of magnitude (1,000-fold) from river to river*, with rates ranging from ~0.1 to 18 grams of oxygen [demand] per square meter per day ($g/m^2/day$) (Rolley and Owens 1967, Chapra 1997, Todd et al. 2009). Importantly,

> The effect of SOD on the oxygen budget of an entire river system should not be underestimated, as it can be a critical sink of DO (Wu 1990). Indeed, in some rivers SOD can account for over half of the total oxygen demand and can play a primary role in the water quality....[Yet] this parameter is often assumed (or estimated) in water quality models (Hatcher 1986, Matlock et al. 2003). Errors in this measurement could lead to inaccurate models for the stream environment, at great biological and financial cost. - Todd et al. (2009)

Only sparse, dated SOD information was available for the LCFRE, taken more than a decade ago by the former NCDENR – DWQ (Division of Water Quality) at five locations on only five dates during summer/fall of one year, 2003 (Bowen et al. 2009, pp. 2-14, 2-15). At a given location, SOD is known to vary substantially by season and from year to year (Hatcher 1986, MacPherson 2003 and references therein). Lacking sufficient data and, thus, finding these sparse data to be a poor fit for the model overall, Bowen et al. (2009) "selected" SOD values until they found one that best fit their model for predicting water-column DO data, which had been constructed using available water-column DO measurements. In other words, Bowen et al. knew what the water-column DO had been because it had been measured during the period of focus, so they tried different SOD values until the model generally "fit" the water-column DO data. The SOD value (adjusted in an attempt to allow

for seasonal changes) was applied to most of the LCFRE; a second, nearly four-fold higher value for SOD was applied to the Northeast Cape Fear River which is heavily influenced by swine CAFOs (see p.18 below). Bowen et al.'s (2009) approach to estimate SOD technically requires that all rates except SOD have been accurately determined based on data for the specific system (Cox 2003). In reality, some of the data needed to accurately estimate the major rates of processes shown in *Figure 3* of these Comments (photosynthesis, respiration, nitrification, denitrification, reaeration) are lacking at representative points along the LCFRE system. Such data should include at least monthly measurements from April through October during dry, average-precipitation, and wet years (Hatcher 1986 and references therein).

C. The Model Predicted 90% Control of LCFRE DO Levels by the "Tributary Inputs," and Compliance with the DO Standard by Reducing Those Inputs

Despite the above-described weaknesses, Bowen et al.'s (2009) model *did* predict - as would be expected from knowledge of pollution sources in the LCFRE basin - that the 20 point sources they considered had only a small effect on the water-column DO concentrations. In contrast, "tributary inputs," loosely defined as excluding the 20 point sources, were evaluated as the major controlling influence on DO. Importantly, when Bowen et al. artificially forced SOD to remain constant over time despite imposing reductions of 30%, 50%, or 70% in BOD loads from the "tribuary inputs," the model predicted that the BOD decreases alone would increase median DO concentrations to well above the present DO standard of 5 mg/L. In addition, if BOD from tributary inputs and SOD were both reduced by 30%, the model predicted that summer DO violations would decrease from 45% to 22%, down to only 7% with a 50% reduction, and down to 1% with a 70% reduction. Such a scenario of decreasing BOD and SOD is realistic, as SOD is known to decrease over time with decreasing water-column BOD inputs, and related decreases in the bioavailabilty of organic matter that settles out to the sediments (Hatcher 1986, MacPherson 2003 and references therein).

Bowen et al. (2009) did not attempt to address the predominant sources in the "tributary inputs." They aptly noted (pp. vii-viii) that their model indicated the importance of benthic fluxes of oxygen. They also aptly recommended additional work to assess SOD and also, importantly, to separately consider the effects of wetland (natural) versus "riverine" (pollution carried by the river and tributaries) loadings to DO conditions in the estuary. The subsequent work in support of this proposal did not conduct these evaluations.

D. Point Source Pollution from NPDES-Permitted Facilities Upstream from the LCFRE

Given the above predictions from Bowen et al.'s (2009) model, control of "tributary inputs" *would* allow the LCFRE to attain the present DO standard. Therefore, a TMDL for the LCFRE segment is entirely appropriate. Moreover, as stated, the available scientific information indicates that human-related pollution - not natural wetland drainage - is the major source of oxygen-demanding materials to this segment (see pp. 18-19 below).

The U.S. EPA states that:[3]

[3] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/overviewoftmdl.cfm#tmdlrequired

the objective of a TMDL is to determine the loading capacity of a given water body and to allocate that load among different pollutant sources so that the appropriate control actions can be taken and water quality standards achieved....**All contributing sources of the pollutants** (point and nonpoint sources) are identified, and they are allocated a portion of the allowable load...." (emphasis added).

Thus, a TMDL for the LCFRE should consider the entire watershed above that segment as potentially contributing to pollution in that segment. According to NC DENR[4], the upper-middle Cape Fear basin has 38 major point sources (discharging ≥ 1 mgd; *Figure 4*) and ~115 minor point sources (< 1 mgd) with NPDES permits. The lower Cape Fear basin contains 10 major point sources and 33 minor point sources with NPDES permits. Thus, the river sustains loading from 195 NPDES-permitted point sources including nearly 50 major NPDES-permitted point sources and nearly 150 minor NPDES-permitted point sources. Consider the following example of a major point source that was not among the 20 specifically assessed by Bowen et al. (2009):

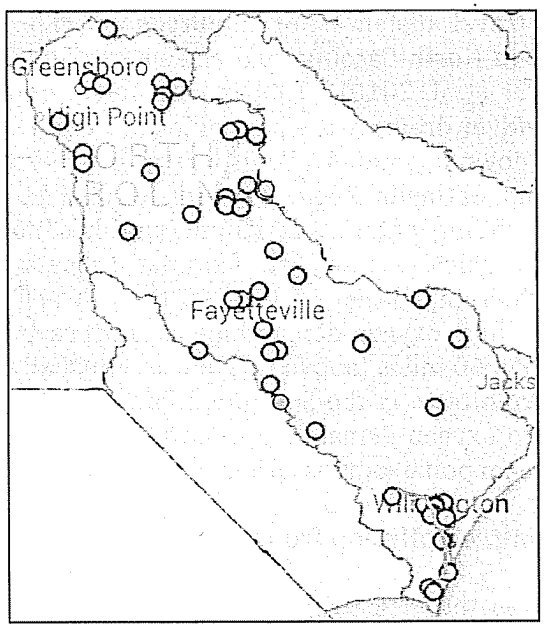

Figure 4. Map showing the locations of major point sources with NPDES permits from NC DENR in the Cape Fear River basin (red dot, Smithfield Packing Company; red line - approximate location of the LCFRE segment proposed for reclassification). Modified from NC DENR (see websites given in footnote 4).

The Smithfield Packing Company at Tar Heel in the mid-Cape Fear River basin, ~60 miles upstream from the LCFRE (location indicated by the red dot in *Figure 4*), is permitted to discharge up to 3 mgd of effluent containing up to 250 pounds of BOD_5 per day during April - October as a monthly average, and up to 500 pounds of BOD_5 as a daily maximum (NC DENR permit #NC0078344). During November-March, the plant is permitted to discharge double those amounts (i.e., 500 pounds per day, monthly average; 1,000 pounds per day, daily maximum, equivalent to 45 mg of biochemical oxygen-demanding materials/L). Rivers are considered to be stressed with too much BOD_5 if concentrations exceed 3 mg/L (Mallin et al. 2006). The plant is also permitted to discharge 30 pounds of ammonia-N/day as a monthly average during April-October, and 60 pounds of ammonia-N per day (7.5 mg/L) as a daily maximum. In November-March, these numbers, as pounds per day, can double. As explained, ammonia is oxygen-demanding, highly toxic to sensitive aquatic life, and a form of inorganic nitrogen that, at concentrations of only 0.1-0.2 mg/L, can stimulate noxious and toxic algal outbreaks (Bricker et al. 1999 and references therein, Mallin 2000). Other inorganic nitrogen forms, nitrate+nitrite, in discharges from the plant can be up to ~120 mg/L as a monthly average, and up to ~185 mg/L as a daily maximum. As stated,

[4] 2014 - http://portal.ncdenr.org/web/wq/npdes-major-facility-map, and http://portal.ncdenr.org/web/wq/npdes-minor-facility-map.

only 0.1-0.2 mg/L of inorganic nitrogen is needed to stimulate noxious and toxic algal outbreaks. Thus, extremely high oxygen-demanding materials and inorganic nitrogen nutrient forms are permitted for discharge by this major point source.

Overall, nearly 150 NPDES-permitted point sources in the Cape Fear River watershed are upstream from or adjacent to the LCFRE. Some pollutants from these point sources, such as the highly soluble nitrogen species, nitrate, are highly soluble; nitrate, for example, is known to travel distances of hundreds of miles downstream from upper to lower watersheds in North Carolina and elsewhere (Mallin et al. 1993, Houser and Richardson 2010, Houser et al. 2010). That is why, for example, various pollutants from the upper Mississippi River drainage are known to contribute to the "dead zone" of little or no oxygen all the way down in southern Louisiana, near the river's confluence with the Gulf of Mexico (Goolsby and Battaglin 2001, Jacobson et al. 2011). Nutrient pollution contributes to oxygen-demanding materials by stimulating algal blooms that die and are then decomposed by bacteria which use oxygen for that process (Burkholder and Glibert 2013, and references therein). Based on the fact that nitrate, much less soluble pollutants such as phosphorus, and oxygen-demanding organic carbon materials can travel much longer distances than 60 miles (above references, Minshall et al. 1983, Meyer and Edwards 1990), the excessive nitrate in the Smithfield Packing Company discharge should be expected to contribute to oxygen-demanding materials in the LCFRE ecosystem. The same is true of other upstream point sources, other regulated sources and nonpoint sources.

E. Point Source Pollution from Animal Production in the Lower Cape Fear Basin

In addition to the ~150 NPDES-permitted point sources that should be considered by NCDENR in developing a TMDL to improve DO in the LCFRE, there are nearly 1,000 swine CAFO point sources in the lower Cape Fear basin (and an unknown number of poultry CAFOs, based on Mallin 2014). The available scientific information shows that swine CAFO point sources are the major source of water quality impairment in the lower Cape Fear basin.

Major degradation of the natural resources in the lower Cape Fear basin due to swine CAFO point sources -- encompassing degradation to the airshed, soils, groundwaters, and surface waters -- has been well-documented and is briefly summarized below. It merits mention that, throughout these Comments, the focus when considering CAFOs is on swine production because relatively little information about poultry production is available to scientists or other members of the general public (e.g. see Rothenberger et al. 2009a). North Carolina is second in poultry production among the states, but nearly all of the operations have fewer animals than are defined by the state legislature as a poultry CAFO, and most information is allowed to the general public only for poultry CAFOs. Thus, most information given below for industrialized animal production in the Cape Fear basin is substantially underestimated because it focuses only on swine.

The available information *does* show that poultry production is a major source of pollution in the Cape Fear watershed (Cahoon et al. 1999). According to the North Carolina Department of Agriculture (http://www.ncagr.gov/stats/coest/Index.htm), in 2012 the lower Cape Fear basin (Brunswick, Pender, Duplin, Sampson, and Cumberland Counties, and estimates for parts of Bladen and Onslow Counties) contained about 5 million swine,

21.5 million poultry, 123 million chickens, and 72,000 cattle. The facilities which produce these animals are *not* required to have streamside buffers, or to control of ammonia or hydrogen sulfide emissions etc. They *are* required to have what can only be described as grossly inadequate waste management because it clearly does not prevent major impacts to public trust natural resources (below). Cahoon et al. (1999) provided the following estimates for the Cape Fear River basin (recall that most swine production occurs in the lower basin):

- Swine: more than 7 million tons of fresh manure per year added to the lower basin;
- Poultry: 2.18 million tons of fresh manure per year;
- Cattle: 2.08 million tons of fresh manure per year;
- Total from this animal production: 82,700 tons of nitrogen (N) and 25,950 tons of phosphorus (P) (Cahoon et al. 1999), the two nutrients that are known to cause major noxious algal outbreaks (Burkholder and Glibert 2013).

Cahoon et al. (1999) concluded that:

> The eutrophication threat to these river basins [which included the Cape Fear River basin]... with expanding animal populations from the potential large nutrient loadings associated with intensive livestock operations is substantial.

Many contaminants are present in swine CAFO wastes and runoff, including extremely high levels of nutrients N and P, more than 100 microbes known to cause human disease, pharmaceutical chemicals that harm beneficial aquatic life, toxic heavy metals (especially copper and zinc), and pesticides such as toxic dithiocarbamates from sprayfield applications (Barker and Zublena 1995; Burkholder et al. 1997, 2007 and references therein, Iowa State University and The University of Iowa Study Group 2002, Extension Toxicology Network 2003). These contaminants can enter the surrounding environment through pathways such as leakage from poorly constructed cesspits, or during major precipitation events that cause cess pit overflow and runoff from recent sprayfield application, or atmospheric deposition followed by wet or dry fallout (Burkholder et al. 2007 and references therein). The magnitude and direction of transport depends on factors such as soil properties, contaminant properties, hydraulic loading characteristics, and crop management practices. Over-application of swine wastes to sprayfields can result in contaminants leaching through permeable soils into vulnerable aquifers (see Section IIIE - Groundwater Degradation from Swine CAFO Point Sources, below).

Contamination of surrounding public-trust surface waters such as the LCFRE in southeastern North Carolina is a common, routine problem *at recommended application rates* as well (e.g. Barker and Zublena 1995; Westerman et al. 1995; Zublena et al. 1995; Stone et al. 1995, 1998; Walker et al. 2000; Aneja et al. 2001, 2003). Improper disposal of animal carcasses and abandoned swine CAFO facilities also contribute to water quality problems. Siting of CAFOs in areas prone to flooding or where there is a shallow water table, such as in the lower Cape Fear basin, increases the potential for contamination of public trust natural resources as well.

Swine CAFO point sources in the lower Cape Fear basin - Swine CAFOs in southeastern North Carolina mostly were installed from the late 1980s through 1995. These CAFOs store

animal wastes in large cess pits (which the industry calls "lagoons") (*Figure 5*). After the solids mostly settle out, the liquid wastes are applied to relatively small sprayfields. The soils in the area are mainly sandy and shallow; the water table is only about three feet from the land surface (Burkholder et al. 1997 and references therein). The shallow, sandy soils simply cannot absorb the massive amounts of waste applied to them by the CAFOs, time after time per season, year after year (see example in *Figure 4*). Waste that is applied to the fields mostly percolates into the shallow groundwater and then moves to receiving streams and rivers (e.g. Evans et al. 1984). Most cess pits for these swine CAFOs were installed in North Carolina prior to 1993, when linings of clay or other materials were not required (Burkholder 1997 and references therein).

Figure 5. Left: A swine CAFO in the lower Cape Fear River basin, showing (from top to bottom) a house (noted for scale), the buildings that contain about 5,000 animals, the adjacent cess pit, the sprayfield, a stream that has been transformed to a gully conveying wastes from the field into a wetland, and a dense bloom of cyanobacteria (blue-green algae), potentially toxic to humans, that was fueled by the high nutrients in the CAFO wastes (see Burkholder et al. 1997, 2007 for supporting information). Thus, clearly the wastes were moving off-site to contaminate adjacent natural resources. This relatively small field with a shallow layer of soil above the water table, and the cess pit, are "supposed to" adequately treat the liquid wastes, year after year, from 5,000 swine per year, equivalent to the amount of wastes produced by 20,000 people (1 swine produces the equivalent amount of wastes, roughly, of 4 people; see below). Photo: M. Mallin. Right: Two swine CAFO cess pits (the car is circled for scale). The pinkish color is due to anaerobic sulfur bacteria and is suggestive of very high levels of hydrogen sulfide gas, which is toxic to humans (Burkholder et al. 1997, and references therein). Photo: R. Dove, Waterkeeper Alliance.

The general situation was described as follows:

> [CAFO] technology, originally designed for application in upland areas with adequate soil depth above the water table, was embraced in counties where 60-80% of the area put into production was originally low-lying wetlands adjacent to rivers and estuaries. The operations were exempt from land zoning laws and mandatory inspection programs. Waste lagoons were not required to have leakage-reducing liners; some were constructed below the water table less than 20 m [50 feet] from neighboring homes and wells . . . The NC Division of Water

> Quality, charged with water resources management, lacked the personnel and resources necessary to adequately monitor surface or groundwater quality. More fundamentally, the North Carolina Department of Agriculture legally refused to provide the Division of Water Quality with basic data such as the location and number of existing and planned animal operations . . . After considerable effort the North Carolina Environmental Management Commission . . . passed rules in 1993 for design of animal waste lagoons and effluent treatment. These rules mandated use of clay or other suitable liners in future construction of lagoons associated with [CAFOs with] 250 or more swine. They included a grandfather clause to exempt existing operations from having to alter their lagoon design . . ..(Burkholder et al. (1997; references included therein).

The information presented below for airshed, soil and groundwater contamination is included because pollution of those natural resources by swine CAFOs can substantially contribute to surface water contamination, which is the main subject of these Comments regarding the state's classification of the LCFRE segment.

Airshed degradation from swine CAFO point sources

Swine CAFOs emit copious air pollutants known to adversely impact human health and, indirectly, surface waters. For example, ammonia and hydrogen sulfide are emitted at levels toxic to humans (U.S. EPA 1998; also Aneja et al. 2001, Liu et al. 2014). Within a 60-mile radius from where it is emitted, the volatilized ammonia tends to return to the land and surface waters with rain (Aneja et al. 2003), where it can adversely affect river ecosystems (below; e.g. Rothenberger et al. 2009b).

Swine CAFO production in the lower Cape Fear basin has caused a significant increase in air pollutants such as ammonia (Aneja et al. 2003, Wing et al. 2012 and references therein). Surface waters and groundwater are also being adversely impacted; Burkholder et al. (2006) documented a significant increase in ammonia concentrations within the lower Cape Fear River where swine CAFOs are highly concentrated. Cahoon et al. (1999) wrote,

> Aerial deposition of nitrogen, principally ammonia-nitrogen, is recognized as a contributing threat to coastal water quality . . . Some studies estimate that up to 90% of the manure nitrogen produced by swine volatilizes and is deposited downwind [to the land and surface waters] (NC DENR Division of Air Quality 1997).

Sampson County (946 square miles), in the Cape Fear River basin, had 1.8 million swine as of 1998. The National Atmospheric Deposition Program has monitored atmospheric ammonia there since 1978. Mallin (2000) noted that during the 1988-1998 decade, there was a concurrent rise in atmospheric ammonia and the swine population; and that from linear regression analysis, 72% of the variability in airborne ammonia could be explained by changes in the county swine population alone. Upwind in the North Carolina Piedmont, counties with low swine populations showed no ammonia increase during the same period.

Soil degradation from swine CAFO point sources

Swine feed contains metals such as copper act as micronutrients in low concentrations, but

as toxic substances at higher levels. The metals persist in the extremely high amounts of swine wastes (Cahoon et al. 1999; see p.10 of these Comments), which are then applied to fields. Sensitive crops often cannot withdraw the metal in the soil, and leave it behind to accumulate. Research done in eastern North Carolina has explained how waste application contributes to metals pollution in field and, importantly, also has shown that as long ago as the mid-1990s, several counties in the lower Cape Fear River basin could no longer be used to grow metal-sensitive crops and would not need to fertilize with nitrogen or phosphorus for decades (Barker and Zublena 1995, Zublena et al. 1995). Runoff from the contaminated soil during/following precipitation events adds some of these toxic pollutants to adjacent surface waters.

Groundwater degradation from swine CAFO point sources

Areas around the cess pits of swine CAFOs in eastern North Carolina have been shown to receive leakage high in contaminant levels. Wells and subsurface seepage near the cess pits can be contaminated with extremely high levels of nitrate and ammonia (e.g. Huffman and Westerman 1995, Westerman et al. 1995, Ham and DeSutter 2000). The high nitrate levels are a result of the high ammonia levels because the ammonia is oxidized to nitrate as it moves away from the waste sources (see Burkholder et al. 1997, 2007, and references therein). High concentrations of nitrate are hazardous to human health, especially for babies and small children (who can be afflicted with methemoglobinemia or 'blue-baby syndrome'), because nitrate competes with oxygen for hemoglobin in the human bloodstream (Smith 2009, Knobeloch et al. 2010).

Many North Carolinians in the Coastal Plain area rely upon groundwater as their drinking water source (North Carolina Groundwater Association, http://www.ncgwa.org). North Carolina's drinking water standard for nitrate is less than 10 milligrams per liter (mg/L).[5] The available data suggest that many unlined swine effluent cess pits in eastern North Carolina cause nitrate pollution to nearby wells at levels that violate the 10 mg/L drinking water standard (e.g. Huffman 2004, Huffman and Westerman 1995, Westerman et al. 1995). Working in Sampson County within the Cape Fear River basin, Westerman et al.'s (1995, p.1749) study illustrates high contamination from unlined cess pit leakage:

> Two swine manure, anaerobic lagoons located in sandy, coastal plain soil were investigated. Both continued to have significant seepage after 3.5 to 5 years of receiving waste. Monitoring wells indicated *broad seepage plumes* [emphasis added], and much variation in concentrations of several parameters with well location, time, and depth of well . . . In some cases, ammonia and chloride concentrations in well samples were as high or higher than the lagoon liquid.

The last sentence of the above quote is especially of concern - that nearby monitoring wells had ammonia concentrations even higher than the lagoon liquid swine waste. Such

[5] (NC DENR Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina, NC Admin. Code Section 15A NCAC 2B .0200, Environmental Management Commission, Raleigh, NC; http://portal.ncdenr.org/c/document_library/get_file?uuid=ad77b198-aa3d-4874-9723-54ce730b3a8d&groupId=38364).

information points to a major threat to shallow drinking water wells located only short distances, as little as 50 feet, from a swine lagoon cess pit.

Based on the available science literature, substantial groundwater contamination also is contributed by lined cess pits if not properly operated, as described by Westerman et al. (1985, p.1750):

> Ritter and Chirnside (1987) . . . reported high concentrations of NH_3-N and NO_3-N in groundwater monitoring wells near a clay-lined anaerobic lagoon for a hog-finishing unit. Some of the high NH_3-N concentrations were possibly due to lagoon overflow, which occurred several times. They suggested that the lagoon management of completely emptying the lagoon twice a year led to drying and cracking of the clay liner, resulting in seepage. They concluded that if clay-lined lagoons are not operated properly, they will have a serious impact on groundwater quality in loamy sand or sandy loam soils.

Ritter and Chirnside (1990) also reported extreme *average* ammonia-N concentrations, up to 1,000 mg/L, and extreme average nitrate-N up to 50 mg/L, in some wells near a clay-lined swine waste cess pit on the Delmarva Peninsula.

Swine CAFOs (both the land application practices and cess pit leakage) additionally pose a significant threat to well water via contamination by other harmful substances and pathogenic microbes (e.g. Stone et al. 1998, Krapac et al. 2002). Moreover, much lower concentrations of nitrate and ammonia can cause disease and death of beneficial aquatic life in receiving surface waters (see below). During summer low flow conditions on the North Carolina Coastal Plain, at least half of stream and river flow can be contributed by groundwater (Garrett et al. 2012 and references therein). Thus, groundwater contamination by swine CAFOs can contribute significantly to surface water contamination. Cahoon et al. (1999, p.414) wrote,

> An important water quality problem in North Carolina deriving from animal waste inputs is nitrogen loading to surface and groundwaters. Nitrogen frequently limits phytoplankton production in North Carolina's coastal waters, so increased nitrogen loads have stimulated noxious and toxic algal blooms and helped cause fish kills.

Surface water degradation from swine CAFOs

The wastes applied to sprayfields, emitted to the overlying airshed during the spraying activity, or leached into groundwater can make their way into surface waters as explained above. In addition, when the sprayfield soils are saturated with contaminants or with water during moderate to high precipitation periods, or due to over-application, the additional applied wastes rapidly move overland, through tile drains, and through the many ditches in the area to nearby surface waters. Thus, working in eastern North Carolina, Westerman et al. (1985) found high levels of nitrate (3-6 mg/L) in surface runoff from swine CAFO sprayfields that received swine waste effluent ***at recommended rates*** - that is, as a result of routine, accepted practices. For comparison, ~0.1 mg/L of nitrate (and ~0.08

mg/L of phosphorus - below) can cause noxious algal blooms (Mallin 2000, Wetzel 2001, and references therein). Working in Duplin County within the Cape Fear River basin, Stone et al. (1995) measured 6-8 mg of total inorganic nitrogen/L (= nitrate + nitrite + ammonia or ammonium) and 0.7-1.3 mg of phosphorus/L, another important nutrient that can fuel noxious and toxic algal outbreaks (Burkholder 2009), in a stream adjacent to swine effluent sprayfields:

> Mean nitrate-N concentrations of water leaving the [two] watershed outlet[s] were two- and four-times higher than background concentrations . . . Daily mean nitrate-N concentrations [at a tributary adjacent to a swine CAFO] sometimes exceeded 10 mg/L and frequently exceeded 6 mg/L. Over-applied swine lagoon effluent and undersized, overloaded lagoons were likely contributors . . . Mean ammonium-N concentrations . . . were approximately two- and four-times higher than background concentrations. Ammonium-N concentrations [at one watershed outlet] exceeded limits considered harmful to humans (0.5 mg/L) and fish (2.5 mg/L) (U.S. EPA 1973). During the first month of the sampling period, daily ammonium-N concentrations ranged from 6 to 12 mg/L . . . These high concentrations indicated that a significant discharge of animal waste products into the waterway had occurred . . . while storm flows are contributing to the total flux of nitrate-N, the majority of the nitrate-N flux is coming directly from the base flow [in other words, the high contamination occurred with and without precipitation/runoff]. - Stone et al. (1995)

Evans et al. (1984) reported 7-30 mg nitrate/L in subsurface flow draining a sprayfield for swine wastes that were applied at recommended rates:

> The potential for nutrient transport was much greater for subsurface drainage [than for surface drainage] . . . Nitrogen application at the recommended rate resulted in phosphorus application at nearly three times the recommended rate. Although this soil fixes [adsorbs] phosphorus, there was evidence of phosphorus movement in subsurface runoff by the fifth year of waste application at a higher rate. Continued phosphorus application even at the low [recommended] rate would eventually result in movement of P in subsurface runoff as the soil's assimilatory capacity for phosphorus would eventually be exceeded. - Evans et al. (1984)

These reports all describe *excessive* levels of inorganic nitrogen and phosphorus in comparison to what is needed to fuel a noxious or harmful algal outbreak. Evans et al. (1984) highlighted another problem -- that recommended rates of nitrogen application resulted in major excesses of phosphorus that, within a relatively short time, would saturate the soil and contaminate receiving adjacent surface- and ground-waters.

As mentioned, the extremely high nitrate in surface waters and groundwater near swine CAFOs comes from the high ammonia in swine wastes that combines with oxygen. Much lower nitrate levels (0.25-0.28 mg/L) than found in the above-described studies can cause disease and death of beneficial aquatic life (Camargo et al. 2005, Camargo and Alonso 2006). Nitrate can interfere with steroid hormone synthesis, adversely affect sperm

motility and viability, depress fecundity, and can be toxic to embryos (Edwards et al. 2004). It can also decrease immune response, act as an endocrine disruptor, and induce harmful hematological and biochemical changes in beneficial aquatic life (Guillette and Edwards 2005).

Although much of the ammonia which contaminates surface waters from swine CAFOs is oxidized to nitrate, before that occurs the ammonia can cause high toxicity to beneficial aquatic life, or can stimulate noxious algal outbreaks. Ammonia is a preferred form of nitrogen for many algal species including various harmful algae that can cause serious human illness (compiled from Bollos and Berge, Twomy et al. 2005, Herndon and Cochlan 2006, Burkholder 2009). Burkholder et al. (1997) reported ammonia concentrations as high as ~40 mg/L in a stream contaminated by a swine cess pit rupture. Such concentrations can be highly toxic to aquatic life (Camargo et al. 2005, Camargo and Alonso 2006), and would also be expected to stimulate noxious/harmful algal growth as the concentration became more dilute downstream (as was observed by Burkholder et al. 1997 and Mallin et al. 1997).

Swine CAFOs can cause other major surface water impacts from suspended solids loads and turbidity. The water near swine CAFOs is often dark and murky, and inhibits beneficial plant growth (Burkholder et al. 1997, Mallin 2000, and references therein). Swine wastes are acidic (pH ~6.5 - Zu et al. 2001 and references therein) and can impart acidity to receiving surface waters, although the lower mainstem Cape Fear River is well buffered due to the ocean's influence. Toxic levels of metals such as copper occur in runoff from swine effluent sprayfields because copper and other "trace elements" are added to swine feed to promote growth and control disease (Payne et al. 1988). These toxic substances can accumulate in sediments, water, and biota, to levels that are toxic to plants and lead to reproductive impairment, poor body condition, and immune system suppression in beneficial animals (Stubbs and Cathey 1999). Copper from swine and other livestock operations can be added to surface waters via overland discharge and groundwater leachate (U.S. EPA 2013).

Many impacts on surface waters from swine CAFOs are only beginning to be examined. Surface waters in Duplin County, also within the Cape Fear River basin, were recently assessed for fecal indicator bacteria (fecal coliforms, *Escherichia coli*, and *Enterococcus*) and candidate swine-specific microbial source-tracking bacteria over an annual period, both upstream and downstream from swine CAFO sprayfields. The authors noted, importantly, that the proximal "upstream" locations were potentially influenced by numerous upstream swine CAFO sprayfields, and also by poultry CAFO dry litter land application sites. The highest fecal indicator bacteria concentrations were found immediately downstream from swine CAFO sprayfields in spring and summer. The findings were summarized as follows:

> Testing of 187 samples showed high fecal indicator bacteria concentrations at both up- and downstream sites . . . Overall, 40%, 23%, and 61% of samples exceeded state [criteria] and federal recreational water quality guidelines for fecal coliforms, E. coli, and Enterococcus, respectively. Two swine indicator bacteria were 2.30 to 2.47 times as prevalent proximal down- than proximal upstream of swine CAFOs . . . *Results suggest diffuse and overall poor sanitary*

quality of surface waters where swine CAFO density is high [emphasis added].
- Heaney et al. (2015)

The water column of receiving rivers is not the only area affected by CAFO contamination. Burkholder et al. (1997) tracked surface water impacts from a swine cess pit rupture upstream from the New River Estuary near of the Cape Fear River basin. Fecal coliform bacteria densities were in the millions of colony-forming units [CFU] per 100 mL, whereas the state standard for safe human contact of the water is 200 CFU/100 mL. The state does not monitor contamination of bottom sediments by CAFO wastes. After 14 days, water-column fecal coliforms along the surface of the bottom sediments mostly yielded 10,000 CFU/100 mL, one to two orders of magnitude higher than elsewhere in the system. Even after 60 days, fecal bacterial densities in the surficial sediments of the affected area were at 1,000-10,000 CFU/100 mL. The data showed that bottom sediments contaminated by CAFO wastes can function as a repository source of fecal coliform bacteria and, likely, for co-occurring harmful microbes, for weeks to more than a month after a waste spill. The organic materials from the wastes that settled out would have been expected to greatly increase the SOD as well.

Surface waters presently classified as C (Sw) waters in areas draining swine and poultry CAFOs in the lower Cape Fear basin are extremely degraded

There is presently ongoing, persistent, extreme degradation of surface waters in the lower Cape Fear basin due to allowed practices of swine and poultry production. A recent description of a Class C (Sw) stream illustrates this reality:

Stocking Head Creek (8-digit Hydrologic Unit Code 003030007), a second-order tributary of the Northeast Cape Fear River, is presently classified by DWR as Class C (Sw) waters. This small stream (length 13.7 miles) drains 7.6 square miles of area containing 40 swine CAFOs and an estimated 11 poultry CAFOs, with total capacity for more than 94,000 swine and more than 1.3 million broiler chickens; it also includes some unconfined cattle (Mallin et al. 2014). Seven sites along the stream were sampled on 5 dates each in a 30-day period in summer and in fall of 2013. The data indicate a situation of persistent, extreme water quality degradation regardless of weather conditions; the excessive pollutant levels were similar whether the stream was sampled in dry or wet (rainy) periods.

The water quality conditions documented in Stocking Head Creek consistently were hazardous to human health at most stations. Geometric means for fecal coliform bacteria were in the thousands (as colony-forming units per 100 milliliters, CFU/100 mL) at 5 of the 7 sites. The state standard for safe human contact is less than 200 CFU of fecal coliform bacteria/100 mL (geometric mean, based on at least 5 consecutive samples during any 30-day period); and surface waters are supposed to have fewer than 400 CFU of fecal coliform baceria/100 mL in at least 80% of samples examined during the 30-day period. At 5 of the 7 sites on Stocking Head Creek, fecal coliform bacteria exceeded 400 CFU/100 mL on all, or nearly all, sampling dates.

Nutrient levels also demonstrated extreme water quality degradation. Some samples had more than 10 mg of nitrate/L. By comparison, the U.S. EPA (2000) recommends that nitrate should be 0.04 mg/L or less in streams within level III nutrient sub-ecoregion #63,

which includes southeastern North Carolina. The maximum ammonium concentration was 38 mg/L near swine waste sprayfields. BOD (5-day) exceeded 10 mg/L in 11 of 70 stream samples, with a maximum at 88 mg/L. Average total phosphorus (TP) per site ranged from 0.15 to 2.83 mg/L. By comparison, the U.S. EPA (2000) recommends that stream TP concentrations should be less than 0.052 mg/L for streams in this area.

Based on more than 30 years of experience as a water quality specialist, I assess these conditions, ongoing and persistent in this representative stream in the Northeast Cape Fear River basin upstream from the LCFRE segment, as comparable to the filthy conditions that occur just downstream from raw sewage discharge.

Swine CAFO wastes versus the 20 point source wastes and wetlands in the lower Cape Fear basin

Swine wastes are very rich in organic, oxygen-demanding materials in comparison to human wastes. Treated and raw domestic sewage contains ~20-60 mg BOD/L and ~300-400 mg BOD/L, respectively; swine waste slurries contain ~20,000-30,000 mg BOD/L (Webb and Archer 1994; also see Spellman and Whiting 2007). Surface waters contaminated with these wastes rapidly become oxygen-depleted, causing fish to suffocate to death (Burkholder et al. 1997, U.S. EPA 1998, Mallin 2000).

The contribution of oxygen-demanding materials from nearly 1,000 swine CAFO sources, mostly in the lower Cape Fear basin, clearly overwhelms the contribution from the 20 point sources considered by DWR. As stated, about 5 million swine are produced annually in the lower Cape Fear basin in CAFOs (Cahoon et al. 1999). It has been estimated that each animal contributes roughly the equivalent amount of waste -- much richer in oxygen-demanding materials -- of four people (derived from U.S. EPA 2004; see *Table 1* below). The population of the City of Wilmington as of 2014 was ~112,000 people. Overall in the lower Cape Fear basin, the 5 million swine produced per year in CAFOs produce ~179 times more wastes than the largest human population center, Wilmington. Moreover, pound for pound the swine wastes, conservatively estimated, contain about 10 times more oxygen-demanding materials than treated human wastes. Thus, in the lower Cape Fear basin, swine CAFO point sources are estimated to produce three orders of magnitude (~1,790 times) more oxygen-demanding materials than treated human wastes.

These Comments have several times referred to the Northeast Cape Fear River and Black River as having sustained major impacts from swine CAFOs. According to NCDENR (2005), the small sub-watersheds drained by the Northeast Cape Fear River and the Black River, alone, have 896 CAFOS that contain ~3,764,121 animals, roughly the same amount of sewage as more than 15 million people. Stocking Head Creek illustrates the surface water quality of streams draining such areas.

Based on the available information, *the massive contribution of organic-rich, oxygen-demanding materials from swine CAFOs also overwhelms the potential contribution from natural wetlands in the LCFRE.* The sparse available SOD data for the LCFRE (give in Bowen et al. 2009, p.3-20) ranged from 0.1900 to 0.6951 grams of oxygen demand per square meter per day ($g/m^2/day$). The highest values measured were near swine CAFOs, 0.5189 to

Table 1. Manure production per 1,000 pounds (lb) live weight on an annual basis. According to this information from the U.S. EPA (2004, Table 3.3), one 250-lb pig produces 7,250 lb of manure per year (19.86 lb/day), whereas one 150-lb human produces 183 lb of manure/yr (0.5 lb/day). A swine CAFO with 1,000 animals thus would produce about the same amount of waste as a city of 39,617 people. As the U.S. EPA (2004) wrote,

> The important difference lies in the fact that human waste is treated before discharge into the environment, but animal waste is either not treated at all or minimally treated....

It has been argued that swine wastes are about 10-fold more liquid than human wastes; if that dilution factor is taken into account, 1 animal would produce about the same amount of waste of 3.96 people, rounded to a ratio of 1:4.

Manure production per 1000 pounds live weight, on an annual basis.

Animal Species	Manure produced lbs./yr	Typical Handling System
Swine	29,000	Liquid
Poultry		
Broilers	28,000	Solid
Layers	22,000	Liquid
Turkeys	16,000	Solid
Beef	21,000	Solid
Dairy	30,000	Liquid
Humans	1,223[1]	Liquid

[1] Based on 150 lb avg. wt. per person producing 0.5 lb of fecal material per day

0.6951 g/m²/day; even areas near urban Wilmington had lower SOD (0.4440 to 0.4679 g/m²/day). Bowen et al. (p.4-42) used an estimated SOD of ~0.4 g/m²/day except for an area heavily influenced by swine CAFOs, the Northeast Cape Fear River sub-basin, where they used an estimated SOD of 1.5 g/m²/day. This information suggests that the swine CAFO-rich Northeast Cape Fear River alone, contributes excessive SOD in comparison to the rest of the LCFRE, expected since that small sub-watershed contains 502 swine CAFOs with 2,021,000 animals, or the equivalent amount of more than 8 million people's wastes per year (NCDENR 2005).

III. Summary and Recommendations

These Comments have explained the following main points regarding DWR's proposed reclassification of a segment of the LCFRE, from upstream of Toomers Creek to a line across the river between Lilliput Creek and Snows Cut, from Class Sc waters to Class Sc (Sw) (= swamp):

- ✓ NCDENR-DWR has proposed to reclassify the lower reaches of one of the most powerful rivers in the nation, a portion of the LCFRE, as a swamp because the agency's efforts to control the relatively small amount of pollution from 20 point sources will not allow that segment to meet present standard for DO (or for pH, turbidity, and toxic copper). This was based on a recent modeling effort (Bowen et al. 2009) which predicted that

the 20 arbitrarily selected point sources have little effect on DO levels in the LCFRE segment. In addition, the segment was described as inappropriate for development of a TMDL, based on two erroneous claims -- that natural wetland drainage is the major contributor of oxygen-demanding materials to the LCFRE segment, and that significant reductions in "background" sources of oxygen-demanding materials would not allow the LCFRE segment to meet the present DO standard.

- ✓ According to the U.S. EPA, assessment of whether a TMDL is needed to improve DO in the LCFRE segment is supposed to consider all point and nonpoint sources in the watershed. In focusing on only 20 point sources, DWR omitted consideration of massive pollution that could be reduced in the so-called "background" loads, including 175 NPDES-permitted, upstream and adjacent point sources in the Cape Fear River basin, and nearly 1,000 swine CAFOs (as well as an unknown number of poultry CAFOs) which are formally defined by the Clean Water Act as point sources. The ~5 million swine produced in the lower Cape Fear River basin contribute the equivalent of ~20 million people's wastes per year, and the massive wastes are much richer in oxygen-demanding materials than human wastes.

- ✓ The available evidence shows that pollution from human activities, not natural drainage from wetlands, is the major source of oxygen-demanding materials to the LCFRE segment, and that the massive pollution also contributes low pH, toxic copper, high turbidity, fecal bacteria, and many other contaminants to the LCFRE segment.

- ✓ The recent modeling effort by Bowen et al. (2009) tacitly included the many other NPDES-permitted point sources and swine/poultry CAFOs within a modeling category called "tributary inputs." The model predicted that a reduction of only 30% of the "tributary inputs" would result in median DO levels higher than the state standard; and that a 70% reduction in the "tributary inputs" would bring the LCFRE into compliance 99% of the time. Thus, reducing the massive pollution from other sources **would** enable the LCFRE segment to attain compliance with its present DO standard.

To protect the health of many North Carolinians of all ages who depend upon this river and estuary to meet its present designated uses, and to protect the LCFRE surface water segment of focus as well as other public trust natural resources in the lower Cape Fear basin, the LCFRE segment should not be reclassified as a Class Sc Swamp (Sw). Instead, DWR should be directed toward efforts to meaningfully reduce the massive pollution from swine CAFOs and NPDES-permitted point sources in the lower Cape Fear Basin (and from poultry production as well, which are a major pollution source with much less available information), which would make it possible for the LCFRE to meet the presently pplicable DO standard, and would also enable the LCFRE to improve in water quality with respect to pH, copper levels, and turbidity.

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Attachment 3

Designation of Critical Habitat for the Endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments of Atlantic Sturgeon and the Threatened Gulf of Maine Distinct Population Segment of Atlantic Sturgeon

National Marine Fisheries Service

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 226

[Docket No. 150818735–7452–02]

RIN 0648–BF28

Endangered and Threatened Species; Designation of Critical Habitat for the Endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments of Atlantic Sturgeon and the Threatened Gulf of Maine Distinct Population Segment of Atlantic Sturgeon

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

ACTION: Final rule.

SUMMARY: We (NMFS) are issuing this final rule to designate critical habitat for the threatened Gulf of Maine distinct population segment (DPS) of Atlantic sturgeon, the endangered New York Bight DPS of Atlantic sturgeon, the endangered Chesapeake Bay DPS of Atlantic sturgeon, the endangered Carolina DPS of Atlantic sturgeon and the endangered South Atlantic DPS of Atlantic sturgeon pursuant to the Endangered Species Act (ESA). Specific occupied areas designated as critical habitat for the Gulf of Maine DPS of Atlantic sturgeon contain approximately 244 kilometers (km; 152 miles) of aquatic habitat in the following rivers of Maine, New Hampshire, and Massachusetts: Penobscot, Kennebec, Androscoggin, Piscataqua, Cocheco, Salmon Falls, and Merrimack. Specific occupied areas designated as critical habitat for the New York Bight DPS of Atlantic sturgeon contain approximately 547 km (340 miles) of aquatic habitat in the following rivers of Connecticut, Massachusetts, New York, New Jersey, Pennsylvania, and Delaware: Connecticut, Housatonic, Hudson, and Delaware. Specific occupied areas designated as critical habitat for the Chesapeake Bay DPS of Atlantic sturgeon contain approximately 773 km (480 miles) of aquatic habitat in the following rivers of Maryland, Virginia, and the District of Columbia: Potomac, Rappahannock, York, Pamunkey, Mattaponi, James, Nanticoke, and the following other water body: Marshyhope Creek. Specific occupied areas designated as critical habitat for the Carolina DPS of Atlantic sturgeon contain approximately 1,939 km (1,205 miles) of aquatic habitat in the following rivers of North Carolina and South Carolina: Roanoke, Tar-Pamlico, Neuse, Cape Fear, Northeast Cape Fear, Waccamaw, Pee Dee, Black, Santee, North Santee, South Santee, and Cooper, and the following other water body: Bull Creek. Specific occupied areas designated as critical habitat for the South Atlantic DPS of Atlantic sturgeon contain approximately 2,883 km (1,791 miles) of aquatic habitat in the following rivers of South Carolina, Georgia, and Florida: Edisto, Combahee-Salkehatchie, Savannah, Ogeechee, Altamaha, Ocmulgee, Oconee, Satilla, and St. Marys Rivers.

DATES: This rule becomes effective September 18, 2017.

ADDRESSES: The final rule, maps, Final Impacts Analysis Reports and Final Regulatory Flexibility Analyses used in preparation of this final rule are available on the NMFS Greater Atlantic Regional Fisheries Office (GARFO) Web site at *http://www.greateratlantic.fisheries.noaa.gov/,* and NMFS Southeast Regional Fisheries Office (SERO) Web site at *http://sero.nmfs.noaa.gov/,* or by contacting Lynn Lankshear, NMFS, GARFO, 55 Great Republic Drive, Gloucester, MA 01930 or Andrew Herndon, NMFS, SERO, 263 13th Avenue South, Saint Petersburg, FL 33701.

FOR FURTHER INFORMATION CONTACT: Lynn Lankshear, NMFS, GARFO at the address above or at 978–282–8473; Andrew Herndon, NMFS, SERO at the address above or at 727–824–5312; or Marta Nammack, NMFS, Office of Protected Resources at 301–427–8469.

SUPPLEMENTARY INFORMATION:

Background

In 2012, we listed five DPSs of Atlantic sturgeon under the ESA: Four were listed as endangered (New York Bight DPS and Chesapeake Bay DPS; 77 FR 5880; February 6, 2012; Carolina DPS and South Atlantic DPS; 77 FR 5914; February 6, 2012) and one as threatened (Gulf of Maine DPS; 77 FR 5880; February 6, 2012). On March 18, 2014, two non-governmental organizations filed a lawsuit alleging we had violated the ESA by failing to issue proposed and final rules designating critical habitat for the Atlantic sturgeon DPSs. Pursuant to a court-ordered settlement agreement, as modified, we agreed to submit proposed rules designating critical habitat for all DPSs of Atlantic sturgeon to the Office of the Federal Register by May 30, 2016. NMFS met that deadline and the two proposed critical habitat rules for the five Atlantic sturgeon DPSs were published on June 3, 2016. The proposed designations can be found at 81 FR 35701 for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon and at 81 FR 36077 for the Carolina and South Atlantic DPSs of Atlantic sturgeon. A subsequent correction notice clarifying the types of manmade structures not included in the proposed designation for the Carolina and South Atlantic DPSs was published on June 28, 2016 (81 FR 41926). On February 11, 2016, NMFS and the USFWS published a final rule, Implementing Changes to the Regulations for Designating Critical Habitat (81 FR 7414) (the Implementation rule). As the Implementation rule discussed, the changes to these regulations were meant to more clearly describe the Services' past and ongoing practices for designating critical habitat. The proposed rules designating critical habitat for Atlantic sturgeon were largely drafted at the time the final Implementation rule was published, and were based on past practices incorporated into that rule. Thus, no substantive changes were made to the Atlantic sturgeon proposed rules as a result of finalizing the Implementation rule.

We solicited comments from the public on all aspects of the proposed rules and held public hearings in Gloucester, Massachusetts; Brunswick, Georgia; Charleston, South Carolina; and Morehead City, North Carolina. The initial regulatory flexibility analysis (IRFA) and the draft Impacts Analysis (DIA) prepared for each proposed rule pursuant to section 4(b)(2) of the ESA were made available for public review and comment along with the proposed rules. Upon request, we re-opened the public comment period of both proposed rules for an additional 15 days, from September 29, 2016, to October 14, 2016 (81 FR 66911; Sept. 29, 2016); the entire public comment period totaled 105 days. After receiving public comment, we decided to complete the critical habitat designations with one final rule. Combining the designations into a single final rule will provide greater clarity to the public about the total extent of the Atlantic sturgeon critical habitat designations, reduce redundancy, and enable the public to better understand the need to designate the affected areas.

Final regulatory flexibility analyses (FRFAs) and final Impacts Analysis reports (IAs) updating the initial analyses and reports, that were published with the proposed rules, have been prepared to accompany this final rule. Combining the regional FRFAs and

IAs into single documents would make it difficult for the public to keep track of which parts of the single documents built upon the underlying data from the individual analyses published with the proposed rules. In addition, at the proposed rule stage, our two NMFS regions used different methodologies to evaluate impacts, relying on consultation databases that are region specific to address the different circumstances applicable to a specific region. Courts have noted the ESA provides the USFWS and NMFS (the Services) with broad discretion and flexibility in determining which particular methodologies or approaches are best for each specific set of circumstances (*See, e.g., Bldg. Indus. Ass'n of the Bay Area et al.* v. *U.S. Dep't. of Commerce et al.,* No. 13–15132, 9th Cir., July 7, 2015 (upholding district court's ruling that the ESA does not require the agency to follow a specific methodology when designating critical habitat under section 4(b)(2)). Accordingly, we maintained the separate sets because combining the two distinct sets of regional analyses would not have gained any efficiencies and would have created overly complicated reports that would be difficult for the public to follow. The final analyses are publicly available (see **ADDRESSES**).

We determined that a key conservation objective for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs is to increase the abundance of each DPS by facilitating increased successful reproduction and recruitment to the marine environment. We know that each of these DPSs is at a low level of abundance and that successful reproduction and recruitment, which are essential to the conservation of the species, occur in a limited number of rivers for each DPS. Based on the best scientific information available for the life history needs of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs, the physical features essential to the conservation of the species and that may require special management considerations or protection are:

(1) Hard bottom substrate (*e.g.,* rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (*i.e.,* 0.0 to 0.5 parts per thousand (ppt) range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;

(2) Aquatic habitat with a gradual downstream salinity gradient of 0.5 up to as high as 30 ppt and soft substrate (*e.g.,* sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development;

(3) Water of appropriate depth and absent physical barriers to passage (*e.g.,* locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support:

(i) Unimpeded movement of adults to and from spawning sites;

(ii) Seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and

(iii) Staging, resting, or holding of subadults or spawning condition adults.

Water depths in main river channels must also be deep enough (*e.g.,* at least 1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river.

(4) Water, between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support:

(i) Spawning;

(ii) Annual and interannual adult, subadult, larval, and juvenile survival; and

(iii) Larval, juvenile, and subadult growth, development, and recruitment (*e.g.,* 13 °C to 26 °C for spawning habitat and no more than 30 °C for juvenile rearing habitat, and 6 milligrams per liter (mg/L) dissolved oxygen (DO) or greater for juvenile rearing habitat).

We determined that the key conservation objectives for the Carolina and South Atlantic DPSs of Atlantic sturgeon are to increase the abundance of each DPS by facilitating increased survival of all life stages and facilitating adult reproduction and juvenile and subadult recruitment into the adult population. We determined the physical features essential to the conservation of the species and that may require special management considerations or protection, which support the identified conservation objectives, are:

(1) Hard bottom substrate (*e.g.,* rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (*i.e.,* 0.0–0.5 ppt range) for settlement of fertilized eggs and refuge, growth, and development of early life stages;

(2) Transitional salinity zones inclusive of waters with a gradual downstream gradient of 0.5– up to 30 ppt and soft substrate (*e.g.,* sand, mud) between the river mouths and spawning sites for juvenile foraging and physiological development;

(3) Water of appropriate depth and absent physical barriers to passage (*e.g.,* locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouths and spawning sites necessary to support:

(i) Unimpeded movement of adults to and from spawning sites;

(ii) Seasonal and physiologically-dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and

(iii) Staging, resting, or holding of subadults or spawning condition adults.

Water depths in main river channels must also be deep enough (at least 1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river.

(4) Water quality conditions, especially in the bottom meter of the water column, between the river mouths and spawning sites with temperature and oxygen values that support:

(i) Spawning;

(ii) Annual and inter-annual adult, subadult, larval, and juvenile survival; and

(iii) Larval, juvenile, and subadult growth, development, and recruitment. Appropriate temperature and oxygen values will vary interdependently, and depending on salinity in a particular habitat. For example, 6.0 mg/L DO or greater likely supports juvenile rearing habitat, whereas DO less than 5.0 mg/L for longer than 30 days is less likely to support rearing when water temperature is greater than 25 °C. In temperatures greater than 26 °C, DO greater than 4.3 mg/L is needed to protect survival and growth. Temperatures of 13 to 26 °C likely to support spawning habitat.

Atlantic Sturgeon Natural History and Status

There are two subspecies of Atlantic sturgeon—the Gulf sturgeon (*Acipenser oxyrinchus desotoi*) and the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Historically, the Gulf sturgeon occurred from the Mississippi River east to Tampa Bay in Florida. Its present range extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. The Gulf sturgeon was listed as threatened under the ESA in 1991. This rule addresses the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), which is distributed along the eastern coast of North America. Historically, sightings of Atlantic sturgeon have been reported from Hamilton Inlet, Labrador, Canada, south to the St. Johns River, Florida, United States. Reported occurrences south of the St. Johns River, Florida, have been rare but have increased recently with the evolution of acoustic telemetry coupled with increased receiver arrays.

Although there is considerable variability among species, all sturgeon species (Order *Acipenseriformes*) have

some common life history traits. They all: (1) Occur within the Northern Hemisphere; (2) spawn in freshwater over hard bottom substrates; (3) generally do not spawn annually; (4) are benthic foragers; (5) mature relatively late and are relatively long lived; and (6) are relatively sensitive to low DO levels (Dees, 1961; Sulak and Clugston, 1999; Billard and Lecointre, 2001; Secor and Niklitschek, 2002; Pikitch *et al.,* 2005).

Atlantic sturgeon have all of the above traits. They occur along the eastern coast of North America from Hamilton Inlet, Labrador, Canada to Cape Canaveral, Florida, United States (Bigelow and Welsh, 1925; Dees, 1961; Vladykov and Greeley, 1963; NMFS and U.S. Fish and Wildlife Service (USFWS), 2007; T. Savoy, CT DEEP, pers. comm.). Atlantic sturgeon are a long-lived, late-maturing, estuarine-dependent, anadromous species with a maximum lifespan of up to 60 years, although the typical lifespan is probably much shorter (Sulak and Randall, 2002; Balazik *et al.,* 2010). Atlantic sturgeon reach lengths up to 14 ft (4.27 m), and weigh over 800 pounds (363 kilograms (kg)). Many datasets demonstrate clinal variation in vital parameters of Atlantic sturgeon populations, with faster growth and earlier age at maturation in more southern systems. Atlantic sturgeon mature between the ages of 5 and 19 years in South Carolina (Smith *et al.,* 1982), between 11 and 21 years in the Hudson River (Young *et al.,* 1988), and between 22 and 34 years in the St. Lawrence River (Scott and Crossman, 1973). Atlantic sturgeon generally do not spawn every year. Multiple studies have shown that spawning intervals range from 1 to 5 years for males (Smith, 1985; Collins *et al.,* 2000; Caron *et al.,* 2002) and 2 to 5 years for females (Vladykov and Greeley, 1963; Van Eenennaam *et al.,* 1996; Stevenson and Secor, 1999). Fecundity of Atlantic sturgeon has been correlated with age and body size, with egg production ranging from 400,000 to 8 million eggs per year (Smith *et al.,* 1982; Van Eenennaam and Doroshov, 1998; Dadswell, 2006). The average age at which 50 percent of maximum lifetime egg production is achieved is estimated to be 29 years, approximately 3 to 10 times longer than for other bony fish species examined (Boreman, 1997).

Analysis of stomach contents for adults, subadults (*i.e.,* sexually immature Atlantic sturgeon that have emigrated from the natal estuary to the marine environment), and juveniles (*i.e.,* sexually immature Atlantic sturgeon that have not yet emigrated from the natal estuary) confirms that Atlantic sturgeon are benthic foragers (Ryder, 1888; Bigelow and Schroeder, 1953; Johnson *et al.,* 1997; Secor *et al.,* 2000; ASSRT, 2007; Guilbard *et al.,* 2007; Hatin *et al.,* 2007; Savoy, 2007; Dzaugis, 2013; McLean *et al.,* 2013).

An anadromous species, Atlantic sturgeon spawns in freshwater of rivers that flow into a coastal estuary. Spawning adults migrate upriver in the spring, typically during February and March in southern systems, April and May in mid-Atlantic systems, and May and July in Canadian systems (Murawski and Pacheco, 1977; Smith, 1985; Bain, 1997; Smith and Clugston, 1997; Caron *et al.,* 2002). A fall spawning migration has been hypothesized for many years (Rogers and Weber, 1995; Weber and Jennings, 1996; Moser *et al.,* 1998) and was recently verified in the Roanoke River, North Carolina, and the Altamaha River, Georgia (Smith et. al., 2015; Ingram and Peterson 2016). There is also a growing body of evidence that some Atlantic sturgeon river populations have two spawning seasons comprised of different spawning adults (Balazik and Musick, 2015; Farrae *et al.,* 2017). Since the listings, additional evidence of fall as well as spring spawning has been obtained for the Chesapeake Bay DPS of Atlantic sturgeon (Balazik *et al.,* 2012; Hager *et al.,* 2014; Kahn *et al.,* 2014).

Spawning typically occurs in flowing water upriver of the salt front of estuaries and below the fall line of large rivers (Borodin, 1925; Leland, 1968; Scott and Crossman, 1973; Crance, 1987; Bain *et al.,* 2000). The fall line is the boundary between an upland region of continental bedrock and an alluvial coastal plain, sometimes characterized by waterfalls or rapids. Spawning sites are well-oxygenated areas with flowing water ranging in temperature from 13 °C (55 °F) to 26 °C (79 °F), and hard bottom substrate such as cobble, hard clay, and bedrock (Ryder, 1888; Dees, 1961; Vladykov and Greeley, 1963; Scott and Crossman, 1973; Gilbert, 1989; Smith and Clugston, 1997; Bain *et al.,* 2000; Collins *et al.,* 2000; Balazik *et al.,* 2012; Hager *et al.,* 2014). Depth at which fish spawn and water depth leading to spawning sites may be highly variable. Atlantic sturgeon in spawning condition have been tracked and captured at depths up to 27 m (Borodin 1925; Dees 1961; Hatin *et al.,* 2002; Balazik *et al.,* 2012; Hager *et al.,* 2014).

Within minutes of being fertilized, the eggs become sticky and adhere to the substrate for the relatively short and temperature-dependent period of larval development (Ryder, 1888; Vladykov and Greeley, 1963; Murawski and Pacheco, 1977; Smith *et al.,* 1980; Van den Avyle, 1984; Mohler, 2003). Hatching occurs approximately 94 to 140 hours after egg deposition at temperatures of 68.0 to 64.4 °F (20 to 18 °C), respectively. The newly emerged larvae assume a demersal existence (Smith *et al.,* 1980). The yolk sac larval stage is completed in about 8 to 12 days, during which time the larvae move downstream to rearing grounds (Kynard and Horgan, 2002). During the first half of their migration downstream, movement occurs only at night. During the day, larvae use benthic structure (*e.g.,* gravel matrix) as refuge (Kynard and Horgan, 2002). During the latter half of migration, when larvae are more fully developed, movement to rearing grounds occurs during both the day and night.

Larval Atlantic sturgeon (*i.e.,* less than 4 weeks old, with total lengths (TL) less than 30 mm; Van Eenennaam *et al.,* 1996) are assumed to inhabit the same areas where they were spawned and live at or near the bottom (Ryder, 1888; Smith *et al.,* 1980; Bain *et al.,* 2000; Kynard and Horgan, 2002; Greene *et al.,* 2009). The best scientific information available for behavior of larval Atlantic sturgeon is described from hatchery studies. Upon hatching, larvae are nourished by the yolk sac, are mostly pelagic (*e.g.,* exhibit a ''swim-up and drift-down'' behavior in hatchery tanks; Mohler, 2003), and move away from light (*i.e.,* negative photo-taxis; Kynard and Horgan, 2002; Mohler, 2003). Within days, larvae exhibit more benthic behavior until the yolk sac is absorbed at about 8 to 10 days post-hatching (Kynard and Horgan, 2002; Mohler, 2003). Post-yolk sac larvae occur in the water column but feed at the bottom of the water column (Mohler, 2003; Richardson *et al.,* 2007).

The next phase of development, referred to as the juvenile stage, lasts months to years in brackish waters of the natal estuary (Holland and Yelverton, 1973; Dovel and Berggen, 1983; Waldman *et al.,* 1996; Shirey *et al.,* 1997; Collins *et al.,* 2000; Secor *et al.,* 2000; Dadswell, 2006; Hatin *et al.,* 2007; ASSRT, 2007; Calvo *et al.,* 2010; Schueller and Peterson, 2010). Juvenile rearing habitat is that habitat necessary for juveniles to grow, develop, and emigrate to the marine environment where they begin the subadult life stage, eventually maturing into adults. Juveniles occur in oligohaline waters (salinity of 0.5 to 5 ppt) and mesohaline waters (salinity of 5 to 18 ppt) of the natal estuary during growth and development. They will eventually move into polyhaline waters (salinity of 18–30 ppt), if available in the natal river estuary, before emigrating from the natal river estuary. Larger, presumably older,

juveniles occur across a broader salinity range than smaller, presumably younger, juveniles (Bain, 1997; Shirey *et al.,* 1997; Haley, 1999; Bain *et al.,* 2000; Collins *et al.,* 2000; Secor *et al.,* 2000; Hatin *et al.,* 2007; McCord *et al.,* 2007; Munro *et al.,* 2007; Sweka *et al.,* 2007; Calvo *et al.,* 2010).

The distribution of Atlantic sturgeon juveniles in the natal estuary is a function of physiological development and habitat selection based on water quality factors of temperature, salinity, and DO, which are inter-related environmental variables. In laboratory studies with salinities of 8 to 15 ppt and temperatures of 12 and 20 °C (53.6 and 68 °F), juveniles less than a year old (also known as young-of-year [YOY]) had reduced growth at 40 percent DO saturation, grew best at 70 percent DO saturation, and selected conditions that supported growth (Niklitschek and Secor, 2009 I; Niklitschek and Secor, 2009 II). Similar results were obtained for age-1 juveniles (*i.e.,* greater than 1 year old and less than 2 years old), which have been shown to tolerate salinities of 33 ppt (*e.g.,* a salinity level associated with seawater), but grow faster in lower salinity waters (Niklitschek and Secor, 2009 I; Allen *et al.,* 2014). For the conditions tested, the best growth for both age groups occurred at DO concentrations greater than 6.5 mg/L (*e.g.,* 70 percent DO saturation with salinity of 8 to 15 ppt and temperature of 12 and 20 °C). While specific DO concentrations at temperatures considered stressful for Atlantic sturgeon are not available, instantaneous minimum DO concentrations of 4.3 mg/L protect survival of shortnose sturgeon at temperatures greater than 29 °C (84.2 °F) (EPA, 2003). However, data from Secor and Niklitschek (2001) show that shortnose sturgeon are more tolerant of higher temperatures than Atlantic sturgeon, and the ''high temperature'' for Atlantic sturgeon is actually considered 26 °C (78.8 °F) (Secor and Gunderson, 1998).

Once suitably developed, Atlantic sturgeon leave the natal estuary and enter marine waters (*i.e.,* waters with salinity greater than 30 ppt); this marks the beginning of the subadult life stage. In the marine environment, subadults mix with adults and subadults from other river systems (Bowen and Avise, 1990; Wirgin *et al.,* 2012; Waldman *et al.,* 2013; O'Leary *et al.,* 2014). Atlantic sturgeon travel long distances in marine waters, aggregate in both oceanic and estuarine areas at certain times of the year, and exhibit seasonal coastal movements in the spring and fall (Vladykov and Greeley, 1963; Oliver *et al.,* 2013).

The exact spawning locations for Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPS Atlantic sturgeon are unknown but inferred based on the location of freshwater, hard substrate, water depth, tracking of adults to upriver locations and the behavior of adults at those locations, historical accounts of where the caviar fishery occurred, capture of YOY and, in limited cases, capture of larvae and eggs. Spawning sites at multiple locations within the tidal-affected river likely help to ensure successful spawning given annual changes in the location of the salt wedge.

Public Comments and Our Responses

We requested comments on the proposed rule to designate critical habitat for the Gulf of Maine, New York Bight, Chesapeake Bay DPSs of Atlantic sturgeon (81 FR 35701; June 3, 2016) and on the proposed rule to designate critical habitat for the Carolina and South Atlantic DPSs of Atlantic sturgeon (81 FR 36077; June 3, 2016) for a 90-day period. Following requests from the public, we re-opened the public comment period for an additional 15 days (81 FR 66911; Sept. 29, 2016), for a total comment period of 105 days. Five public hearings were also held on the following dates and in the following locations:

1. Thursday, July 21, 2016, 3 to 5 p.m., Gloucester, Massachusetts.
2. Thursday, July 21, 2016, 6 to 8 p.m., Gloucester, Massachusetts.
3. Monday, June 20, 2016, 7 to 9 p.m., Brunswick, Georgia.
4. Tuesday, June 21, 2016, 7 to 9 p.m., Charleston, South Carolina.
5. Thursday, June 23, 2016, 7 to 9 p.m., Morehead City, North Carolina.

In addition to the public hearings, during which substantive comments on the proposed designations could be provided by the public, we held a public informational meeting prior to each public hearing in Massachusetts, Georgia, South Carolina, and North Carolina. We also held public informational meetings in Annapolis, Maryland on July 13, 2016, and in Portland, Maine on July 18, 2016. These informational meetings reviewed the purpose of designating critical habitat and answered procedural questions. We did not accept public comment or answer substantive questions about the areas proposed for designation at the informational meetings; rather, we provided information on the public comment process. To further facilitate public participation, the proposed rules were made available on our regional Web pages and comments were accepted during public hearings, and via standard mail, facsimile, and through the Federal eRulemaking portal. In addition to the proposed rules, the correction notice for the proposed rule for the Carolina and South Atlantic DPSs, maps of the proposed critical habitat units, and the DIAs supporting our conclusions under section 4(b)(2) of the ESA were made publicly available.

Twenty-one people attended the public hearings for the proposed rule to designate critical habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon, either in-person or via telephone, and we received 1,577 responses to the request for public comments on the proposed rule and supporting documents through *Regulations.gov* and by mail, including over 1,000 form letters. Approximately 40 people attended the public hearings for the proposed rule to designate critical habitat for the Carolina and South Atlantic DPSs of Atlantic sturgeon, and 354 public comments were received on the proposed rule and supporting documents.

We reviewed all comments received for substantive issues relevant to the proposed critical habitat rules. Some comments resulted in changes between the proposed and final designation. Changes between the proposed designations and final designation are highlighted in the ''Summary of Changes From the Proposed Rules'' section of this rule. The relevant public comments received, both written and oral, are addressed below. We have responded to the comments received on the proposed rule for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon separately from our responses to the comments received on the proposed rule for the Carolina and South Atlantic DPSs of Atlantic sturgeon because it would be difficult for a commenter to identify his or her individual comment and our response if we merged the comment responses. However, we have assigned comments to major issue categories and, where appropriate, have combined similar comments from multiple members of the public or referenced the response to identical comments received on both proposed rules. We received some comments related to the listing and DPS delineation and comments critical of our final rule Implementing Changes to the Regulations for Designating Critical Habitat (81 FR 7414; February 11, 2016); those comments are not relevant to this

critical habitat designation and are not addressed below.

Comments on the Gulf of Maine, New York Bight, and Chesapeake Bay DPS Proposed Critical Habitat Designations (81 FR 35701; June 3, 2016)

Comments on Geographical Area Occupied

Comment 1: A commenter stated that we have not provided any evidence that Atlantic sturgeon occupied the Susquehanna River at the time the species was listed, or at any time in recent history. They stated that the most recent sighting of Atlantic sturgeon occurred in 1987, nearly 25 years before the species was listed in 2012, and that sighting occurred near the mouth of the Susquehanna River rather than in the Susquehanna River. The commenter noted that Exelon monitored the Susquehanna River for sonic transmitter tagged sturgeons from other river systems (Delaware River, Potomac River) during 2010 and 2011 with fixed station acoustic telemetry receivers, and no tagged Atlantic sturgeon were recorded in the Susquehanna River in either year. In addition, they stated that Atlantic sturgeon have not been caught in the Conowingo Dam fish lift in 44 years of fish lift operations, there have been no reports of anglers catching Atlantic sturgeon or observations of breaching Atlantic sturgeon in the Susquehanna River, and there are no records for Atlantic sturgeon in the Susquehanna River in the USFWS tagging database or the Maryland Department of Natural Resources reward program database.

Our Response: Our regulations at 50 CFR 424.02 define ''geographical area occupied by the species'' as ''An area that may generally be delineated around species' occurrences, as determined by the Secretary (*i.e.,* range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (*e.g.,* migratory corridors, seasonal habitats, and habitats used periodically, but not solely, by vagrant individuals).'' The range of each DPS is informed by numerous lines of evidence including the life history of Atlantic sturgeon, tagging, tracking, and genetic analyses. Often at the time of designating critical habitat, we do not have detailed information or the same level of detail for every part of the species' range. However, the absence of collection or sighting of Atlantic sturgeon in any part of their range does not equate to absence of Atlantic sturgeon. Atlantic sturgeon can be difficult to detect when present in marine and estuarine waters because they are benthic fish, spending most of their lives well below the water surface, they do not school, they move within the estuary, and subadults and adults spend only part of the year in estuarine waters.

There has been very little effort to detect the presence of Atlantic sturgeon in the Susquehanna River in recent times. Receivers were placed in the Susquehanna River to detect acoustically tagged Atlantic sturgeon in 2010 and 2011 but, at that time, we made it clear that an absence of detections was not confirmation of absence of the species in the river, given the low number of Atlantic sturgeon that were acoustically tagged and the limited number of receivers placed in the river below Conowingo Dam.

Fish behavior rather than fish abundance influences whether a sturgeon enters a fish lift that was designed for a different fish species. Therefore, absence of Atlantic sturgeon in the fish lift also does not equate to absence of Atlantic sturgeon in the river below a dam. Many of the rivers for which we have more abundant documentation of Atlantic sturgeon presence also have dams with fish lifts (*e.g.,* Connecticut, Penobscot, and Saco Rivers), and only one Atlantic sturgeon has been observed and documented in a fish lift (at the Holyoke Dam in the Connecticut River (ASSRT 2007)).

The Maryland Reward Program relied upon reports of Atlantic sturgeon incidentally caught in fishing gear. The Program operated when directed fishing for, and incidental capture of, Atlantic sturgeon was prohibited and when abundance of Atlantic sturgeon was unknown and estimated to be low (thus later necessitating listing under the ESA). The lack of reported captures of Atlantic sturgeon in the Susquehanna can be explained by any number of factors including whether: Fishing was occurring in the Susquehanna when Atlantic sturgeon were present, the gear type fished was conducive to catching Atlantic sturgeon, or the fisherman reported the capture. Similarly, to assess whether the absence of USFWS tagging database records for Atlantic sturgeon captures in the Susquehanna reflects absence of Atlantic sturgeon in the Susquehanna River, a measure of the amount of effort to search for, capture, and tag Atlantic sturgeon in the Susquehanna River must be provided. Based on the best scientific information available, there was no directed effort to search for, capture, and tag Atlantic sturgeon in the Susquehanna River. Therefore, the absence of records in the USFWS tagging database does not inform the presence or absence of Atlantic sturgeon in the river.

The lack of evidence for Atlantic sturgeon presence in the Susquehanna based on the scientific studies or recreational fishing in the river is more likely the result of methods and gear that do not effectively capture sturgeon. Sturgeon tend to sink rather than float when exposed to electroshocking (Moser *et al.,* 2000). Electroshocking conducted to retrieve other fish species often does not result in detection of Atlantic sturgeon because the electric current may only penetrate a few feet from the surface of the water and not reach the bottom where sturgeon are most likely to occur. Although some sturgeon have been detected during electrofishing for other species, electroshocking is not an effective means for detecting sturgeon presence. Gillnet gear is only effective when selective for the size of sturgeon present, and sturgeon can get snagged on recreational hook gear but do not typically take a hook. Therefore, creel surveys of recreational fisheries are unlikely to provide evidence of sturgeon presence, particularly when the recreational fisheries are targeting fish species dissimilar to sturgeons (*e.g.,* in size, feeding characteristics).

Since the listing of the Chesapeake Bay DPS in 2012, increased effort to detect Atlantic sturgeon in the Pamunkey, Nanticoke, and Rappahannock Rivers has led to the discovery of Atlantic sturgeon spawning populations and sturgeon presence that were undetected before the listing. These include a spawning population in the Pamunkey River (Hager *et al.,* 2014; Kahn *et al.,* 2014), a likely spawning population in the Nanticoke River, and detection of Atlantic sturgeon in the Rappahannock River.

Comment 2: An industry trade group stated we inappropriately delineated the ''geographical area occupied'' by the species as the entire ''aquatic habitat (*e.g.,* below the high tide line)'' of inland freshwater areas that are currently accessible to the Atlantic sturgeon. These commenters stated that we inappropriately included not just areas where the species has actually been located, but instead we also included wider areas around the species' occurrences and areas that may be used only temporarily or periodically by the species. They stated that ''areas identified as occupied include vast areas where there is no evidence the species even occurs, much less occupies.'' The commenter states that the Services' Consultation Handbook provides that occupied critical habitat is ''critical habitat that contains

individuals of the species at the time of the project analysis.''

Our Response: Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as an area that may generally be delineated around species' occurrences (*i.e.,* range), and this may include those areas used throughout all or part of the species' life cycle, even if they are not used on a regular basis (*e.g.,* migratory corridors, seasonal habitats, and or habitats used periodically, but not solely by vagrant individuals). This is consistent with past critical habitat designations *(e.g.,* Final Rule Designating Critical Habitat for Threatened Elkhorn and Staghorn Corals (73 FR 72210; November 26, 2008): ''We have long interpreted 'geographical area occupied' in the definition of critical habitat to mean the range of the species at the time of listing (45 FR 13011; February 27, 1980)''). The geographical area occupied as specified in this designation meets the regulatory definition, and our application of the term ''geographical area occupied'' to Atlantic sturgeon is appropriate. As the court in *Arizona Cattle Growers Ass'n* v. *Salazar* (606 F.3d 1160, 1164 (9th Cir. 2010)) held, ''[d]etermining whether a species uses an area with sufficient regularity that it is 'occupied' is a highly contextual and fact-dependent inquiry. Cf. *Cape Hatteras Access Pres. Alliance* v. *United States DOI,* 344 F. Supp. 2d 108, 119–20 (D.D.C. 2004). Relevant factors may include how often the area is used, how the species uses the area, the necessity of the area for the species' conservation, species characteristics such as degree of mobility or migration, and any other factors that may bear on the inquiry.'' In claiming that the 1998 Consultation Handbook provides that occupied critical habitat is that which is occupied by individuals of the species at the time of a project analysis, the commenter did not include the entire discussion about occupied critical habitat. As we explained more fully in our Handbook, ''[a] species does not have to occupy critical habitat throughout the year for the habitat to be considered occupied (*e.g.* migratory birds).'' The court in *Arizona Cattle Growers* cited this language as appropriately recognizing that ''a species need not be present continuously for habitat to be considered ''occupied.'' 606 F.3d at 1165. The court rejected a narrow interpretation of ''occupied'' based solely on documented ''residence'' of individual animals, holding that ''[w]here data are inconclusive or where habitat is used on a sporadic basis, allowing the FWS to designate as 'occupied' habitat where the species is likely to be found promotes the ESA's conservation goals and comports with the ESA's policy of ''institutionalized caution'' (*Id.* at 1166–1167), and that ''[t]he fact that a member of the species is not present in an area at a given instant does not mean the area is suitable only for future occupancy if the species regularly uses the area'' (*Id.* at 1167).

For Atlantic sturgeon, we identified the geographical area occupied based on the species' well-known anadromous life history, including returning to natal rivers to spawn, spawning behaviors, and habitat common to sturgeon species and verified for Atlantic sturgeon, as well as the need to protect spawning and reproductive habitat for population growth and conservation of the species, among other factors. Some portion of each river population returns to its natal river to spawn every year, and if spawning occurs and is successful, young sturgeon use the natal river to forage, develop and mature every year.

Comment 3: A state agency stated there may be habitat features conducive for Atlantic sturgeon reproduction and recruitment in the Piscataqua, Salmon Falls, and Cocheco Rivers, but there was no evidence that Atlantic sturgeon have used New Hampshire estuaries and coastal rivers as spawning and nursery habitat from at least 35 years of surveys, studies, etc. The commenter stated that recent evidence from acoustical tagging (Micah Kieffer, USGS, personal communication, as cited in the comment) leads to the conclusion that sturgeons spend only brief periods in the Piscataqua River/Great Bay system during longer movements between the Merrimack and Kennebec Rivers. A fisherman similarly stated that in all of his fishing trips in the Piscataqua River over the course of 20-plus years, he had never encountered Atlantic sturgeon in the Piscataqua River, and he does not believe that Atlantic sturgeon spawning or juvenile rearing occurs in the Piscataqua, Salmon Falls, and Cocheco Rivers.

Our Response: We disagree with these commenters' assertions that Atlantic sturgeon do not occur in these waterbodies. The Piscataqua River as well as the Cocheco and Salmon Falls Rivers downriver of their respective lowermost dams are part of the geographical area occupied by Atlantic sturgeon. Recent evidence of their presence includes detection of tagged Atlantic sturgeon (M.Kieffer, USGS, pers. comm.). Because the number of tagged Atlantic sturgeon represents only a fraction of the total number of sturgeon, and receivers for detecting tags are not in the rivers throughout the year, the number of Atlantic sturgeon detected in the Piscataqua is very likely less than the total number of Atlantic sturgeon that actually occur in the Piscataqua and as far upriver as the lowermost dams of the Cocheco and Salmon Falls Rivers.

We identified the Piscataqua River and portions of the Salmon Falls and Cocheco Rivers as a potential critical habitat area for the Gulf of Maine DPS because the physical features are present. We considered whether the identified area was essential to the conservation of the Gulf of Maine DPS and concluded that it was, given the capture of a large female Atlantic sturgeon with eggs, at the head-of-tide in the Salmon Falls River in South Berwick, Maine on June 18, 1990, thus demonstrating behavior consistent with spawning was occurring in the system. We also took into consideration the limited number of other rivers with spawning and rearing habitat in the Gulf of Maine DPS, the continuing threats to the DPS, the threats to the features of critical habitat, and the uncertainty for how much spawning and rearing habitat is necessary to recover the Gulf of Maine DPS. Together, this information supports our conclusion that the Piscataqua River, and portions of the Salmon Falls and Cocheco Rivers, are part of the geographical area occupied by the Gulf of Maine DPS and these areas are essential to the conservation of the Gulf of Maine DPS.

We are not surprised that there have been very few incidental captures of Atlantic sturgeon in fisheries or research surveys and studies conducted in the Piscataqua River. We know from other river systems that capture of any of the Atlantic sturgeon life stages can be difficult even when the proper gear for capturing Atlantic sturgeon is used, and used at the time and in the area where Atlantic sturgeon are likely to occur. Atlantic sturgeon populations in a number of rivers were considered extirpated at one point, only later to find that genetically unique populations were present (*e.g.,* the James River and York River systems, the Connecticut River, the Nanticoke River, and Marshyhope Creek).

Comment 4: A representative for a power operation on the Hudson River stated that atypical passage or straying is not enough to constitute critical habitat, and critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species.

Our Response: We agree that it is inappropriate to designate the entire area occupied by a DPS as critical

habitat. However, we have not done that for any of the Atlantic sturgeon DPSs. The geographical area occupied by the New York Bight DPS of Atlantic sturgeon is a broad area that includes the Hudson River as far upriver as the Federal Dam near Albany, NY. The New York Bight DPS consists of all Atlantic sturgeon spawned in the watersheds that drain into coastal waters, including Long Island Sound, the New York Bight, and Delaware Bay, from Chatham, Massachusetts to the Delaware-Maryland border on Fenwick Island. The range of the DPS in marine waters extends from Labrador, Canada to Cape Canaveral, Florida, United States. The area of the Hudson River that we are designating as critical habitat is, therefore, a specific area within the much broader geographical area occupied by the DPS.

Comments on Physical or Biological Features (PBFs)

Comment 5: A commenter stated the critical habitat designation for Atlantic sturgeon fails to identify any in-river habitats that are important aggregation areas for Atlantic sturgeon. They also stated that we designated in-river habitats where sturgeon congregate, presumably for resting and energy conservation, for both the southern DPS of green sturgeon, and for Gulf sturgeon, and it is likely that Atlantic sturgeon have a similar habitat requirement.

Our Response: While there are similarities between all sturgeon species, there are also differences. The proposed rule and the Impacts Analysis and Biological Information Source Document summarized the literature describing spawning behavior for male and female Atlantic sturgeon. Briefly, male Atlantic sturgeon in spawning condition have been observed to stage in more saline waters of the coastal estuary before moving upriver once the water temperature reaches approximately 6 °C (43 °F). They may spend weeks moving upstream and downstream of the presumed spawning area(s) before moving back downriver to the lower estuary and residing there until outmigration in the fall (Smith *et al.,* 1982; Dovel and Berggren, 1983; Smith, 1985; Bain, 1997; Bain *et al.,* 2000; Collins *et al.,* 2000; Hatin *et al.,* 2002; Greene *et al.,* 2009; Balazik *et al.,* 2012; Breece *et al.,* 2013). In contrast, spawning females move upriver when temperatures are closer to 12 to 13 °C (54 to 55 °F), return downriver relatively quickly, and may leave the estuary and travel to other coastal estuaries until outmigration to marine waters in the fall (Smith *et al.,* 1982; Dovel and Berggren, 1983; Smith, 1985; Bain, 1997; Bain *et al.,* 2000; Collins *et al.,* 2000; Greene *et al.,* 2009; Balazik *et al.,* 2012; Breece *et al.,* 2013).

The use of telemetry tags for Atlantic sturgeon and more widespread use of receiver arrays has provided new information on Atlantic sturgeon spawning behavior and whether or when staging occurs. In the James River, some males moved straight to the hypothesized spawning ground without any apparent staging period while others occurred downriver in brackish water during the summer before moving upstream in August or early September; still others occurred farther upriver for a period of time before the spawning period (Balazik and Musick, 2015). Given the various movement patterns, it is not clear to what extent staging occurs or, for those fish that do appear to stage, whether it is essential for successful reproduction. Therefore, we have not included specific staging areas as a physical or biological feature of Atlantic sturgeon critical habitat. However, we recognize new research may lead to better identification regarding whether, where, and when Atlantic sturgeon stage. Therefore, the feature addressing access includes open passage between the river mouth and spawning sites to support life history needs associated with reproduction such as staging, resting, or holding of spawning condition adults.

Comment 6: Two commenters provided information on the presence of Atlantic sturgeon in the Hudson River and in Delaware Bay in proximity to sand waves, postulating that sand wave habitat provides the same function as deep holes provide for green and Gulf sturgeon, allowing Atlantic sturgeon to rest and feed during the spawning season. According to the commenters, in the Hudson River, sand waves were found in proximity to the Atlantic sturgeon spawning areas. Side scan sonar showed a high density of spawning size Atlantic sturgeon in sand wave habitat and no sturgeon in sand habitat without waves. A gill net set in proximity to the sand wave habitat had high catch rates of Atlantic sturgeon. Similarly, in the Delaware Bay, telemetry tagged Atlantic sturgeon were detected in high density in a relatively small area (18.8 acres) within, and bordering sand wave habitat. The commenters point out that habitat that provides for rest or cover has been identified as an essential feature for other fish species.

Our Response: The commenters provide new, intriguing information for a possible association between Atlantic sturgeon and sand wave habitat. When designating critical habitat, we do not have to know exactly why the listed species occurs in an area. We do, however, need to identify physical or biological features that support the life history needs of the species. The commenters postulate that the sand waves provide resting and feeding areas for Atlantic sturgeon during spawning and feeding in the lower estuary. However, no information was provided to support this theory and the literature does not point toward evidence of feeding or resting during spawning. On the contrary, available references suggest female Atlantic sturgeon make rapid upriver and downriver movements during spawning and can completely leave the spawning estuary and travel to other estuarine environments, presumably for foraging. Males move upriver and downriver of the spawning area during the spawning season, and then move downriver at the end of the spawning season presumably to rest and forage before leaving the spawning estuary in the fall. At this time, we do not have sufficient information to determine what life history needs sand waves may support.

Sand waves are a common feature of the Hudson River and Delaware Bay as well as other rivers and bays (*e.g.,* see information for the Delaware Bay Benthic Mapping Project at *http://www.dnrec.delaware.gov/coastal/dnerr/documents/benthic4plet.pdf,* and Levin *et al.,* 1992). The mapping images provided by the commenter for the Hudson River depict dynamic wave habitat and approximate spawning area for Atlantic sturgeon. Wave habitat is depicted as occurring in a number of areas. Some of these are in proximity to spawning areas and some are not. Similarly, the information provided by the commenter for Delaware Bay depicts sand wave habitat in proximity to an observed aggregation of Atlantic sturgeon. However, no information is provided for Atlantic sturgeon presence in other areas of the Bay where sand wave habitat also occurs and does not occur. Therefore, the information provided and the other available information (*i.e.,* published literature) do not support the commenter's position that sand waves in the Hudson River and Delaware Bay support the life history needs of the New York Bight DPS, and we have not included sand waves as a physical or biological feature of critical habitat for the New York Bight DPS of Atlantic sturgeon.

Comment 7: A commenter stated that while the proposed designation includes soft-bottom habitats for juvenile foraging and development, it fails to expressly recognize the need to protect soft-bottom areas that serve as

resting and feeding habitats for spawning adults. The commenter called upon us to designate soft-bottom areas of the Hudson River for resting and feeding habitats for spawning adults, particularly the areas with sand waves, as critical habitat.

Our Response: Soft-bottom areas of the Hudson River are part of the Hudson River critical habitat unit based on the best available scientific information that soft bottom substrates and the transitional salinity zone are needed for juvenile rearing. We are not aware of any information that indicates Atlantic sturgeon spawning adults feed or rest in spawning areas, and the commenters did not provide any such information. Available references indicate spawning female Atlantic sturgeon make rapid upriver movements to spawning areas and quickly depart spawning areas while males move upriver and downriver of the spawning area during the spawning season. If new information on the use of soft substrate by spawning adults becomes available, it will be considered by Federal agencies assessing the effects of proposed actions on the Hudson River critical habitat, and by us as the consulting agency in ESA section 7 consultations. More details of our consideration of sand wave habitat as a physical or biological feature is provided in our response to Comment 6. As noted there, the best scientific information available does not currently support sand waves as a physical or biological feature for Atlantic sturgeon critical habitat.

Comment 8: An industry trade group asserted that we must revise our proposed designation to explain how each specific critical habitat unit to be designated contains the PBFs essential to the conservation of the species, suggesting that our approach should be the same as that taken in the designation of critical habitat for the Southern DPS of green sturgeon (74 FR 52300; October 9, 2009). They also suggested our proposed designation is overly broad, improperly used ''ephemeral reference points,'' and is unsupported by facts or science. The commenters suggested we identified and proposed to designate sweeping areas of occupied habitat that undoubtedly capture many areas that do not have, and likely never will have, physical or biological characteristics essential for the conservation of the species, noting that the designations cover manmade areas that they state are not important to the species, such as ''manmade features'' below the mean high water mark that cannot or would not be accessed by the species (*e.g.,* outfalls, enclosures, quays) and industrialized areas used by ocean-going vessels. One commenter suggested it appeared we had merely designated entire rivers from the confluence of the Atlantic Ocean back to either some major tributary or some large impoundment or impassable boundary upstream. Several commenters suggested that areas should not be designated as critical habitat because environmental conditions in certain stretches of rivers are poor and would not support the PBFs. Similarly, other commenters stated we had failed to limit the mapped areas in our proposed designation to areas where we believe the PBFs occur.

Our Response: We disagree. As we explained in our final rule, Implementing Changes to the Regulations for Designating Critical Habitat (81 FR 7414; February 11, 2016), in each designation we will identify specific areas of critical habitat ''at a scale determined by the Secretary to be appropriate.'' We are not required to make determinations at an infinitely fine scale, and we need not determine that each square inch, square yard, acre, or even square mile independently meets the definition of critical habitat. We have discretion to determine the appropriate scale for the analysis, which is informed by, among other things, the life history of the species, the scales at which data are available, and biological or geophysical boundaries (such as watersheds). Our regulations at 50 CFR 424.02 also indicate that PBFs may be ephemeral or dynamic, and we may designate areas with ephemeral or dynamic PBFs if the other applicable requirements of critical habitat designations are met, and if there are documented occurrences that a particular habitat type is in the area and there is a reasonable expectation of that habitat occurring again (81 FR 7414; February 11, 2016). As we acknowledged in the proposed rule, there are large areas of most rivers where data are still lacking. The available data also represent a snapshot in time, and the exact location of a PBF may change over time (*e.g.,* water depth fluctuates seasonally, as well as annually, and even hard substrate may shift position). Although the PBFs may vary even at the same location, if any of the available data regarding a particular PBF fell within the suitable range (*e.g.,* salinity of 0–0.5 ppt or hard substrate [gravel, cobble, etc.]), we considered that the essential PBF is present in the area. When data were not available for certain rivers or portions of occupied rivers, we used our general knowledge of Atlantic sturgeon spawning and applied river-specific information to determine the location of PBFs essential to spawning. Smaller specific areas within each unit could not be identified because the submerged nature of the essential PBF, the limits of available information on the distribution of the PBFs, the varying distribution of the PBFs from time to time, and limits on mapping methodologies make it infeasible to define the specific areas containing the PBFs more finely than described in this rule. The presence of manmade structures that do not provide the PBFs within a specific area being designated as critical habitat does not render the boundaries of the specific area invalid; we have explained that the PBFs must be in a project area for it to function as critical habitat. While we agree that manmade structures themselves (*e.g.,* an outfall pipe, dock, pier, navigational buoy) cannot and do not contain the PBFs and therefore are not part of the critical habitat designation, the mere presence of such a manmade structure in an area does not mean that the area does not contain one or more PBFs or that these areas are not important to the species. We have clarified the point in regulatory text that manmade features that do not provide the PBFs are not essential to the species and are not included in critical habitat. We believe our designation is consistent with our regulations and based on the best scientific information available for Atlantic sturgeon DPSs.

Comment 9: Two commenters stated we failed to consider in a complete and meaningful way, the role certain aspects of aquatic chemistry play on determining whether a river has suitable spawning habitat. The commenters suggested we should have considered pH and levels of calcium and magnesium ions. They suggest these chemical characteristics can determine whether Atlantic sturgeon will spawn in a particular reach of river, and thus, it is crucial that these features are given special management consideration in future section 7 consultations and, if need be, protected accordingly.

Our Response: The literature on Atlantic sturgeon has not typically reported pH, calcium, and magnesium levels for rivers where Atlantic sturgeon spawn. For example, in their review of essential Atlantic sturgeon spawning habitat in Virginia, Bushnoe *et al.* (2005) reported pH for waters of the James, York, Pamunkey, Mattaponi, and Rappahannock Rivers where they anticipated Atlantic sturgeon spawning could occur. However, with respect to other water parameters, they noted available water quality data for the James River measured calcium carbonate concentration, not calcium

concentration, as an indicator of hardness. Therefore, they could not directly compare the measured calcium carbonate concentrations with reported calcium concentrations measured in other rivers where Atlantic sturgeon spawn. Conductivity was measured in the Rappahannock River, but neither hardness or conductivity measurements were available for the Pamunkey River or Mattaponi River. Recent publications regarding Atlantic sturgeon spawning for the Chesapeake Bay DPS of Atlantic sturgeon (*e.g.,* Balazik *et al.,* 2012; Hager *et al.,* 2014) do not include measures of water pH, calcium, or magnesium in spawning areas.

We considered the information provided by the commenters in the report they provided with their comments and references cited within that report. Unfortunately, the report itself does not provide any new information regarding pH and levels of calcium and magnesium ions. The report mentions a 1976 study that indicated spawning of the European Atlantic sturgeon had been successful in the Rione River of the Russian Caucasus when the pH ranged from 7.4–7.6. The report also states that a pH level of 6.8–7.7 is acceptable to various species of sturgeon (Holcik *et al.,* 1989), but continues to state there is no specific research on pH levels appropriate for Atlantic sturgeon. Beyond this, no further conclusions regarding pH and Atlantic sturgeon were made. The provided report also briefly mentioned calcium and magnesium ions. It states: ''Salinity was 0.4 psu, which is on the high side of Ca[lcium] and M[a]g[nesium] ion levels present in rivers where Gulf Sturgeon spawn successfully (Ken Sulak, pers. comm. to B. Kynard, 15 Aug 2016). Specific acceptable levels of salinity for gametes and eggs of Atlantic sturgeon are not known and are not discussed by the Atlantic Sturgeon Status Review Team (ASSRT 2007) or in the preamble to NMFS' proposed designation. However, based on Gulf Sturgeon tolerance and Cherr and Clark (1985), the levels of Ca[lcium] and M[a]g[nesium] ions in the Ocklawaha River should not be a problem for egg fertilization or egg rearing of sturgeons.'' Beyond this discussion of calcium and magnesium, no further information is provided regarding the relationship of these ions to successful spawning of Atlantic sturgeon. The report provided by the commenters also cited additional literature that may discuss these water quality parameters. However, we attempted to acquire these references and were unable to because they were not readily available to the public. Thus, we determined there was not enough information for us to include the specific water quality parameters mentioned by the commenter as essential PBFs for any DPS of Atlantic sturgeon.

Comment 10: An association of municipal wastewater agencies stated that the preamble of the proposed rule for the Gulf of Maine, New York Bight, and Chesapeake Bay DPS properly explains that ''specific oxygen concentration and temperature values are provided as examples and guidance'' but the proposed rule omits this key language from the regulatory text. The commenter believes the regulatory text should include this explanation or, alternatively, the examples of the water feature characteristics should be removed from the final rule or be made more specific to the spawning and subsequent stages of development of the Atlantic sturgeon in the specific habitats described in the proposed rule.

Our Response: We do not provide explanations of the regulations in the regulatory text. The use of ''*e.g.*'' in the regulatory text informs the reader that the DO level and water temperature are provided only as guidance, and these are not the only values for either DO or temperature that are suitable for all Atlantic sturgeon age classes addressed by the PBFs.

Comment 11: A commenter stated the proposed rule for the Carolina and South Atlantic DPSs also frames the features as ''optimal'' and ''suboptimal'' and recommended that we ''revise Part (a)(4)(iii) of the proposed rule for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs'' to frame the features as optimal and suboptimal.

Our Response: Upon reading the comment, we realized that framing the example of dissolved oxygen and temperature values as ''optimal'' and ''suboptimal'' can be misinterpreted as establishing specific, exclusive values. Since these values were meant to be examples of the numerous possible combinations of dissolved oxygen, water temperature, and salinity essential to Atlantic sturgeon conservation, we did not revise the language for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon to frame the features as ''optimal'' and ''suboptimal.'' This is because there is not one single DO level or temperature range that is best for Atlantic sturgeon in terms of habitat avoidance. We did revise the language for the Carolina and South Atlantic DPSs of Atlantic sturgeon by replacing the terms ''optimal'' and ''suboptimal.'' The new phrases convey that the examples provide context, but do not establish static, exclusive values for the essential physical feature.

The dissolved oxygen levels and water temperature values set forth in the proposed rules for the Atlantic Sturgeon DPSs were examples based on the best available information for conditions in different rivers occupied by Atlantic sturgeon and observed responses of sturgeon to these variables. Water quality factors of temperature, salinity and dissolved oxygen are inter-related environmental variables. Dissolved oxygen concentrations in water can fluctuate given a number of factors including water temperature (*e.g.,* cold water holds more oxygen than warm water) and salinity (*e.g.,* the amount of oxygen that can dissolve in water decreases as salinity increases). This means that, for example, the dissolved oxygen levels that support growth and development will be different at different combinations of water temperature and salinity. Similarly, the dissolved oxygen levels that we would expect Atlantic sturgeon to avoid would also vary depending on the particular water temperature and salinity. As dissolved oxygen tolerance changes with age, the conditions that support growth and development and likewise, the dissolved oxygen levels that would be avoided, change. This combination of factors makes it such that we cannot identify a single set of dissolved oxygen, water temperature and/or salinity conditions as optimal or suboptimal for any of the DPSs.

Like salinity and dissolved oxygen, water temperature fluctuates in the dynamic rivers and estuaries used by Atlantic sturgeon. The scientific literature for Atlantic sturgeon does not always include the water temperature where Atlantic sturgeon are detected or captured. There may also be differences in temperature tolerance of Atlantic sturgeon that originate from different rivers, and differences in temperature tolerance within the same river depending on the life stage. Therefore, while we generally know the ranges of water temperature and dissolved oxygen in which Atlantic sturgeon occur, we cannot identify a single ''best'' water temperature or dissolved oxygen level for all Atlantic sturgeon, in all rivers, under all circumstances.

We stated in the preamble of the proposed rule for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs that, ''Specific areas designated as critical habitat based on the four features are not expected to have water with oxygen concentration of 6 mg/L and the specific water temperatures at all times and within all parts of the

area.'' We similarly stated for the example in the proposed rule for the Carolina and South Atlantic DPSs of Atlantic sturgeon that, ''Appropriate temperature and oxygen values will vary interdependently, and depending on salinity in a particular habitat.'' Thus, we believe the terms ''optimal'' and ''suboptimal'' inadvertently conveyed a different meaning.

Comment 12: A commenter recommended that we revise the guidance for DO concentrations and temperature values provided in the proposed rule to be consistent with existing U.S. Environmental Protection Agency Clean Water Act water quality criteria applicable to the Chesapeake Bay Watershed. The commenter further stated the proposed regulatory language establishing a DO concentration of 6 mg/L and a maximum temperature of 30 °C for juvenile rearing habitat is inconsistent with existing water quality criteria. The commenter also stated that the proposed rule should evaluate and address existing conditions in the waters for the features which will dictate where to designate critical habitat. This framework will provide a necessary reference for both the agency and commenters from which the true implications of the proposed habitat components can be evaluated. For example, the proposed rule provides that temperature between 13 °C to 26 °C is optimal for spawning habitat, but there is no indication of how that temperature range compares to the ambient temperature of the waters themselves. In other words, does the proposed critical habitat meet the habitat component for temperature most of the time, some of the time, etc. Second, the proposed rule must include a natural condition provision to reflect natural instream temperature and DO levels which are outside of the temperature and DO features in the proposed rule. Where ambient temperature and/or DO is outside of these levels, the natural condition must control. Any regulatory requirements must be targeted toward the natural condition and not critical temperature/dissolved oxygen elements that are not naturally present.

Our Response: The water quality features are a physical feature essential to the corresponding Atlantic sturgeon DPSs. As discussed in our response to Comment 11, because DO and temperature vary interpedently based on local environmental conditions, the DO and temperature values provided in the proposed rules are provided as examples only. For example, the earliest life stages are the most sensitive to DO levels. Therefore, earlier life stages (*e.g.,* juveniles) may avoid areas based on one DO level while older life stages (*e.g.,* subadults or adults) may avoid areas based on a different DO level. The example provided in the regulatory text in the proposed rule for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon is just one example. We have not included a framework for each critical habitat area or a natural condition provision. However, we agree that these should be considered when Federal agencies are determining whether a proposed Federal agency action may affect designated critical habitat for the Atlantic sturgeon DPSs, and considered by us when we are consulting on Federal agency actions. See our responses to Comments 83, 84 and 85 for more information on the water quality feature for the Carolina and South Atlantic DPSs of Atlantic sturgeon.

Comments on Special Management Considerations or Protection

Comment 13: A commenter stated the proposal does not specify what ''special management considerations or protections'' are appropriate or necessary for the conservation of Atlantic sturgeon in all and/or each specific DPS. Given the areal extent of the proposed designation and the potential for consultation on numerous and varied actions (water use, wastewater discharges, dredging, etc.), the final rule needs to be more specific regarding the special management considerations or protections that may be required for all or specific DPSs.

Our Response: Special management considerations or protections are the methods or procedures useful in protecting the PBFs essential to conservation of listed species. We provided information in the proposed rule for why the PBFs essential to the conservation of each DPS may require special management or protection. This provision of a designation does not establish measures that may be recommended or required during section 7 consultation, such as RPMs and terms and conditions. Our impacts analyses and 4(b)(2) report describe the types of measures that might be required to address adverse impacts to the PBFs for federal actions expected to require consultation.

Comment 14: An industry trade group believes we failed to provide any assessment of current management or protections in place and whether those are adequate for the conservation of the Atlantic sturgeon. The commenters claim we must consider whether any of the proposed critical habitat units are presently under special management or protection for Atlantic sturgeon. The commenters acknowledge we have identified a number of initiatives that could protect Atlantic sturgeon but believe we must actually assess these initiatives to determine whether they are sufficient and determine what further management actions may benefit from critical habitat designation. The commenters go on to state we should consider each feature and specific area proposed and assess current management measures in place to make an actual determination as to whether special management may be needed in the reasonably foreseeable future, and if so, what that management would be, and how the critical habitat designation would further that management. The commenters conclude that our discussion of special management considerations is limited to general discussion regarding how barriers, water withdrawals, and dredging can generally affect water flow, quality, and depth and/or alter hard substrate, and that we have made non-specific assertions that special management for the essential PBFs may be required ''as a result of global climate change.''

Our Response: We disagree. When determining whether PBFs may require special management considerations or protection, we do not base our decisions on whether management is currently in place or whether that management is adequate (81 FR 7414; February 11, 2016). In *Center for Biological Diversity* v. *Norton,* 240 F.Supp. 2d 1090, 1096–1100 (D. AZ, 2003), the court rejected reading the ESA to mean that if adequate management or protections are already in place, then an area cannot meet the definition of critical habitat because special management considerations or protections are not required (''Defendant's construction of 'critical habitat' also adds the term 'additional' to the statute. As Defendant stated in its final rule, '*Additional* special management is not required if adequate management or protection is already in place. . .' There is absolutely nothing in § 1532, or its implementing regulations, to support Defendant's inclusion of 'additional.' As such, Defendant's construction of the 'critical habitat' definition is impermissible and contrary to law.'') Additionally, we are not required to determine if a PBF currently requires special management considerations, or to determine what that management would be, and how critical habitat designation would further that management. We are only required to make a determination that a PBF *may* require special management

considerations or protection (81 FR 7414; February 11, 2016). Consequently, we assessed the need for special management considerations for each PBF in the proposed rule and identified numerous actions or natural factors that could adversely impact each PBF, as is required by the ESA (''Because the emphasis in the requirement is on the word 'may,' the evidence shown by the Service supports the reasonable conclusion that *some* special management considerations or protection may be needed in the future to protect the sea ice habitat PCE [primary constituent element]. However, neither the Service nor the ESA have to be the vehicles by which the procedures or actions involved in the considerations or protection are accomplished. The Service has shown that someday, not necessarily at this time, such considerations or protection *may* be required. In other words, the Service has shown that it is within the realm of possibility that such considerations or protection may be needed now or in the future. Furthermore, the Service does not have to identify the source of such considerations or protection, merely that the considerations or protection may be necessary in the future. For example, the evidence in the record showing that sea ice is melting and that it will continue to melt in the future, perhaps at an accelerated rate, is more than enough proof that protection *may* be needed at some point'' (*Alaska Oil and Gas Ass'n* v. *Salazar,* 916 F. Supp. 2d 974, 990–992 (D. AK 2013), (Reversed on other grounds and remanded by *Alaska Oil & Gas Ass'n* v. *Jewell,* 815 F.3d 544 (9th Cir. 2016)).

We also disagree with the commenters' characterization that we made non-specific assertions regarding the special management needs of the PBFs that may be necessary as a result of global climate change. The proposed rule specifically identifies the impact from global climate change's impacts to water temperature and DO, as potential threats to the survival and recovery of Atlantic sturgeon in the southeastern United States.

Comment 15: A commenter asked if the objective of the special management considerations or protections is to create optimal habitat, specifically, to create the physical features described in § 226.225(a)(1) of the proposed rule, even if those features do not currently exist.

Our Response: The answer to this question is no. Critical habitat is based on the presence of PBFs essential to the conservation of the listed species and which may require special management or protection. We only designate critical habitat when the PBFs essential to conservation of the listed species may require special management considerations or protections. If we identify PBFs essential to the listed species but those features do not require special management or protection, then we do not designate critical habitat based on those PBFs.

The purpose of designating critical habitat is to prevent the destruction or adverse modification of the habitat as a result of Federal activities. Section 7(a)(1) of the ESA requires Federal agencies to use their authorities in furtherance of the purposes of the ESA (*i.e.,* aid in the conservation of listed species). However, there is not a requirement that Federal agency actions improve or create habitat for ESA-listed species.

Comment 16: Commenters requested that we include language to address known, significant, and growing uses that will adversely impact Atlantic sturgeon habitat in the Hudson River.

Our Response: For critical habitat designations we identify activities that may necessitate special management or protection of the PBFs. We have provided this information for the PBFs identified for the critical habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs. We cannot foresee every activity that would necessitate special management or protection of the PBFs. However, we believe the list of activities provided by us is comprehensive enough to provide adequate notice on which activities may affect critical habitat. The impact of Federal agency actions on the critical habitat features are assessed through ESA section 7 consultation.

Comment 17: One commenter requested that we include ''clear guidance for considering the effects of a changing climate on critical habitat designation for species recovery in the final rule.'' They requested we consider ''projected changes to salinity, temperature and DO, including changes in sea level rise.'' They further requested that we document the extent that climate change was considered when assessing the need for the inclusion of currently unoccupied habitat in the final rule.

Our Response: We acknowledge climate change is likely a factor contributing to the possible need for special management considerations or protection for the PBFs, and we recognize that climate change may affect the availability of some PBFs to sturgeon in some areas. As discussed in the response to comments for our regulations, Implementing Changes to the Regulations for Designating Critical Habitat (81 FR 7414; 7426; February 11, 2016), in those circumstances where the best scientific data available indicate that a species may be shifting habitats or habitat use, we may include specific areas accommodating these changes in a designation, provided we can explain why the areas meet the definition of critical habitat. No information is currently available, and none was provided by the commenter, that indicates any of the Atlantic sturgeon DPSs may be shifting habitats or habitat use in response to the effects of climate change. For example, Breece *et al.* (2016) projected how habitat use by adult Atlantic sturgeon of the Delaware River could shift in response to climate change, but did not provide evidence that Atlantic sturgeon are, or may be, shifting habitats or habitat use in the Delaware River as a result of climate change. We are not aware of other publications that indicate that any DPS of Atlantic sturgeon is shifting habitats or habitat use in response to the effects of climate change.

The commenter did not include any riverine-specific information regarding the areal influence of changes to salinity, temperature and DO, or sea level rise. We are designating as critical habitat the river areas that capture the varying distribution of the PBFs and that are appropriate to encompass the habitat essential for the conservation of the species. The designation includes all habitat required for reproduction and recruitment essential for the recovery of the DPSs, and reflects consideration of in-river changes that may result from climate change (*e.g.,* temperature, salt-water intrusion, etc.). We did consider the presence of the PBFs in each river, and the variability in the salt wedge seasonally and annually that influences where the Atlantic sturgeon life stages occur in the estuary, and we accommodated for these shifts in the critical habitat designation.

We considered whether any designations of unoccupied habitat were essential for the conservation of the Gulf of Maine, New York Bight or Chesapeake Bay DPSs because of the function they are likely to serve as climate changes, and we determined there were no such areas. We will continue to review Atlantic sturgeon habitat needs as new information about potential effects from climate change becomes available. Consistent with NMFS guidance in the context of individual section 7 consultations, we will consider how climate change interacts with a proposed action's effects on the PBFs in assessing an action's impacts on the critical habitat's

ability to support the species' recovery. These analyses will necessarily be case-by-case and dependent on the action, environmental conditions at the time in the affected river (including projected changes from climate change, if relevant), and the status of the species.

Comment 18: An industry trade group indicated we failed to map potential threats to Atlantic sturgeon (*e.g.,* manmade structures, dredging areas). This industry trade group also noted that we did not include an exception from critical habitat for manmade structures in the regulatory language for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs.

Our Response: Threats to the species were identified in both the Listing Rules (77 FR 5880; February 6, 2012 and 77 FR 5914; February 6, 2012) and the Status Review (ASSRT, 2007). There is no requirement to map the existence of threats to the species in a critical habitat designation. Information on activities that may affect critical habitat is properly characterized in the impact analyses. We appreciate the comment noting that we did not include an exception from critical habitat for manmade structures that do not provide the PBFs for northeastern DPSs. This was an oversight, as we did include the exception for the Carolina and South Atlantic DPSs. We have now included and clarified this exception for all five DPSs.

Comments on Designation of Unoccupied Critical Habitat

Comment 19: A commenter asked that the final rules expand on the documentation for upstream and downstream critical habitat boundaries of the critical habitat units and identify unoccupied habitat essential to the conservation of a particular DPS. The commenter noted that many of the upstream critical habitat boundaries are defined by dams or locks, and that presence of a barrier, in and of itself, should not constitute the upstream extent of critical habitat. As one of the objectives of the rule is to ''increase the abundance of each DPS by facilitating increased successful reproduction and recruitment to the marine environment,'' the commenter suggested revisiting consideration of these reaches as essential, but currently unoccupied habitat.

Our Response: Section 3(5)(A) of the ESA allows for consideration and inclusion of unoccupied habitat in a critical habitat designation if such habitat is essential for conservation of the species. The 1998 and 2007 status reviews for Atlantic sturgeon, ASMFC's 2009 review of Atlantic coast diadromous fish habitat, and the 2012 listing rule for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs (77 FR 5880; February 6, 2012) of Atlantic sturgeon reviewed historical and current use of rivers within the range of each DPS. We have considered the life history, status, and conservation needs information in these reviews, the cited literature, and new literature for each DPS (*e.g.,* Wippelhauser and Squiers, 2015 for the Gulf of Maine DPS; Breece *et al.,* 2013 for the New York Bight DPS; Hager *et al.,* 2014 for the Chesapeake Bay DPS). We have concluded that unoccupied habitat is not essential to the recovery of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs because Atlantic sturgeon reproduction and rearing habitat for each DPS is available downriver of dams or in rivers that are not dammed, and the boundaries of the critical habitat areas take into consideration the seasonal and annual variations in the location of the salt wedge that influences where Atlantic sturgeon life stages occur within the estuary as well as any potential shifts that may occur as a result of climate change. Therefore, we are not designating unoccupied habitat for these DPSs.

We agree that presence of a barrier does not necessarily constitute the upstream extent of critical habitat; however, in the case of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon, the barriers included to denote the upstream limit of the designation are the same designators as the upstream limit of the area occupied and therefore are appropriate in this case. We recognize that the upstream limits of the area occupied at the time of listing is not necessarily the historical upstream limit (*e.g.,* there is historical reference to the presence of sturgeon below Mohawk Falls which is upstream of the modern-day upstream limit of Atlantic sturgeon in the Hudson River); however, we have determined that currently unoccupied habitat is not essential for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs. Additionally, barriers that occur at a critical habitat boundary provide an easily recognizable landmark for where critical habitat begins or ends. Non-ephemeral reference points (*e.g.,* dams, bridges) can be used in a textual description of the boundaries of critical habitat.

Comments Designating Specific River Units or River Areas

Comment 20: Several environmental organizations stated that we incorrectly claimed that we could not designate estuarine or marine areas as critical habitat due to insufficient data and that the best available scientific information supports identification of PBFs in estuarine and marine environments that are essential to Atlantic sturgeon conservation. These commenters said that a growing body of research has identified critical feeding and seasonal aggregation sites, and that the sites identified to date should be designated as critical habitat. The commenters stated there is a scientific consensus that Atlantic sturgeon use marine waters of particular depths as migration corridors; the commenters asserted that available information supports the contention that all five DPSs use the same narrow migration corridor and known aggregation sites. The commenters stated that water depth, available prey, substrates, temperature, salinity and seascapes are factors correlated with, and that influence, Atlantic sturgeon use of specific estuarine and marine habitats as feeding or seasonal (winter, summer) aggregations, and migratory corridors, and that these features may require special management considerations or protection. The commenters stated that our regulations, Implementing Changes to the Regulations for Designating Critical Habitat, (81 FR 7414; February 11, 2016) support the use of generally-defined PBFs or an ecosystem approach. Finally, the commenters discussed our previous critical habitat designations for green and Gulf sturgeon as valid models for designating estuarine and marine areas as critical habitat for Atlantic sturgeon.

Our Response: We reconsidered the information available, but reached the same conclusion that we cannot identify critical habitat for adults or subadults of any of the five Atlantic sturgeon DPSs in marine or nearshore estuarine waters at this time. We agree that the regulatory definition of PBFs is intentionally broad because we cannot predict what species will be listed in the future, and what features that support the life history needs of those species will be necessary for designating their critical habitats. However, as described in the response to comments for our regulations, Implementing Changes to the Regulations for Designating Critical Habitat (81 FR 7414; February 11, 2016), ''we need to clearly articulate in our proposed and final rules designating critical habitat for each species how the essential features relate to the life-history and conservation needs of the species. This type of specificity will be in the individual proposed and final rules designating critical habitat for

each species.'' Thus, while prior designations for other species may provide important background, critical habitat designations are specific to particular species, their life history traits, habitat and resource uses, and information available for that species.

Some of the literature available for Atlantic sturgeon uses the term ''critical habitat'' in reference to areas where Atlantic sturgeon occur. However, the literature is not applying the term ''critical habitat'' as it is defined in the ESA. Similarly, the word ''essential'' has been used in the literature, but it is not used in the same context as it is in the critical habitat regulations. The Background of our regulations (81 FR 7414; February 11, 2016) explains that ''[t]he purpose of critical habitat is to identify the areas that are essential to the species' recovery.'' The explanation makes clear that critical habitat is the specific area(s) essential to species recovery.

We reviewed the critical habitat designations for the Southern DPS of green sturgeon and for Gulf sturgeon in the event there were similarities in the life history of sturgeon species that could inform the essential PBFs for the Atlantic sturgeon DPSs. Marine waters were designated for Gulf sturgeon and the Southern DPS of green sturgeon based on information that certain marine waters were a migratory/connectivity corridor for subadult and adult sturgeon between estuaries and marine foraging areas. However, unlike the Southern DPS of green sturgeon and Gulf sturgeon, the available information for Atlantic sturgeon foraging in marine waters (Johnson *et al.,* 1997; Dunton, 2014) is inconclusive regarding whether any particular marine waters are essential foraging areas for Atlantic sturgeon, and thus there are no identifiable migratory corridors between specific foraging areas. Furthermore, those sources do not provide the necessary information to allow us to identify what the PBFs associated with potential marine foraging for Atlantic sturgeon might be.

The scientific information available on Atlantic sturgeon forage items does not provide the specificity we need in identifying PBFs that are essential to the DPSs. The available information indicates that Atlantic sturgeon are opportunistic, benthic-cruisers that consume benthic prey over soft (unconsolidated) substrates. Other than being benthic prey, the specific Atlantic sturgeon prey items identified in the literature were common and vary between sites. Therefore, it is not possible to determine if gravel-sand and sand substrate types are essential habitat features for Atlantic sturgeon prey or, because Atlantic sturgeon are opportunistic foragers, the sturgeon happen to be feeding over these substrate types because they are ubiquitous, and we lack information to define prey, substrates or feeding areas more specifically for Atlantic sturgeon.

We cited in the preamble of the proposed rules the literature that identifies Atlantic sturgeon aggregation areas. The term ''aggregation'' as it is used in the literature for Atlantic sturgeon is not defined by any particular quantitative measure. The number of areas described in the literature as an ''Atlantic sturgeon aggregation area'' demonstrates the ubiquitous nature of Atlantic sturgeon in the marine range as well as the liberal use of the term for characterizing the presence of Atlantic sturgeon in an area. For example, the commenters referred to literature identifying Atlantic sturgeon feeding areas in the Bay of Fundy and Long Island Sound. Our background information cited to literature describing other Atlantic sturgeon foraging areas, including areas with mud bottom, gravelly-sand substrate, and sand substrate. Stein *et al.* (2004) noted that sturgeon were most often incidentally captured over gravelly-sand and sand substrate and suggested that their presence was associated with foraging. However, Stein *et al.* (2004) also reflected that the gravel-sand and sand substrate types were the dominant substrate types along the coastline, so it was uncertain if Atlantic sturgeon presence was correlated to the substrate type or if Atlantic sturgeon presence was coincidental to the substrate type.

The commenters referred to Laney *et al.* (2007) as demonstrating that ''shallow, nearshore waters off North Carolina are an important winter habitat for Atlantic sturgeon.'' The commenters did not provide information for why these particular shallow, nearshore waters are essential to one or more of the Atlantic sturgeon DPSs compared to all shallow, nearshore waters that are accessible to the DPSs. We need to have information to be able to make the connection between species' presence and presence of one or more PBFs that are essential to the conservation of the species and may require special management or protection. The commenters did not provide, and we could not find, information to distinguish these shallow, nearshore waters from other shallow, nearshore waters, or information that identifies more specific features of these waters. Tagging work by Erickson *et al.* (2011) showed that adult Atlantic sturgeon from the Hudson River move about within the Mid-Atlantic Bight, occurring as far south as Delaware for the late fall to early winter and then as far south as the area off Chesapeake Bay for the latter part of the winter. The data do not suggest movement from the river to a specific overwintering area where the fish reside throughout the winter. The available information for where Atlantic sturgeon occur in the winter also includes evidence of sturgeon in marine waters off estuaries where they were detected in the fall, sturgeon making long migrations along the coast to southern coastal waters, sturgeon possibly overwintering in an estuary, and at least one sturgeon moving in and out of a Gulf of Maine estuary during the winter (Laney *et al.,* 2007; Dunton *et al.,* 2010; Oliver *et al.,* 2013; Dunton *et al.* 2015; Taylor *et al.* 2016; C. Hager, Chesapeake Scientific, pers. comm.; T. Savoy, CT DEEP, pers. comm.; G. Zydlewski, Univ. of Maine, pers. comm.). Because this information is conflicting, we could not determine whether or where overwintering areas are essential to one or more of the Atlantic sturgeon DPSs.

We cannot designate critical habitat based on the presence of the species alone. Therefore, while we acknowledge there is literature that identifies aggregation areas where Atlantic sturgeon are generally found, it does not provide specificity as to the purpose of the aggregations or the features that support those purposes. Therefore, we do not believe it provides the information we need to meet the statutory and regulatory requirements to designate critical habitat.

The commenters stated that the Atlantic sturgeon DPSs use a narrow migratory corridor within marine waters and we should designate this narrow corridor as critical habitat. The commenters' characterization of these waters as a ''narrow corridor'' is subjective. As we described in the preamble for the proposed rules, Atlantic sturgeon generally occur within the 50 m depth contour. However, the literature is not consistent for the depth contour where Atlantic sturgeon occur in the marine environment. Based on fisheries-dependent data for incidental captures of Atlantic sturgeon, Stein *et al.* (2004) described that ''peak sturgeon captures along the coast were approximately bracketed by isobaths ranging from 10 to 50 m'' while Dunton *et al.,* (2010), using both fisheries-dependent and fisheries-independent data of incidental Atlantic sturgeon captures, concluded that ''Atlantic

sturgeon were largely confined to water depths less than 20 meters.'' Erickson *et al.* (2011), using location data of tagged Atlantic sturgeon, described the mean range of marine waters where Atlantic sturgeon occurred as 9.9 to 24.4 m depth depending on time of year. Erickson *et al.* also noted differences between fish, with some sturgeon using more shallow waters (5–15 m) and some using deeper waters (35–70 m) compared to the other tagged Atlantic sturgeon. Given these inconsistencies, we could not identify the PBFs that facilitate migration for any of the five DPSs.

The commenters also pointed to the findings of Breece *et al.* (2016) as research that could inform our designation of critical habitat in marine waters, nearshore bays, and sounds. Noting that Atlantic sturgeons' seasonal coastal migrations are difficult to predict, Breece *et al.* (2016) used ocean color and sea surface temperature recorded during the spring to partition waters of the Delaware Bay and ocean waters off Delaware Bay into six ''seascapes,'' and tested the hypothesis that these seascapes are predictors of the occurrence of Atlantic sturgeon during their spring migration in the mid-Atlantic. The commenters stated that Seascape E is a physical feature of marine waters that is essential to the Atlantic sturgeon DPSs (*e.g.,* for migrating between estuaries and marine waters and for where Atlantic sturgeon spend most of their life in marine waters) and asked us to designate marine waters as critical habitat for the Atlantic sturgeon DPSs. We considered and cited the Breece *et al.* (2016) study for the information that it provides for Atlantic sturgeon marine distribution. However, we did not conclude that Seascape E was an essential PBF because: (1) The equipment to detect sturgeon was primarily placed in or occurred within Seascape E, and the information was not provided on the presence of Seascape E in other parts of the marine range; and (2) because a clear correlation between what specific PBF(s) is essential to the conservation of the species could not be determined.

The Breece *et al.* (2016) study was temporally and geographically limited in scope relative to the range of the DPSs. Detection data were collected by fixed receivers and by receivers fixed to a glider for the months of April through June, the period of peak Atlantic sturgeon abundance during spring migration (Breece *et al.,* 2016). More than half of the fixed receivers were located in Delaware Bay. The remaining receivers were placed within approximately 20 km of the shoreline along the coast from approximately 30 km (*i.e.,* off New Jersey) and south (*i.e.,* off Maryland) of the mouth of the Bay. The glider mission covered a greater area; within approximately 25 km of the shoreline along a 120 km stretch of coastline between Bethany Beach, Delaware (south of the mouth of the Bay), and Chincoteague, Virginia. While the geographic area covered is large and the time period is when we would expect many Atlantic sturgeon to occur in the areas, this is a small geographic area, relatively mid-range, of the expansive Atlantic sturgeon DPSs' marine range from Canada to Florida, United States. Breece *et al.* (2016) noted that the variables used to define the seascapes were so dynamic, that the results of the study were presented with respect to an 8-day average of ocean color and sea surface temperature for each seascape. Based on the average, Seascape E was the most prevalent seascape class in the study area, and the equipment to detect the presence of Atlantic sturgeon occurred primarily within Seascape E. Additionally, Breece *et al.* (2016) were unable to determine why Atlantic sturgeon were associated with Seascape E. The authors state: ''[f]ull understanding of the processes driving the association of Atlantic Sturgeon to Seascape E is not yet known; however, it appears we can use this global product to estimate spatial occurrence without requiring direct observation of individuals to inform coastal ocean users during spring migration.'' Therefore, while potentially useful to resource managers for identifying potential areas of high sturgeon abundance in the Mid-Atlantic Bight region, the information still does not help us understand what, if any, PBFs exist in the area that may be essential to the conservation of the species.

Finally, the commenters stated that Atlantic sturgeon aggregation areas in marine and nearshore estuarine waters should be designated as critical habitat because these require special management and protection as a result of vessel strikes of Atlantic sturgeon from ships using the marine corridors, strikes from turbine blades in tidal estuaries, impingement and entrainment in water intakes, fisheries bycatch, and other threats to the fish including dredging, sand mining, pipeline and other construction, wind farm development, and impaired water quality. However, special management considerations or protection in the context of critical habitat designations are the methods or procedures useful in protecting the PBFs essential to the conservation of the listed species. The threats described by the commenters are threats to individual Atlantic sturgeon and not their habitat.

Comment 21: Several additional environmental organizations, including one that established an online form letter submission from which we received over 1,000 form letters, as well as a representative for New York State Department of Environmental Conservation, and academics, also pointed to the publications by Dunton *et al.* (2015) and Breece *et al.* (2016) and stated that we should designate critical habitat for the Atlantic sturgeon DPSs in marine waters, bays, and sounds.

Our Response: Some bays are part of the critical habitat designations. These include Merrymeeting Bay of the Kennebec River critical habitat unit, and Haverstraw Bay of the Hudson River critical habitat unit. Bays that occur between the mouth of the river and the Atlantic Ocean, such as Chesapeake Bay, are not part of the designated critical habitat because we do not have information that these areas contain PBFs that are essential to reproduction and recruitment of the offspring. The available information describes spawning adults as moving into the rivers and either staging in the river for a period of time or immediately moving upriver to spawning areas and, similarly, after spawning, moving downriver and either remaining in the river until outmigration in the fall or leaving immediately to move to other estuarine systems (Savoy and Pacileo, 2003; ASSRT, 2007; Greene *et al.,* 2009; Simpson, 2008; Austin, 2012; Balazik *et al.,* 2012; Breece *et al.,* 2013; Hager *et al.,* 2014; Kahn *et al.,* 2014). Juveniles spend months to years in the natal estuary, moving upriver and downriver with seasonal and annual changes in the salt front to access rearing habitat (*e.g.,* within their preferred salinity range). There is no information that natal juveniles are moving as far downriver as a bay or sound between the river mouth and the ocean, and returning to the natal river without continuing the outmigration to the ocean. Available information from tracking suggests they move downriver through the river estuary, into and through any adjoining bay or sound upon their first outmigration to the ocean. Thus, while soft substrate between the river mouth and spawning sites is essential for successful recruitment, we do not have information that soft substrate in these bays and sounds is essential to recruitment of the offspring to the marine environment. The comments did not provide new information for juvenile use of bays and sounds between the natal river and the ocean.

See also our response to Comment 20, and the biological information for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs in the Impacts Analysis and Biological Information Source Document.

Comment 22: A commenter stated that further spatial delineation of the Delaware River critical habitat areas is essential, given the multiple and vital uses of this waterway, which include but are not limited to: 94 discharges regulated under a Total Maximum Daily Load for polychlorinated biphenyls (PCBs) under the Clean Water Act; multiple water withdrawals serving regional populations; and significant commercial navigation. In addition, given the varying requirements of the different life stages of the Atlantic sturgeon, temporal delineation of critical habitat should also be considered for the final designation.

Our Response: The PBFs that support reproduction and recruitment and that are essential to the conservation of the New York Bight DPS are all of those that we have identified in the proposed critical habitat designation. These may require special management considerations or protection as a result of certain kinds of activities, including activities listed by the commenter. We are, therefore, required to designate these areas as critical habitat for the New York Bight DPS. The boundaries of each critical habitat area, including the Delaware River critical habitat area, encompass no more and no less than the area containing the PBFs essential to the conservation of the DPS and which may require special management considerations or protection.

It appears that the commenter is requesting that we identify the specific areas within the Delaware River where each of the features occurs; however, this goes beyond the scope of what is required in a critical habitat designation. (see *Home Builders Ass'n of Northern California* v. *U.S. Fish and Wildlife Service,* 616 F.3d 983 (9th Cir., 2010)). We have provided references in the rule, and in the Impacts Analysis and Biological Information Source Document that support our determination that the PBFs are present in the area designated and can provide guidance to Federal agencies when they need to request ESA section 7 consultation and consider the effects of their actions on critical habitat.

We do not use temporal designations for critical habitat because the PBFs are either present year round or will be present at some expected time during the year that cannot be predicted with precision (*e.g.,* the location of the salt front moves throughout the year, but given the multitude of factors that influence the exact location, we could not predict with any reasonable certainty the timing of any particular location). The timing of a proposed Federal action and the effects it would have on the critical habitat are considered during ESA section 7 consultation. For example, the effects of an activity that will impact hard substrate in freshwater reaches of the Delaware River may be different during the spawning season than during the winter.

Comment 23: The Navy raised concern that freshwater suitable for Atlantic sturgeon spawning was not available to Atlantic sturgeon in the Piscataqua River system below the lowermost dams of the Salmon Falls and Cocheco Rivers.

Our Response: Freshwater is available below the lowermost dams of the Salmon Falls and Cocheco Rivers. The salinity changes within the river estuary seasonally and daily depending on freshwater flow and tidal changes. See our response to Comment 3 for additional information on the Piscataqua River.

Comment 24: A commenter stated that nearshore shallow water areas of the Potomac River from Key Bridge to at least Marshall Hall should not be considered critical habitat because substrate from at least Marshall Hall to Key Bridge is deeply silty, and near shore salinity is closer to fresh than to 0.5 ppt salinity. The commenter stated that the feature is substrate with salinity greater than 0.5 ppt. Therefore, this area should not be designated critical habitat.

Our Response: We are not required to determine that every segment of the critical habitat contains all of the PBFs essential to conservation of the species, but rather, we demonstrate overall that the designated unit contains the PBFs essential to conservation of the species. We have provided references in the rule, and in the Impacts Analysis and Biological Information Source Document that support our determination that the PBFs are present in the area designated as critical habitat in the Potomac River. Briefly, the Potomac River estuary extends approximately 187 river kilometers (rkm) from the Chain Bridge to the mouth of the river. The river is tidal freshwater from Chain Bridge to Quantico, VA; the mixing zone of transitional salinity occurs from Quantico, VA, to the crossing of the U.S. Highway 301 Bridge, MD, and the remainder of the river estuary, from the U.S. Highway 301 Bridge crossing to the Chesapeake Bay, has a wide channel with gradually sloping, shallow flats near shore (USGS, 1984).

Comment 25: The Virginia Institute of Marine Science provided new information, based on their data collections, that adult Atlantic sturgeon occur upriver of the Route 360 bridges on both the Pamunkey and Mattaponi Rivers.

In 2015, a receiver placed at rkm 144 of the Pamunkey River, 5 km above the Route 360 Bridge, regularly detected 18 acoustically-tagged, adult sturgeon during the summer and early fall. The commenter believes that the occurrence of the adults in freshwater of the Pamunkey River during the spawning period (Hager *et al.,* 2014; Kahn *et al.,* 2014) and the detected movements of the adults support that the geographical area occupied includes the waters at least 5 km upriver of the Route 360 Bridge crossing, and suggests that this part of the Pamunkey River has the essential PBFs of critical habitat based on patches of sand from bank erosion. The commenter recommends that we extend critical habitat above the Route 360 bridge in the Pamunkey River approximately 14 rkm up to Nelson's Bridge Road Route 615 crossing on the Pamunkey.

The commenter also recommended extending the upriver boundary of the Mattaponi critical habitat unit by 10 rkm above the Route 360 bridge to rkm 122. In the summer and early fall of 2015, one tagged adult female Atlantic sturgeon ascended the Mattaponi River and was detected at the uppermost receiver located near the Route 360 bridge crossing. This is during the time and in an area where spawning would be expected to occur. Based on the time series of detections at this receiver, the commenter believes this individual moved past the receiver upstream, then moved back down again.

Our Response: We considered the information provided and agree that the detected presence of at least 18 adult Atlantic sturgeon in the Pamunkey River above the Route 360 Bridge crossing provides evidence that the geographical area occupied by the DPS in the Pamunkey is above the Bridge crossing, and the area is used by adults during the fall spawning period for the Chesapeake Bay DPS. We did not agree with the commenter that sand from bank erosion is evidence that hard substrate occurs in the area. However, the literature cited in the comments (*e.g.,* Bushnoe *et al.,* 2005) provides additional information for hard substrate (gravel) in the area. We, therefore, revised the boundary of the York River critical habitat unit by extending critical habitat by

approximately 14 rkm to the Nelson's Bridge Road Route 615 crossing on the Pamunkey River.

We did not revise the upriver boundary of the critical habitat designation on the Mattaponi River. We have considered the information provided by VIMS. While their data analysis suggests to them that the fish moved further upriver, there is no evidence that it moved upriver and, even if it did, these are the movements of just one fish. We cannot determine whether the movements of this fish are representative of all Atlantic sturgeon that occur in the Mattaponi or are movements of a vagrant fish. Additionally, critical habitat is based on the presence of the essential PBFs. VIMS did not provide information that the PBFs of critical habitat occur in the Mattaponi River upriver of the Route 360 Bridge crossing. Therefore, we are not changing the upriver boundary for the York River critical habitat unit in the Mattaponi River.

Comment 26: Maryland Department of Natural Resources (MD DNR) requested amendment of the critical habitat designation for the Chesapeake DPS to include: Marshyhope Creek; Broad Creek; Deep Creek; and, areas of the Nanticoke River above its confluence with the Marshyhope Creek and the lower Nanticoke River down to Chapter Point, MD. The MD DNR provided the 2016 project report for riverbed mapping of the Broad Creek, Marshyhope Creek, and Nanticoke River (Bruce *et al.,* 2016), information on the detection of an adult Atlantic sturgeon in spawning condition, and salinity, water temperature, and DO in Marshyhope Creek, Broad Creek, and the Nanticoke River.

Our Response: The substrate information for Marshyhope Creek and the Nanticoke River was not received in time for us to consider it for inclusion in the proposed rule. However, we were aware that a final report was imminent and alerted the public in the Impacts Analysis and Biological Information Source Document to the proposed rule that the presence of adult sturgeon in spawning condition and at the time when the Chesapeake Bay DPS spawns suggests that the PBFs essential to Atlantic sturgeon reproduction and recruitment are present in Marshyhope Creek. We also alerted the public that after receiving the report, we would assess whether to expand critical habitat to include this area. The final project report was submitted to us by the MD DNR during the public comment period. We reviewed the information as well as other available information for the Nanticoke River, including the MD DNR final report, ''Assessment of Critical Habitats for Recovering the Chesapeake Bay Atlantic Sturgeon Distinct Population Segment,'' funded by the NOAA Species Recovery Grants to States (ESA Section 6 Program). The benthic mapping report does provide information to confirm the presence of hard substrate in low salinity waters of Marshyhope Creek and the Nanticoke River. In addition, the MD DNR Section 6 report provides evidence that the area is likely being used for spawning. This information along with information related to the presence of suitable spawning substrate (Bruce *et al.,* 2016) indicates that there is the potential for spawning and recruitment to occur in the Nanticoke River and Marshyhope Creek.

Our review of this best available information confirmed that critical habitat for the Chesapeake Bay DPS occurs in the Nanticoke River and its tributary, Marshyhope Creek. Designation of the area is a natural outgrowth of the proposed rule given that we stated in the proposed rule that we suspected spawning was occurring in Marshyhope Creek, a tributary of the Nanticoke, and we stated in the Impacts Analysis and Biological Information Source Document that we were awaiting receipt of substrate information and would consider designating critical habitat in the River if we received additional information that confirmed that the PBFs are present. The PBFs may require special management considerations or protection as a result of activities, such as dredging and construction projects (*e.g.,* docks, piers), that may affect the PBFs. Therefore, we are designating critical habitat in the Nanticoke River and Marshyhope Creek for the Chesapeake Bay DPS.

We are not, however, designating critical habitat in the Nanticoke River and Marshyhope Creek as two separate areas as recommended by MD DNR, and we are not designating critical habitat in Broad Creek or Deep Creek. Critical habitat that is designated within the geographical area occupied by the species is based on the presence of the PBFs. While information on salinity and water quality is generally available, information on hard substrate (*e.g.,* gravel, cobble) in low salinity waters is not available for Broad Creek or Deep Creek. The substrate study did indicate the presence of gravel-sand, and sand-gravel in Broad Creek, but hard substrate such as gravel and cobble that provides interstitial spaces for the offspring after hatching is essential for spawning. We will reconsider Broad Creek and Deep Creek as new information becomes available on hard substrate and information to show that these areas could be used by Atlantic sturgeon for spawning (*e.g.,* evidence of spawning adult presence in the area, evidence for the presence of natal offspring).

Based on the PBFs essential to the conservation of the Chesapeake Bay DPS, the Nanticoke River system critical habitat unit consists of the waters of the Nanticoke River from the Maryland State Route 313 Bridge crossing near Sharptown, MD, to where the main stem discharges at its mouth into the Chesapeake Bay as well as Marshyhope Creek from its confluence with the Nanticoke River and upriver to the Maryland State Route 318 Bridge crossing near Federalsburg, MD, for a total of 60 rkm of aquatic habitat.

Comment 27: One commenter requested consideration of additional literature and datasets for determining whether to include the Eastern River, Abagadasset River, Muddy River, Sheepscot River up to Head Tide Dam, Dyer River up to Boynton Trask Dam, Saco River from Cataract Dam downstream to its mouth, Mousam River below the confluence with Fernald Brook, tributaries of Great Bay (Spruce Creek, Berrys Brook, Sagamore Creek, Lubberland Creek, Crommet Creek, Bellamy River, Sturgeon Creek), and Penobscot Bay as critical habitat for the Gulf of Maine DPS. The commenter also indicated that the Taunton River, MA, up to the confluence with the Nemasket River should be included in the critical habitat designation for the New York Bight DPS.

Our Response: We have reviewed the additional information and datasets referenced by the commenter. We are not adding these additional areas to the critical habitat designations. We discussed in our response to Comment 20 why the critical habitat designations for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs do not include bays and sounds that occur between the river mouth and the ocean, such as Penobscot Bay. No information was provided by the commenter that allowed us to identify PBFs in Penobscot Bay.

As described in our regulations at 50 CFR 424.12(b)(1) and the proposed rule, critical habitat must contain the PBFs essential to the conservation of the DPS, and that may require special management or protection. The Cataract Dam is located downriver of freshwater, and Atlantic sturgeon do not pass upriver of the dam. The dam is at the location of a natural falls that would be impassable to Atlantic sturgeon even if the dam was not present. As a result, hard bottom substrate (*e.g.,* rock, cobble,

gravel, limestone, boulder, etc.) in low salinity waters (*i.e.,* 0.0–0.5 ppt range) for settlement of fertilized eggs, refuge, growth, and development of early life stages is not available to Atlantic sturgeon in the Saco River. Therefore, we are not designating critical habitat in the Saco River since the area of the river within the geographical area occupied by the Gulf of Maine DPS does not contain the PBFs essential to successful reproduction and recruitment.

For the other waterways named by the commenter, we do not have information on whether Atlantic sturgeon spawn or spawned in that particular waterway. Atlantic sturgeon can be identified to their river of origin based on genetic analysis, likely due to their strong affinity for natal homing (*i.e.,* adults spawn in the river in which they were spawned). Some straying occurs and recolonization of rivers within a DPS is possible. However, we have no way to determine the likelihood that a particular river will be recolonized or the timespan over which recolonization would occur. Therefore, just as we considered the Union River as described in the Impacts Analysis and Biological Information Source Document, we investigated whether there is any evidence that sturgeon are now using, or have ever used, a particular river or river segment for spawning. The 2007 Status Review for Atlantic Sturgeon (ASSRT, 2007) indicated Atlantic sturgeon historically spawned in the Taunton River, Massachusetts (Table 1 in that document). However, the Status Review report does not provide the reference for this conclusion and we could not locate information to support the conclusion. There is no recent evidence of spawning for the Taunton River. Similarly, the 2007 Status Review report indicated Atlantic sturgeon historically spawned in the Sheepscot River and possibly spawn presently in the Sheepscot River. However, a study of the Kennebec Estuary, including the Sheepscot River, spanning the time period 1977–2001 did not find any evidence of Atlantic sturgeon spawning in the Sheepscot River (Wippelhauser and Squiers, 2015). Based on the best scientific information available, we cannot determine that the Taunton River and Sheepscot River are essential to reproduction or recruitment of the New York Bight and Gulf of Maine DPSs, respectively. Similarly, we do not have evidence that Atlantic sturgeon historically spawned or presently spawn in the other waterways named by the commenter. Based on the best scientific information available, these waterways are not essential to the conservation of the DPSs. Therefore, we cannot designate critical habitat in the Eastern River, Abagadasset River, Muddy River, Dyer River up to Boynton Trask Dam, Mousam River below the confluence with Fernald Brook, or tributaries of Great Bay (Spruce Creek, Berrys Brook, Sagamore Creek, Lubberland Creek, Crommet Creek, Bellamy River, Sturgeon Creek).

Comment 28: A commenter was concerned that the critical habitat designations for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs do not include all of the rivers listed in Table 1 of the 2007 Status Review labeled as historically or presently supporting Atlantic sturgeon spawning, or having Atlantic sturgeon nursery habitat.

Our Response: The regulations for identifying critical habitat differ from the approach used by the Atlantic Sturgeon Status Review Team to label rivers as historically or presently supporting Atlantic sturgeon spawning, or having Atlantic sturgeon nursery habitat. For example, the Status Review Team considered nursery habitat as any habitat used by immature Atlantic sturgeon, including non-natal estuaries used by subadult Atlantic sturgeon. For this critical habitat designation, we consider nursery habitat to be habitat within the natal estuary used by natal juveniles. Therefore, in our approach, a river would only be labeled as having nursery habitat if there was also evidence that it historically or presently supported Atlantic sturgeon spawning. As described in the response to Comment 27, we considered the evidence that the 2007 Status Review cited for whether a river historically supported or presently supports an Atlantic sturgeon spawning population. This information helped to inform whether an area contained the PBFs essential to the conservation of the particular DPS and that may require special management considerations or protection.

Comment 29: A commenter stated tributaries are vital components of the estuarine habitat that Atlantic sturgeon need to reproduce and develop, and conditions in tributaries affect the Hudson River. Therefore, the commenter recommended that we designate critical habitat for the entire length of, or the segment downstream of a dam or impassable rapids, in: Lents Cove, Annsville Creek, Popolopen Creek, Constitution Marsh and Foundry Cove, Moodna Creek below Route 9W, Wappinger Creek below the rapids, Roundout Creek below the dam, Esopus Creek below the dam, Jansen Kill below Route 9G, Ramshorn Creek, Catskill Creek below the rapids, Stockport Creek below the dam, Coxsackie Creek, Schodack Creek, Moordener Kill, Normans Kill, and the Mohawk River below the locks.

Our Response: The commenter did not provide and we do not have information that suggests Atlantic sturgeon spawn or spawned in the waterways, all tributaries of the Hudson River, named by the commenter. Additionally, the commenter did not provide and we do not have information indicating that the features are present in these waterways. Based on information provided in the Atlantic Sturgeon Status Review (ASSRT, 2007) and the Atlantic Sturgeon Stock Assessment, these areas are not essential to the conservation of the DPS, and we cannot designate the areas as critical habitat. However, we do recognize the connection of tributaries to the main stem Hudson River, the importance of a healthy ecosystem to Atlantic sturgeon.

Comment 30: A commenter stated that the frequency and timing of use suggests that PBFs, including foraging areas and cover from predation, may occur within certain bays, estuaries and near-shore marine areas. The commenter acknowledged that PBFs must be defined under the ESA, and that these data are not currently available for the entire range, but should be considered for the areas available. The commenter recommended that we: Consider the DPS-specific references (Calvo *et al.,* 2010; Erickson *et al.,* 2011; and Breece *et al.,* 2016) in the Final Rule; continue to consider this information gap to be a research priority; and, develop a schedule for designating bay and near-shore critical habitats essential to support the successful development, growth and migration of sub-adult and adult Atlantic sturgeon.

Our Response: Our consideration of the best available information to identify potential PBFs for the Atlantic sturgeon DPSs in marine waters, bays, and sounds is described in the proposed rule, Impacts Analysis and Biological Information Source Document, and in our response to Comment 20. This information included research findings described in Calvo *et al.,* 2010, Erickson *et al.,* 2011, and Breece *et al.,* 2016. Based on the best scientific information available for each DPS, and information for Atlantic sturgeon in general, we were not able to identify any PBFs for marine waters, sounds, or bays, other than for those bays that contain the PBFs essential for reproduction and recruitment of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs and that are included as part of the designated critical habitat.

Critical habitat designations are based on the best available scientific information. We cannot commit to a schedule for designating additional critical habitat for the Gulf of Maine, New York Bight, or Chesapeake Bay DPS because we cannot predict when information will be available to inform any potential future modification of this critical habitat designation or any new designation.

Comment 31: A conservation group pointed to a recent report by Moberg and DeLucia (2016) that recommended minimum values of DO, water temperature, and salinity values to support habitat suitable for successful recruitment of Atlantic sturgeon in the Delaware River. These values are instantaneous DO greater than or equal to 5.0 mg/L, and temperature less than 28 °C when salinity is less than 0.5 ppt. The commenter noted that estuaries are naturally dynamic habitats and the areas that support habitat suitable for successful recruitment could change with migration of the salt front. The commenter recommended that designated critical habitat include river segments that may serve as reproduction and recruitment habitats that accommodate changes in migration of the salt front, DO, and temperature conditions.

Our Response: We agree that estuaries are naturally dynamic habitats. In the Background section of the proposed rule we described that multiple spawning sites have been identified within many of the rivers used for Atlantic sturgeon spawning (Dovel and Berggren, 1983; Van Eenennaam *et al.,* 1996; Kahnle *et al.,* 1998; Bain *et al.,* 2000; Sommerfield and Madsen, 2003; Bushnoe *et al.,* 2005; Simpson, 2008; Hager, 2011; Austin, 2012; Balazik *et al.,* 2012; Breece *et al.,* 2013), and spawning sites at different locations within the tidal-affected river would help to ensure successful spawning, given annual changes in the location of the salt wedge. For example, Breece *et al.* (2016) reported a difference of 30 km in the average location of the Delaware River salt front during adult Atlantic sturgeon occupancy in 2011 compared to 2009 and 2012.

Designating critical habitat that includes multiple potential spawning areas helps to ensure Atlantic sturgeon can select the best spawning site, given the natural annual variations in environmental conditions within the river estuary. When several habitats, each satisfying the requirements for designation as critical habitat, are located in proximity to one another, an inclusive area may be designated as critical habitat (50 CFR 424.12(d)). Therefore, within the geographical area occupied by the DPS in each river, we considered all areas that contained the PBFs that are essential to the particular DPS and identified the boundaries, accordingly. As described in the response to a previous comment, we concluded for purposes of the critical habitat designations that unoccupied habitat was not essential to the conservation of the Gulf of Maine, New York Bight, or Chesapeake Bay DPS.

We are aware of the report by Moberg and DeLucia (2016) that focused on DO levels for survival of Delaware River natal juveniles in low salinity waters. However, the water quality feature for critical habitat is the interrelated variables of salinity, DO, and water temperature that are necessary for use of the habitat rather than fish survival. Fish avoid, when possible, habitats that would result in their death, and studies have shown that fish avoidance of habitat occurs before the DO levels of the habitat have dropped so low as to be deadly (Breitburg 2002; EPA, 2003). Studies have also shown that the DO concentration at which the fish will begin to avoid habitat is approximately equal to the DO concentration that reduces their growth rate. Therefore, identifying the temperature, DO, and salinity values that result in reduced Atlantic sturgeon growth can serve as a proxy for identifying the temperature, DO, and salinity values that result in Atlantic sturgeon habitat avoidance.

We considered the available information on Atlantic sturgeon growth, and temperature, DO, and salinity (Breitburg, 2002; EPA, 2003; Niklitscheck and Secor 2009; Niklitscheck and Secor 2010; Allen *et al.,* 2014) when we developed the examples provided in the proposed rule. Our intent was to provide an example in the proposed rule of a set of conditions that we expect to correlate to Atlantic sturgeon use of an area; it was not our intent to provide an example of the DO levels that are necessary for the survival of any particular age class of Atlantic sturgeon.

Comment 32: A commenter stated that our decision to not designate any estuarine areas as critical habitat is arbitrary and capricious, noting that natal estuaries are attached to a natal river, which makes these estuaries critical and, therefore, they should be designated. The commenter also stated that we should also designate estuaries that it knows are important (*e.g.,* the mouth of the Merrimack and the Saco River).

Our Response: The critical habitat designated for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs includes estuarine waters of the named river. It is a common misconception that all rivers are all freshwater and only bays or sounds are the estuarine waters. We are designating critical habitat in the Merrimack River, downstream of the Essex Dam to the mouth of the Merrimack River. We are not designating critical habitat in the Saco River because the area of the river within the geographical area occupied by the Gulf of Maine DPS does not contain the PBFs essential to the conservation of the DPS. Our response to Comment 20 addresses the best available information for identifying other PBFs in bays and sounds that are essential to the conservation of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs.

Comment 33: The commenter believes that areas proposed to be designated as critical habitat in the James River exceed what is necessary to protect Atlantic sturgeon and will accomplish little habitat restoration in the Chesapeake Bay DPS. The commenter states that considering the breadth of available information on biological and habitat data, critical habitat in the James River could be more specifically defined.

Our Response: The boundaries of the critical habitat areas are based on the presence of the PBFs essential to the conservation of the Chesapeake Bay DPS, and which may require special management considerations or protection. The PBFs are based on substrate, water quality, open passage, and the transitional salinity zone necessary for Atlantic sturgeon adults to reproduce and juveniles to rear in the natal estuary prior to emigration to the marine environment.

The best available information supports the conclusion that there are two spawning groups of Atlantic sturgeon returning to the James River, one in the spring and one in the fall. Spawning occurs in different areas of the river for each group. Such a difference is not unexpected given changes in the location of an estuary's salt wedge from spring to fall. Even in rivers where only one spawning season is currently known, spawning Atlantic sturgeon may select for the best spawning site in the river estuary, given the environmental conditions at the time (*e.g.,* flow and salinity), which vary depending on weather and other conditions (*e.g.,* more freshwater inflow due to a rainy spring or high snowpack can result in the salt front being farther downstream). Designating critical habitat that includes multiple spawning areas helps to ensure successful spawning, given the natural variations in environmental conditions within the

river estuary. Similarly, critical habitat that encompasses the complete habitat needs of Atlantic sturgeon juveniles is necessary because Atlantic sturgeon offspring select for the habitat with the combined variables of DO, water temperature, and salinity that best support their growth and development. Because estuaries are also dynamic environments with daily and seasonal changes in salinity, Atlantic sturgeon juveniles must be able to move within the natal estuary to remain in or access the salinity zone most suitable for the stage of development. As such, limiting the designation in the James River would not allow for inclusion of all of the PBFs that are essential to the conservation of the DPS.

Comment 34: A commenter stated that we must identify, with specificity and substantial evidence, those areas of the Susquehanna River that we believe exhibit the PBFs essential to the conservation of Atlantic sturgeon. Further, to meet our obligations under the Administrative Procedure Act, we must then provide stakeholders with an additional opportunity to comment on the justifications for the determinations.

Our Response: The ESA and the regulations implementing the critical habitat provision of the ESA (50 CFR part 424) do not require that we provide ''substantial evidence'' or articulate a particular level of specificity as to where exactly the PBFs may be found in a particular unit. The proposed rule did specify that the area containing the PBFs of critical habitat in the Susquehanna River is the 16 km of the Susquehanna River main stem from the Conowingo Dam to where the river drains at its mouth into the Chesapeake Bay. These are the lowermost 16 km of the river's overall 714 km length.

Upon reexamination of the information for the PBFs, we determined that PBF 2 (*i.e.,* aquatic habitat with a gradual downstream salinity gradient of 0.5 to as high as 30 ppt and soft substrate (*e.g.,* sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development) is not present in the lowermost 16 rkm of the Susquehanna River that we proposed to designate as critical habitat. In addition, these waters are likely to remain freshwater because saltwater from the ocean generally does not push into the upper Chesapeake Bay, and there is a large volume of freshwater flowing into the upper Bay from the Susquehanna and other rivers (Chesapeake Bay Program, 1987).

The proposed 16 rkm of the Susquehanna River does not have a salinity gradient and is unlikely to have a salinity gradient in the future. Because this PBF is not present in the lowermost 16 rkm of the Susquehanna River, and we determined that the coexistence of all four PBFs is required for successful reproduction and recruitment of the Chesapeake Bay DPS, the lowermost 16 rkm of the Susquehanna River are not included in critical habitat for the Chesapeake Bay DPS. Further information on the salinity, substrate, and water quality below the Conowingo Dam is available at *http://www.exelon corp.com/locations/ferc-license-renewals/Conowingo/Pages/ Documents.aspx.*

Comment 35: A number of commenters, including a coalition, objected to the proposed designations and stated that we provided no data or analysis in support of our conclusions that the essential PBFs we have identified are actually present throughout the expansive areas we have proposed for designation, nor any discussion of the location of essential PBFs within the areas.

Our Response: We are not required to conduct new analyses for critical habitat designations. We are required to use the best available information. The proposed rule, the biological information in the Impacts Analysis and Biological Information Source Document, and our administrative record for the critical habitat designations provide the sources of information for where the PBFs occur within each designated critical habitat area. We balanced the desire to provide detail on each critical habitat designation against the need to provide transparent and concise information. An excessively lengthy document can be perceived as burdensome to read and comment upon. We provided a level of detail that we believe was necessary and desired by the general public. In all cases, we have cited the sources of information for the presence of the PBFs in the specific critical habitat areas.

We also took into account the dynamic environment in which the PBFs occur. Some of the PBFs occur in more than one location or occur in a location at certain times of the year. For example, hard bottom substrate in low salinity waters (0.0 to 0.5 ppt) may be available farther downriver in the spring than in the fall, depending on seasonal changes in freshwater input, or may be available farther downriver in one year compared to another, depending on the freshwater input to the estuary in that particular year. Likewise, the exact boundaries of the transitional salinity zone will fluctuate with seasonal changes in flow, annual changes in flow, and even tide cycles. The boundaries of the critical habitat areas account for these cyclical changes that are reasonably expected to occur based on the best available information for the particular river within which we are designating critical habitat.

Comment 36: A representative for a power operation stated that the area of the Hudson River in the vicinity of the facility should be excluded from the critical habitat designation because: this part of the Hudson River does not possess characteristics of value to Atlantic sturgeon at any life stage, and it is inconceivable that any federally-approved action within the vicinity of Indian Point would ever rise to the level of destruction or adverse modification of critical habitat as the Services have defined it.

Our Response: We are not required to determine that every segment of the critical habitat contains all of the PBFs essential to the conservation of the species, but rather, we demonstrate overall that the designated unit contains the PBFs essential to conservation of the species (See *Home Builders Ass'n of Northern California* v. *U.S. Fish and Wildlife Service,* 616 F.3d 983, 988–989 (9th Cir., 2010)). We recognize in the rule that the location of some PBFs may shift daily, seasonally, or annually. We disagree that the area noted in the comment does not contain the essential PBFs of critical habitat; the area contains soft substrate and is within the salinity gradient necessary for the development of juveniles. It is also an area of the Hudson River where barrier-free passage is necessary for the upstream and downstream movement of adults.

The commenter's determination that activities associated with the Indian Point nuclear facility would not destroy or adversely modify the critical habitat is not a comment on the designation, but rather a conclusion of the effects of the activities that would be considered in an ESA section 7 consultation. Even if we agreed with that conclusion, there is no means to exclude an area based on the potential impacts of the operations of one facility. We also note that the critical habitat designated in the vicinity of Indian Point could be affected by other Federal actions independent of Indian Point (*e.g.,* dredging, water quality regulations, etc.).

We considered impacts of designating critical habitat for the New York Bight DPS, and concluded there was no basis to exclude any particular area from the proposed critical habitat because of the conservation benefits of the critical habitat designations to the species and to society. While we cannot quantify nor monetize these benefits, we believe they

are not negligible and are an incremental effect of the designations. See our response to Comments 51, 52 and 53 for further information on the Impacts Analysis for the Gulf of Maine, Chesapeake Bay and New York Bight DPSs.

Comment 37: A commenter stated that scientifically demonstrated identification of known PBFs needed for physiological development have not been specifically determined for the Atlantic sturgeon, and designating critical habitat in the Delaware River may be premature. The commenter goes on to state that the length and breadth limits of the critical habitat area alone apply assumptions that are not well documented in science, and, in the case of the downstream limit on the Delaware River, arbitrary landmarks were used to identify the beginning and end of the designated critical habitat. The commenter also states that the down-river boundary is demarcated by a land-based, manmade monument that possesses no inherent biological or physiological value indicating that sturgeon reproduction, early growth, and population maintenance begins or ends here.

Our Response: The critical habitat designations are not premature. The ESA requires that we designate critical habitat at the time a species is listed unless designating critical habitat is not prudent for the species (this rarely occurs) or is not determinable. If critical habitat is not determinable at the time of listing, we are allowed one additional year. At the end of that year, we must designate critical habitat based on the best available information.

We concluded that critical habitat was not determinable when the Atlantic sturgeon DPSs were listed as endangered and threatened in 2012. We failed to meet the one-year timeframe for designating critical habitat. We proposed critical habitat in June 2016. We have used the best available information to determine the essential PBFs that may require special management considerations or protection and identify where those PBFs occur to develop the critical habitat designation. While we agree that more information on the exact location of Atlantic sturgeon spawning would be generally informative and could allow us to better manage the species, the absence of this more specific information did not impair our ability to develop the critical habitat designation. This is in part because our critical habitat designation was not designed to include only spawning habitat.

The proposed rule described the PBFs and provided an explanation, in the context of Atlantic sturgeon life history, of why the PBFs are essential to the conservation of the Atlantic sturgeon DPSs. We provided the same background as well as the list of cited literature in the Impacts Analysis and Biological Information Source Document.

All of the PBFs are necessary for successful Atlantic sturgeon spawning and recruitment of offspring to the marine environment. Adults need habitat suitable for spawning, for traveling to and from spawning sites, and for staging, resting, and holding before and after spawning. The offspring need habitats in the natal estuary suitable for rearing. The habitat needed by juvenile Atlantic sturgeon changes as they grow and develop in the natal estuary. All juvenile habitat types in the natal estuary are needed for successful rearing of the offspring. Laboratory studies have shown differences in Atlantic sturgeon growth with different combinations of the combined variables of DO, water temperature, and salinity. Captures of Atlantic sturgeon juveniles in the natal estuary, likewise, reveal differences in the distribution of larger, older Atlantic sturgeon juveniles compared to smaller, younger Atlantic sturgeon juveniles. Therefore, we identified the boundaries of each critical habitat area that encompassed the PBFs essential to the conservation of each Atlantic sturgeon DPS and that may require special management considerations or protection. When several habitats, each satisfying the requirements for designation as critical habitat, are located in proximity to one another, an inclusive area may be designated as critical habitat (50 CFR 424.12(d)).

The boundaries of each critical habitat unit are consistent with how we have designated critical habitat for other species in rivers (*e.g.,* the southern DPS of green sturgeon, Gulf of Maine DPS of Atlantic salmon). One or more of the PBFs occur throughout the identified critical habitat areas. Riverbanks are the lateral boundaries. The downriver boundary is the mouth of the river because that is the downstream limit of the most extensive feature (the transitional salinity zone). The upriver boundary is the beginning of the named river, a manmade structure that is impassable by sturgeon, a natural feature that is impassable by sturgeon, or the upriver extent of tidal influence because, depending on the particular river, that is the upstream extent of the presence of the PBFs that are essential to the conservation of the DPS and that may require special management considerations or protection, or the upstream limit of the occupied area.

We cannot use ephemeral reference points (*e.g.,* trees, sand bars) to clarify or refine the boundaries of critical habitat. We can use physical structures that occur at the boundary of the area containing the PBFs in our regulatory description of the critical habitat areas. Doing so better informs Federal agencies of the area within which they should consider effects of their proposed actions to determine whether they are required to consult with us under section 7 of the ESA.

The Delaware River critical habitat unit extends from the upstream point of tidal influence (identified by a bridge that crosses the river at that boundary) downriver to where the river enters the Delaware Bay. A mouth of a river is often considered to be rkm 0 of that river. However, in this case, New Jersey regulations count the mouth of the Delaware Bay (*i.e.,* where it drains into the Atlantic Ocean) as rkm 0. To avoid confusion, we described the downriver boundary of the critical habitat unit based on the pre-established points and markers that demarcate the Delaware River and the Delaware Bay.

Comments on Impacts Analysis, Exclusions, and INRMPs

Comment 38: Many commenters, including those representing maritime associations, tug and barge operator associations, pilot associations, shipbuilders, and Federal and state agencies, stated we should exclude the Federal navigation channels and dredge disposal sites from the critical habitat designations (*e.g.,* in the Penobscot, Hudson, Delaware, York, and James Rivers). They believe including them will prevent or delay dredging of Federal navigation channels, resulting in impacts to navigation safety, less commerce, and harm to the environment (*e.g.,* by increasing the risk of vessel damage that could cause fuel spills). They also stated that including the Federal navigation channels and dredge disposal sites does not contribute to protecting the Atlantic sturgeon DPSs or their existing habitat.

Our Response: We disagree. The Federal navigation channels and dredge disposal sites are part of the areas that we have identified as critical habitat based on the presence of the PBFs essential to the conservation of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs, and because those essential PBFs may require special management considerations or protection. There are conservation benefits of the critical habitat designations, both to the species and to

society. While we cannot quantify or monetize these benefits, we believe they are not negligible and are an incremental effect of the designations.

The purpose of designating critical habitat is to contribute to species' conservation (*i.e.,* facilitate recovery of the ESA-listed species for which critical habitat is designated). Because the Federal navigation channels and dredge disposal sites within the critical habitat areas are part of the area containing the essential PBFs, we are not excluding the Federal navigation channels and areas used for dredge disposal.

Critical habitat designations do not stop or prevent Federal agency actions. The sole ESA requirement with respect to designated critical habitat is that Federal agencies consult with us (or the USFWS for species under their jurisdiction) on any Federal agency action (*i.e.,* any action that agency intends to fund, authorize or carry out) that may affect critical habitat. The purpose of the consultation is to ensure that actions taken by Federal agencies are not likely to result in the destruction or adverse modification of critical habitat. ESA section 7 consultation is not required if there is no Federal agency action. For example, section 7 consultation is not required when a private citizen will engage in an activity on private land that does not require any authorization from a Federal agency, and does not include any Federal funds to carry out the activity.

For those activities conducted by private citizens that include a Federal agency action (*e.g.,* the citizen receives funding from a Federal agency or is required to obtain a permit from a Federal agency), the Federal agency taking the action is required to consult with us if the agency determines the proposed action may affect any Atlantic sturgeon DPS, its designated critical habitat, any other ESA-listed species under our jurisdiction, or its designated critical habitat.

Federal agency actions that are necessary to maintain safe navigation (*e.g.,* maintenance dredging) and support commerce are expected to continue to occur following the critical habitat designation. ESA section 7 consultations considering effects to the Atlantic sturgeon DPSs have occurred since the DPSs were listed in 2012. Because Atlantic sturgeon are generally present in the critical habitat areas, designating critical habitat is unlikely to increase the number of ESA section 7 consultations because Federal agencies are already required to consult with us under section 7 for actions that may affect the listed species.

Comment 39: Commenters expressed concern that designating critical habitat would prevent repairs to or new construction of marine terminals, docks, and other port infrastructure, thus impacting commerce. They commented we should exclude parts of the critical habitat areas adjacent to marine terminals, docks, and other port infrastructure to avoid such impacts.

Our Response: Activities such as repairs to or new construction of marine terminals, docks, and other port infrastructure can occur when such structures are within or in proximity to designated critical habitat. Section 7(a)(2) of the ESA requires Federal agencies to consult with us if the agency will fund, authorize, or carry-out an activity that may affect designated Atlantic sturgeon critical habitat. If, during consultation, we determine a Federal agency action is likely to destroy or adversely modify critical habitat, we will work with the Federal agency to identify modifications to the proposed action to remove the likelihood that the action will destroy or adversely modify critical habitat. In that case, we would document our determination in a Biological Opinion and provide one or more Reasonable and Prudent Alternatives for the Federal agency to implement. If we conclude that the proposed activity is not likely to adversely modify or destroy the critical habitat, then we will make that determination in a Biological Opinion and the action can occur as originally proposed.

Comment 40: A representative of Bath Iron Works, a shipbuilder for the Navy, and a representative of Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc. (collectively, ''Entergy''), an energy company that owns a power plant, had similar concerns for the critical habitat designations in the Kennebec River for the Gulf of Maine DPS, and in the Hudson River for the New York Bight DPS. Both commenters expressed concern that the critical habitat designations would increase operational costs, adversely affect the ability to operate, or otherwise impact national security, and requested that we not designate critical habitat in the vicinity of Bath Iron Works on the Kennebec River or in the vicinity of Indian Point Nuclear Power Plant on the Hudson River.

Our Response: We disagree, and appreciate the opportunity to correct some common misconceptions about critical habitat. The first misconception is what is required or prohibited when critical habitat is designated. Critical habitat designations do not create refuges or preserves where activities cannot occur. Critical habitat designations do require Federal agencies to consult with us if they are funding, authorizing or carrying out an action that may affect designated critical habitat for ESA-listed species under our jurisdiction. A Federal action can occur as proposed if we agree with a Federal agency's determination that a proposed action may affect designated critical habitat, and that all of the anticipated effects are insignificant, discountable, or wholly beneficial. A Federal action can also occur as proposed if we agree with a Federal agency's determination that a proposed action is likely to adversely affect critical habitat, but will not destroy or adversely modify critical habitat. A Federal action is required to be modified if we conclude that the proposed action is likely to destroy or adversely modify critical habitat. In that circumstance, we work with the Federal agency to identify modifications to the proposed action that allow the proposed action to occur without destruction or adverse modification of critical habitat. We do not consult on proposed Federal agency actions that will have no effect on critical habitat, and we do not consult on activities that do not include a Federal agency action (*e.g.,* no Federal funding for the action and no required Federal authorization for the action).

There are also misconceptions about what we can exclude and what we must not include in critical habitat designations. We must not include as part of a critical habitat designation any lands or other geographical areas owned or controlled by the Department of Defense (DOD) or designated for its use, that are subject to an INRMP prepared under section 101 of the Sikes Act, if we determine that such plan provides a conservation benefit to the species, and its habitat, for which critical habitat is proposed for designation. We also do not designate critical habitat within foreign countries or in other areas outside of United States jurisdiction (50 CFR 424.12(h)). We can exclude an area from a critical habitat designation based on economic, national security, or other relevant impacts if the benefits of exclusion outweigh those of inclusion, so long as the exclusion will not result in the extinction of the species concerned. However, we are not required to exclude particular areas from a critical habitat designation based on any of these impacts.

As required, we did consider the economic impacts, impacts to national security, and other relevant impacts of the critical habitat designations, including the conservation benefits of

the designation, both to the species and to society. We concluded that economic impacts of designating critical habitat for each DPS would be low. Our conclusion is based on two determinations. First, the primary source of economic impacts as a result of designating critical habitat for the Atlantic sturgeon DPSs are the administrative costs of conducting ESA section 7 consultations. Second, because Atlantic sturgeon occur throughout the critical habitat areas designated for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs, Federal actions that may affect critical habitat are also likely to affect the fish. Therefore, a single section 7 consultation would consider both the effects to the DPS and to its critical habitat. Our analysis of the economic impacts of designating critical habitat also considered whether modifications were likely to occur. Based on the best available information, including responses from Federal agencies that we are likely to consult with, we concluded that modifications to Federal actions are unlikely to occur as a result of section 7 consultations on effects of the actions to designated Atlantic sturgeon critical habitat.

We considered at the proposed rule stage, the concerns expressed by the Navy that designating critical habitat in the Kennebec River critical habitat unit adjacent to Bath Iron Works, a private shipbuilder for the Navy, would affect the Navy's ability to build and test current and future classes of surface ships, resulting in a risk to military readiness and national security. The Navy described the activities likely to occur as: Flooding and dewatering dry docks, updating and maintaining pier structures, including pile driving, and dredging activities to maintain proper channel and berthing depths. The essential PBFs of critical habitat in the area are salinity suitable for older juveniles, open passage for juveniles suitably developed to leave the natal river, open passage for adults traveling through the area to and from spawning areas, open passage for subadults traveling through the area, and soft substrate. Maintaining and/or updating pier structures may affect open passage and substrate (*e.g.,* placing more pier structures in the area, altering the substrate to make it more suitable for the pier structure). Similarly, dredging to maintain proper channel and berthing depths may affect (*e.g.,* remove) the substrate that supports juvenile foraging, and change the depth affecting the salinity (*e.g.,* as a result of changes to mixing in the estuarine river or the extent of saltwater intrusion). However, the activities also may affect Atlantic sturgeon. For example, construction to maintain or update piers can produce sounds that disrupt normal behaviors such as sturgeon foraging, staging, and spawning. Dredging may injure or kill sturgeon that come into contact with the gear (*e.g.,* older juveniles passing through as they leave the natal river, adults traveling through the area to and from spawning areas, subadults traveling through the area). Because the Navy's activities may also affect the Gulf of Maine DPS of Atlantic sturgeon and sturgeon from other DPSs that can occur in the area, we do not anticipate any ESA section 7 consultations to arise strictly for the purpose of assessing the effects of Navy funded, authorized, or conducted activities on designated critical habitat in the Kennebec River. In addition, based on the best available information, we do not anticipate any ESA section 7 consultations for Navy activities in the Kennebec River will require modifications to avoid destruction or adverse modification of critical habitat based on the past consultation history and the nature of the identified categories of activities in the area. We considered all of the impacts arising from the critical habitat designation for the Gulf of Maine DPS, and determined the impacts would be coextensive with the impacts from listing the DPS. We will continue to work with the Navy to address any concerns about the ESA section 7 consultation process. Finally, should it be necessary, the regulations implementing section 7 of the ESA allow for informal consultation where emergency circumstances mandate the need to consult in an expedited manner, for situations involving acts of God, disasters, casualties, national defense or security emergencies, etc.

The commenter did not establish how the critical habitat designation would impact security zones around private facilities, including the Indian Point nuclear facility in the Hudson River referenced by the commenter, that are meant to keep unauthorized vessel traffic at a distance from a facility. We do not foresee that the existence of the security zone and measures in place to maintain that security zone will affect the PBFs of critical habitat. For example, maintaining the security zone does not alter the substrate or the water temperature, nor does it block passage of Atlantic sturgeon moving through the area. Given that, we do not anticipate any impacts of the critical habitat designation on national security related to the security zone at the nuclear facility on the Hudson River. Given the lack of any impact to national security, and the benefit of designating critical habitat for the New York Bight DPS, we are using our discretion to not exclude the security zone area from the critical habitat designation in the Hudson River.

Comment 41: One commenter stated we should allow for exclusion of designated critical habitat areas following a facility's submission of reports complying with 40 CFR 122.21(r) (*i.e.,* National Pollution Discharge Elimination System (NPDES) Program Requirements for facilities with cooling water intake structures).

Our Response: The ESA does not provide any mechanism or authority to us for establishing criteria that would automatically exclude parts of a critical habitat designation after critical habitat has been designated. We can change a critical habitat designation based on new information regarding the listed species and its habitat. Such changes must be made through rulemaking, in accordance with the same regulations used to initially designate critical habitat for a species, and must include an opportunity for public comment.

Comment 42: The Navy commented that Naval Weapons Station Earle, Naval Support Facility Indian Head, Naval Support Facility Carderock, and Joint Base Anacostia Bolling were described in previous correspondence to us, but were not addressed in the proposed rule. The Navy asked us to confirm that these facilities do not overlap with any of the proposed critical habitat units.

Our Response: We confirm that Naval Weapons Station Earle, Naval Support Facility Indian Head, Naval Support Facility Carderock, and Joint Base Anacostia Bolling do not overlap with any of the proposed critical habitat units. In February 2014, we requested the Department of the Navy identify to us facilities that occurred within areas that we were considering for proposed critical habitat. After sending the letter, we changed the boundaries of the critical habitat areas to better identify the in-water habitat in which the PBFs that may require special management considerations or protection occur. As a result of the change to the boundaries, Naval Weapons Station Earle, Naval Support Facility Indian Head, Naval Support Facility Carderock, and Joint Base Anacostia Bolling do not occur within the critical habitat for the New York Bight or Chesapeake Bay DPSs. Our October 12, 2016, letter to the Deputy Assistant Secretary of the Navy for Environment provided our determinations for these facilities. A copy of that letter is provided in Appendix C of the Impacts Analysis and

Biological Information Source Document.

Comment 43: The Navy also commented on our conclusion regarding the INRMP for Naval Weapons Station Yorktown, a complex of three facilities located on Virginia's Lower Peninsula between the York and James Rivers, and asked for confirmation that Restricted Area 33 CFR 334.260 and Restricted Area 33 CFR 334.270 are included in the 4(a)(3)(B) exemption for the York River critical habitat unit.

Our Response: Yes. As described in section 1.2 of the INRMP for Naval Weapons Station Yorktown, the INRMP's scope comprises all lands, ranges, nearshore areas, and leased areas: Owned by the United States and administered by the Navy; used by the Navy via license, permit, or lease for which the Navy has been assigned management responsibility; or withdrawn from the public domain for use by the Navy for which the Navy has been assigned management responsibility (Navy, 2006).

The regulations at 33 CFR 334.260 describe three areas of the York River associated with Naval Weapons Station Yorktown. Public access is prohibited or restricted in some manner (*e.g.,* vessels may pass through but not anchor, no trawling or net fishing) for each area, and the regulations are enforced by the Commander, Naval Weapons Station Yorktown, Virginia, and such agencies as he/she may designate.

The regulations at 33 CFR 334.270 for waters of the York River adjacent to Cheatham Annex Depot of Naval Weapons Station Yorktown restrict access by the public. No loitering is permitted within the area, and oystermen may work their own leaseholds or public bottom within the area, provided they obtain special permission from the Officer in Charge, Cheatham Annex Depot, Naval Supply Center, Williamsburg, Virginia. The Officer in Charge, Cheatham Annex Depot, is responsible for enforcing the regulations at 33 CFR 334.270.

Based on the information provided in the regulations of Title 33, the areas described by sections 334.260 and 334.270 are controlled by the DOD and are within the scope of the INRMP for Naval Weapons Station Yorktown. We determined that the INRMP provides a conservation benefit to the Chesapeake Bay DPS of Atlantic sturgeon and its habitat, for which critical habitat is proposed for designation. Therefore, critical habitat for the Chesapeake Bay DPS will not include the specific lands or other geographic areas of Naval Weapons Station Yorktown, including the Restricted Areas described in sections 334.260 and 334.270. Consultation under section 7(a)(2) of the ESA is not required for any Federal agency action that may affect the features of Atlantic sturgeon critical habitat occurring within the areas described at 33 CFR 334.260 and 33 CFR 334.270. However, consultation under section 7(a)(2) of the ESA is required for Federal agency actions if the proposed action may affect any ESA-listed species.

Comment 44: The Navy requested that we consider exclusion of Naval Station Norfolk and Portsmouth Naval Shipyard once INRMPs for these facilities are complete and we have reviewed the INRMPs.

Our Response: We cannot designate as critical habitat any lands or other geographical areas owned or controlled by the DOD or designated for its use, that are subject to an INRMP prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if we determine in writing that such plan provides a conservation benefit to the species, and its habitat, for which critical habitat is proposed for designation. Therefore, once any new INRMPs are complete, we will review the documents. If we conclude that the INRMP provides a conservation benefit to the particular Atlantic sturgeon DPS, we will initiate a rulemaking to remove the area from the critical habitat designation.

Comment 45: The Navy disagrees with our determination that consultations for effects of dredging on critical habitat will be fully coextensive with consultations to address impacts to Atlantic sturgeon. The Navy believes that critical habitat can or will result in an additional commitment of resources, and will require modification of proposed actions to prevent adverse effects to critical habitat.

Our Response: We acknowledge that dredging occurring within designated critical habitat may require consultation to ensure Federal actions are not likely to destroy or adversely modify critical habitat. However, since all of the critical habitat areas for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs are occupied habitat, nearly all those additional consultations will be coextensive to consultations that would also occur to consider the impact to the sturgeon that occur in those areas. As described in our response to *Comment 38,* ESA section 7 consultations considering effects to the Atlantic sturgeon DPSs have occurred since the DPSs were listed in 2012. While some existing consultations may need to be reinitiated to consider effects to critical habitat, Atlantic sturgeon are generally present in the critical habitat areas, so designating critical habitat is unlikely to increase the number of ESA section 7 consultations.

Comment 46: The Navy is also concerned that we did not fully consider impacts to national security resulting from the designation of critical habitat in areas that overlap with naval bases and areas owned by naval contractors. A list of areas and additional information was provided, including information that identified areas designated as Restricted Areas and Surface Danger Zones by the U.S. Army Corps of Engineers (USACE) pursuant to 33 CFR part 334. As described by the Navy, Restricted Areas generally provide security for Government property and/or protection to the public from the risks of damage or injury arising from the Government's use of that area, and access is by permission only. Surface Danger Zones may be closed to public access on a full time or intermittent basis.

Our Response: We carefully considered the information provided by the Navy. For the Chesapeake Bay DPS, the Navy provided information on some facilities and training areas that are not part of the James River critical habitat unit. The Lower James River Boat Training Area overlapping with Restricted Areas 33 CFR 334.290, 334.293, and 334.300; Lower James River Precision Anchorage and Buoy Mooring Training Areas that overlap Restricted Area 33 CFR 334.300; and, portions of the Underwater Light Salvage Operations Dive Training Areas (*e.g.,* that overlap with Restricted Areas 33 CFR 334.310, 334.320, 334.350, 334.360, and Danger Zone in § 334.340) do not occur within the James River critical habitat unit. The James River critical habitat unit is that part of the James River from Boshers Dam and downstream to where the main stem river discharges at its mouth. The extent of the critical habitat unit may have been unclear, however, because the regulatory text of the proposed rule correctly described the boundaries of the critical habitat unit, but the map incorrectly depicted the James River critical habitat unit as including Hampton Roads. We have corrected the map.

The remaining part of the Lower James River Boat Training Area (*i.e.,* overlaps with Restricted Area 33 CFR 334.280) and the remaining part of the Underwater Light Salvage Operations Dive Training Area (*i.e.,* overlaps with Restricted Area 33 CFR 334.280) occur within the James River critical habitat unit. In addition, portions of the Underwater Light Salvage Operations Dive Training Area occur within the

York River critical habitat unit (*e.g.,* Restricted Areas 33 CFR 334.260 and 334.270) of the Chesapeake Bay DPS. The Navy also provided information for and requested exclusion of the in-water parts of the Philadelphia Navy Yard Annex Reserve Basin and Piers that occur in the Delaware River critical habitat unit of the New York Bight DPS, and of the Portsmouth Naval Shipyard that occurs in the Piscataqua River critical habitat unit of the Gulf of Maine DPS. We are not excluding any of these from the critical habitat designations.

In their comments, the Navy states that designating critical habitat: could shut down, limit or delay operations as a result of the need to consult under section 7 of the ESA; could increase the frequency and scope of consultation requirements; and would likely result in project delays and additional mitigation requirements or modifications not considered during planning. Our ESA section 7 consultation history with the Navy does not support the Navy's speculation. The consultation history demonstrates that Navy activities, including training, pier maintenance, and dredging, have occurred since the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs were listed under the ESA in 2012. As described above, we expect any consultation necessary to consider the effects of Navy actions on designated critical habitat for these DPSs will be coextensive with consultations on the effects of the proposed action on the sturgeon. Further, the GARFO ESA Section 7 Team has developed methods and tools to help action agencies requesting consultation, and to help expedite the consultation process.

Finally, as described in our response to Comment 38, there are conservation benefits of the critical habitat designations, both to the species and to society. While we cannot quantify or monetize these benefits, we believe they are not negligible. Once we exclude an area from a critical habitat designation, we lose the ability to consider the effects of Federal agency actions that could adversely modify or destroy designated critical habitat. This could allow for actions to proceed that would result in the loss of habitat containing the PBFs essential to the conservation of a DPS, hindering or even preventing recovery of the particular DPS. Therefore, given the benefits of designation, we did not exclude any particular area from the critical habitat units.

Comment 47: The Navy provided an illustration of the upper, middle, and lower danger zones associated with the Potomac River Test Range (PRTR) Complex and explained that the map in the INRMP for Naval Support Facility Dahlgren (NSF Dahlgren) does not show the entire extent of the danger zones. The Navy further commented that we previously determined that the NSF Dahlgren INRMP provides a benefit to Atlantic sturgeon and its habitat and, in accordance with section 4(a)(3)(B) of the ESA, the particular areas of the facility covered under the INRMP will not be part of the designated critical habitat.

Our Response: We thank the Navy for the information. Our consideration of the PRTR was based on the description of the danger zone provided in the regulations at 33 CFR 334.230 and the Water Range Sustainability Environmental Program Assessment for the Potomac River Test Range (May 2013) and the NSF Dahlgren INRMP.

Section 4(a)(3)(B) of the ESA prohibits designating as critical habitat any lands or other geographical areas owned or controlled by the DOD or designated for its use, that are subject to an INRMP prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a conservation benefit to the species, and its habitat, for which critical habitat is proposed for designation. We determined that the INRMP for NSF Dahlgren provides a benefit to the Chesapeake Bay DPS and its habitat. However, the PRTR is outside of the scope of that INRMP. The scope of the INRMP for NSF Dahlgren is described as natural resources management on those lands and near-shore areas at Naval Support Facility Dahlgren that are: Owned by the United States and administered by the Navy; used by the Navy via license, permit, or lease for which the Navy has been assigned management responsibility; withdrawn from the public domain for use by the Navy for which the Navy has been assigned management responsibility; and, leased lands on the installation and areas occupied by non-DOD entities. Specifically, the INRMP describes the NSF Dahlgren as divided ''into two land masses by Upper Machodoc Creek. Mainside encompasses 2,678 acres on the northern side of Upper Machodoc Creek and is used for operational and support activities and military housing. Pumpkin Neck, located to the south of Upper Machodoc Creek, is 1,641 acres and supports two large testing areas and scattered testing facilities.'' In addition, the INRMP states that NSF Dahlgren maintains real estate transactions to ''18 small range stations located along the Potomac River Test Range (PRTR) to support [its] primary tenant's, Naval Surface Warfare Center, Dahlgren Division (NSWCDD), over water testing activities.'' The INRMP describes the PRTR Complex which is five land based firing ranges and one water range, the PRTR. However, both the INRMP and the Water Range Sustainability Environmental Program Assessment describe the PRTR as the responsibility of the NSWCDD. The regulations at 33 CFR 334.230 also identify the PRTR as controlled by the NSWCDD, including for closing one or more of the three danger zones on a full-time or intermittent basis in the interest of public safety during hazardous operations.

The Navy, in their comment, described the PRTR as associated with NSF Dahlgren. The INRMP description of the land and nearshore areas for NSF Dahlgren supports use of ''associated with'' rather than ''part of.'' For example, with the exception of Figure 2–4 depicting the five land based firing ranges and the PRTR, the illustrations in the INRMP do not include the PRTR as part of NSF Dahlgren. Throughout the INRMP, the Potomac River is described as being adjacent to NSF Dahlgren whereas certain Potomac River tidal tributaries are described as within the installation, and NSF Dahlgren is described as having only approximately 6.4 km (4 miles) of Potomac River shoreline.

The INRMP explains that management of the Dahlgren base previously transferred from the NSWCDD to Naval District Washington (NDW), which was re-designated as NDW West Area and, in 2005, became NSF Dahlgren. The Water Range Sustainability Environmental Program Assessment explains that NSF Dahlgren is responsible for oversight and maintenance of the land and all structures assigned and constructed on or in the land, and the NSWCDD controls the PRTR during hazardous operations, in the interest of public safety. Both the INRMP and the Water Range Sustainability Environmental Program Assessment state the Potomac River is under the jurisdiction of the State of Maryland. In August 2016, we contacted the Navy and received confirmation that the Navy does not manage the lands or waters of the Potomac River that are the PRTR.

We agree that the PRTR is designated for use by the Navy. However, based on the INRMP, the regulations, and the Water Range Sustainability Environmental Program Assessment, the PRTR is not part of those lands or near shore areas at NSF Dahlgren that are ''owned by the U.S. and administered by the Navy; used by the Navy via license, permit, or lease for which the

Navy has been assigned management responsibility; withdrawn from the public domain for use by the Navy for which the Navy has been assigned management responsibility; or leased lands on the installation and areas occupied by non-DoD entities.'' We, therefore, concluded that the lands and waters of the PRTR are not subject to the NSF Dahlgren INRMP, and do not meet the requirements of 50 CFR 424.12(h) that would prohibit us from including them as critical habitat.

In revisiting our determination, we considered whether the NSF Dahlgren INRMP provides a conservation benefit to the Chesapeake Bay DPS of Atlantic sturgeon if the lands and waters of the PRTR were subject to the INRMP. We concluded that the INRMP does not because the management practices in the INRMP offer limited protection to the habitat within the PRTR, and the PRTR covers most of the area that we are designating as the Potomac River critical habitat unit. Designating this area as critical habitat provides a benefit to the Chesapeake Bay DPS, and the PBFs in this area are essential to the conservation of the DPS. Therefore, management practices in the INRMP would have to provide a similar conservation benefit, either directly or indirectly addressing the PBFs that may require special management considerations or protection.

Comment 48: Newport News Shipbuilding expressed concern that designating critical habitat in the lower James River would have economic impacts and impacts to national security. The commenter proposed that we make appropriate exclusions for industries that demonstrate insignificant and discountable impact to and/or appropriate mitigations for the Atlantic sturgeon.

Our Response: We considered whether to use our discretion to exclude areas from the critical habitat designations. We declined to exercise our discretion and did not exclude any areas. Critical habitat is the specific areas on which are found the PBFs essential to the conservation of the species and which may require special management considerations or protection. It is the presence of the PBFs and the PBFs' potential need for special management considerations or protection that dictates the designation, not the effect a particular industry at a given point in time may have on the PBFs.

We considered the economic impacts of designating critical habitat in the James River, impacts to national security, and the expected impact to species recovery resulting from the designation. While we have used the best available information and an approach designed to avoid underestimating impacts, many of the potential impacts are speculative and may not occur in the future.

Our conservative identification of potential incremental economic impacts indicates that any such impacts, if they were to occur, would be very small and likely to consist solely of the administrative costs of consultation. We recognize the potential that ESA section 7 consultation stemming from these designations may, sometime in the future, result in project modifications and associated costs. However, discussions with Federal action agencies identified no instances of past project modifications that would have been necessary as a result of Atlantic sturgeon critical habitat having been designated, and these discussions and correspondence with Federal agencies yielded no suggestions that project modifications are likely to result from this designation in the future. Further, even if modifications were to be required to avoid destruction or adverse modification of critical habitat, it is extremely unlikely that modifications that would be required to avoid destruction or adverse modification of critical habitat would not also be required to avoid jeopardizing the species. Therefore, project modification costs resulting solely from these critical habitat designations are likely to be small, if they were to occur.

Comment 49: An industry trade group pointed to our determinations that the majority of the section 7 consultation costs would already be incurred based on the listing of the Atlantic sturgeon itself and that ''[i]t is extremely unlikely that [project] modifications that would be required to avoid destruction or adverse modification of critical habitat would not also be required because of adverse effects to the species.'' They wondered, if there are no categories of permits or other Federal activities that would be impacted solely or even primarily by consultation over impacts to designated critical habitat (rather than impacts to the listed species), what is the purpose of designating critical habitat? They went on to state that if designation of critical habitat is ''not prudent,'' we should not make such a designation.

Our Response: We are required by section 4(a)(3) of the ESA to designate critical habitat when we list a species as endangered or threatened. We may decline to designate critical habitat for a species, if doing so is ''not prudent.'' Our regulations (50 CFR 424.12) explain that designation of critical habitat is not prudent if: (1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species; or if designation would not be beneficial to the species. The life history of Atlantic sturgeon is fairly well described, so designating critical habitat will not increase the degree of threat to the species from taking or other human activity. In determining whether a designation would not be beneficial, the factors we may consider include but are not limited to: Whether the present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or whether any areas meet the definition of ''critical habitat.'' For Atlantic sturgeon, the present or threatened destruction, modification, or curtailment of a species' habitat or range has been identified as a threat, and the areas we have proposed for designation meet the definition of critical habitat, and, therefore, designation is clearly prudent. In addition, while we have determined that the majority of section 7 consultation costs would already be incurred based on the listing of the species, we determined there will be additional benefits when impacts to critical habitat are assessed during consultations. Designating critical habitat identifies areas where Federal agencies can focus their conservation programs and use their authorities to further the purposes of the ESA. It also helps focus the conservation efforts of other conservation partners, such as State and local governmental organizations, and individuals. In addition, we found that there will be numerous conservation benefits to Atlantic sturgeon, its ecosystem, and to the public, resulting from the designation. Therefore, we believe that designation of critical habitat for Atlantic sturgeon is beneficial to the species.

Comment 50: An industry trade group suggested we had failed to perform the requisite analysis of whether certain areas should be excluded. They believe that to comply with our statutory mandate to consider whether the benefits of excluding areas from the critical habitat designation outweigh the benefits of designation, we must provide some specific analysis of the conservation benefits derived from designating specific areas compared to the economic costs of designating those areas. They indicated we made no attempt to carve out less valuable areas based on economic, national security, or other relevant impacts. They claimed

our analysis is cursory and grossly inadequate, because we do not evaluate whether the benefits of exclusion outweigh the economic costs of designation for particular areas that will be designated (aside from areas of concern to the Navy).

Our Response: The commenters' argument misstates the requirements of the ESA. Section 4(b)(2) of the ESA contains two distinct elements: An initial mandatory consideration of impacts of a designation, and a separate discretionary exclusion provision. The ESA does not require use of any particular methodology in the consideration of impacts, let alone require comparing the benefits of designation to the benefits of excluding certain areas as part of this portion of section 4(b)(2) (see, *e.g., Building Industry Association of the Bay Area* v. *U.S. Department of Commerce,* 792 F.3d 1027 (9th Cir. 2015)). Similarly, the ESA does not require that we carve out ''less valuable'' areas of critical habitat.

In our proposed rule, we explained our preliminary determination that we would not exercise our discretion to consider exclusions. However, based on input received during the public review process raising concerns about the impacts and uncertainties associated with unoccupied critical habitat, and questions raised about the nature of the conservation values these unoccupied units provide, we determined that conducting a discretionary exclusion analysis for areas of unoccupied critical habitat areas in the Carolina and South Atlantic DPS was warranted. Given that occupied units are currently used by Atlantic sturgeon for reproduction and recruitment, and due to the severely depressed levels of all river populations in all 5 DPSs, occupied units are far too valuable to both the conservation and the continuing survival of Atlantic sturgeon to be considered for exclusion.

Section 4(b)(2) of the ESA provides that the Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat. This is true unless he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned. The legislative history regarding section 4(b)(2) exclusion analyses suggests that the consideration and weight given to impacts is within the Secretary's discretion (H.R. 95–1625), and the Secretary is not required to give economic or any other 'relevant impact' predominant consideration in his specification of critical habitat.

Based on that analysis, we have elected to exclude the Santee-Cooper river system (CU1) and Savannah River (SAU1) unoccupied units of critical habitat, because the benefits of exclusion (that is, avoiding some or all of the impacts that would result from designation) outweigh the benefits of designation.

Comment 51: A commenter stated the economic analysis discussed in the preamble and supplementary information is focused exclusively on the administrative costs to the Federal agencies of ESA section 7 consultations, and these costs are not inconsequential. They go on to state that, for the New York Bight DPS, the projected medium and high costs are estimated to equal approximately $2.83 and $5.57 million, respectively. The preamble states that ''[a]ny incremental economic impacts will consist solely of the administrative costs of consultation; no project modifications are projected to be required to address impacts solely from the proposed critical habitat.'' The commenter claims that no estimates are presented of costs to applicants for projects funded, authorized or carried out by Federal agencies (for example, projects subject to Clean Water Act actions for which ESA consultations are likely), including analyses of the impacts of a project, the time needed for consultation, and any specific requirements deemed necessary for the project. The commenter also states that the estimated administrative costs, the large number of activities entailing Federal action, and the complexity of the essential PBFs identified and potentially requiring consideration dictate that the final rule should address these additional economic costs.

Our Response: The designation of critical habitat requires Federal agencies to consult with us under section 7 of the ESA if their proposed action may affect critical habitat. Designating critical habitat does not affect the activities of private individuals conducting activities on private land unless those activities are federally-funded or require federal authorization. Therefore, in terms of the economic impacts of a critical habitat designation, the costs are those associated with conducting informal or formal ESA section 7 consultations, including preparation of consultation documents. Preparation of a license application is not a cost of ESA section 7 consultation because the license application is required separate from any critical habitat designation.

The economist who drafted the economic analysis contacted Federal agencies for input on the number and type of modifications that may occur as a result of critical habitat designations. The Federal agencies did not identify any modifications. We used a 10-year history of ESA section 7 consultations to inform the number and type of ESA section 7 consultations likely to occur in the future. To address uncertainty, the economist provided three different scenarios that affected the overall estimated costs associated with the critical habitat designations. Despite receiving information from Federal agencies that no modifications were anticipated, the economist also presented information for modification costs based on consultations for Federal agency actions that may affect ESA-listed salmon species, as salmon were considered a reasonable proxy for Atlantic sturgeon for this analysis. For example, project modifications might include date restrictions, use of silt fences, upland disposal of excavated material, maintenance of all heavy equipment to minimize pollutant release, use of a bubble curtain to minimize sound effects, and pollution and erosion control.

We consider the incremental impacts of critical habitat designations (*i.e.,* the impacts that would occur in the absence of any other action (78 FR 53058; August 28, 2013)). The costs of the critical habitat designations are the costs of conducting ESA section 7 consultations (*i.e.,* the administrative costs of section 7 consultation, which include the projected costs to NMFS, the Federal agency taking the action, and the third party (*e.g.,* applicant), and the cost of completing a biological assessment). Because the Federal agencies would most likely have to consult with us anyway given presence of Atlantic sturgeon and, in many cases, other ESA-listed species within the critical habitat areas, the incremental cost of the critical habitat designations will be low. Therefore, the medium and high cost estimates are not likely representative of the costs of the critical habitat designations. Even the low cost estimates likely overestimate the economic impact of the critical habitat designations for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs because the critical habitat designations are unlikely to result in more ESA section 7 consultations then would have occurred in the absence of critical habitat.

Comment 52: An industry trade group suggested we had significantly underestimated the true costs to a permittee, because we had not included potential costs associated with employing biologists, other consultants, or legal support they believe may be necessary to navigate the consultation

process. They went on to state that consultation could cause project modifications, additional avoidance measures, or require additional mitigation above what was required by the action agency. The commenters reported Sundig (2003) estimated the direct, out-of-pocket costs of section 7 consultation for a single-family housing project to be several thousand dollars per house. Beyond the consultation process itself, the commenters suggested requirements to avoid or mitigate impacts to critical habitat could result in economic losses of millions of dollars. The commenters concluded that by severely underestimating the number of consultations that will be triggered by the proposed designations and the costs of those consultations, we failed to provide a meaningful analysis of section 7 consultation costs.

Our Response: We disagree. In our impacts analyses we did not assert that no project modifications would be required to address impacts to critical habitat. Rather, we concluded that the same project modifications would most likely address any adverse impacts to both sturgeon and to critical habitat, and as such, these costs are not solely attributable to the critical habitat designation. Our impacts analyses discuss the types of project modifications that might be required to address adverse effects to critical habitat for all the Federal activities projected to require consultation over the next 10 years. The commenters stated we did not include potential costs associated with employing biologists, other consultants, or legal support that they believe may be necessary to navigate the consultation process. As noted previously, we anticipate that in nearly all cases, section 7 consultations would likely have been required to consider potential adverse effects to Atlantic and/or shortnose sturgeon for any action potentially affecting Atlantic sturgeon critical habitat. These costs would be incurred even without the designation. However, we also projected that every future consultation will involve additional administrative costs, including costs to third parties such as permittees or applicants, related to the additional analyses added to a consultation to address critical habitat. These costs would depend on the complexity of the consultation and whether the permittee is required to produce a biological assessment (see Economic Analysis for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs, (Table 3–6) and Impacts Analysis of Critical Habitat Designation for the Carolina and South Atlantic DPSs of Atlantic Sturgeon (Industrial Economics, 2014)). In criticizing our impacts analyses, the commenter cites Sundig (2003) and its conclusion that costs of consultation for a single-family housing project are estimated to be several thousand dollars per house. While we find Sundig (2003) to be too hypothetical and generalized to warrant changes in our analysis, as discussed above, our analysis does include estimated permittee costs of consultation not obviously dissimilar to Sundig's (2003) 'several thousand dollars' per permittee. In addition, it does not appear that Sundig (2003) took into account that at least some and possibly most of the impacts and costs described are co-extensive with the listing of the species, and not attributable solely to critical habitat designation. We see no basis to change our impacts analysis based on this comment.

Comment 53: A commenter representing two agency groups stated that the sweeping critical habitat designations would impede critical economic growth, including activities that are necessary to sustain the U.S. economy, without commensurate benefits to the Atlantic sturgeon.

Our Response: We disagree. The economic analysis for designating critical habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon provides information on the economic impacts of the critical habitat designations, and addresses uncertainty by presenting costs for scenarios that are not likely to occur. The draft economic analysis was peer-reviewed by three experts before it was released for public comment at the same time as the proposed rule. Our review of the likely economic impacts of the critical habitat designations is provided in the proposed rule and Impacts Analysis and Biological Information Source Document. As described, the best available information supports that incremental economic impacts as a result of the critical habitat designations for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs will be low.

There are conservation benefits of the critical habitat designations, both to the species and to society. While we cannot quantify nor monetize these benefits, we believe they are not negligible and are an incremental effect of the designations.

Comment 54: A commenter stated that many project impacts are minimal (*e.g.,* placing a pole on an islet or bar to allow an aerial electric line to cross a river) and would not be likely to impact the Atlantic sturgeon, but would trigger time-consuming and costly ESA section 7 consultation requirements if they intersect and may affect areas designated as critical habitat. They stated that consultation with NMFS often results in modification, delay, or other changes to projects, with potentially significant adverse impacts on their customers' access to reliable and secure energy supplies at a reasonable cost, and without commensurate (if any) demonstrated benefit to the listed species.

Our Response: The ESA requires consultation when a Federal agency action may affect a listed species or critical habitat. We agree that many projects have impacts that are minimal. If a project will have no effect on critical habitat, there would be no section 7 consultation on effects to critical habitat. If effects are insignificant or discountable, consultation is completed informally via a letter exchange between the Federal agency and NMFS. We do not expect consultations on small projects to be time consuming or costly for Federal agencies or applicants. The commenter did not provide specific information regarding any consultation that had the potential to significantly impact access to reliable and secure energy supplies at a reasonable cost and we are not sure what consultations the comment refers to, on what types of projects or listed species. The commenter did not provide context or specific examples supporting the comment that consultations with us often result in modification, delay, or other changes to projects and we disagree with this claim. The contracted economist contacted Federal agencies for information on any consultations with us that resulted in project modifications that might be required again in the future due to critical habitat designation. None of the Federal agencies identified any such consultations. In fact, the majority of ESA section 7 consultations with us are concluded informally and never rise to the level of a formal consultation with a biological opinion issued by us, and thus would not involve modifications or delays that result in significant economic impacts.

We disagree with the commenter's claim that consultation with NMFS does not result in demonstrated benefits to listed species. Informal consultation (*i.e.,* concurrence with a not likely to adversely affect determination) is a simple process that confirms that effects of an action will be wholly beneficial, insignificant or discountable. Formal consultation, resulting in a Biological Opinion, allows proposed Federal actions to move forward and even result

in adverse effects to listed species, but requires implementation of measures that minimize the effects of take of listed species. For critical habitat, benefits of consultation include ensuring that critical habitat is not likely to be destroyed or adversely modified, or identifying minor changes to projects that can avoid or minimize adverse effects. The benefits of designating critical habitat as well as the requirement to designate critical habitat are described in the proposed rulesrules for these Atlantic sturgeon critical habitat designations. Recovery of ESA-listed species is often a lengthy process. Progress towards meeting recovery goals of down-listing and de-listing are anticipated benefits of all of the actions taken to recover ESA-listed species, including designating critical habitat.

Comments on ESA Section 7 Consultation

Comment 55: A commenter sought confirmation that the statement, ''we determined that any resulting consultations will likely be coextensive'' means that there will not be an increased consultation burden for updating or maintaining pier structures (including pile driving), or for new, currently unpermitted dredging, fill, or discharge activities in the Kennebec River, and an Atlantic sturgeon critical habitat designation for the Kennebec River will not provide a basis to reopen existing dredging permits to require additional consultation.

Our Response: For clarification, the requirement to consult under ESA section 7 is for Federal agencies if the agency anticipates taking an action that may affect ESA-listed species or designated critical habitat. Private citizens do not consult with us under ESA section 7 but, as applicants for Federal agency actions (*e.g.,* permits) or potential recipients of Federal funding, private citizens may engage with the action agency (*i.e.,* the Federal agency funding, authorizing, or carrying out an action) during the ESA section 7 consultation with us.

We, as the consulting agency, cannot foresee every circumstance that might require ESA section 7 consultation. However, based on the best available information for the presence of Atlantic sturgeon and other ESA-listed species in the Kennebec River critical habitat unit, information from Federal agencies regarding anticipated agency actions and past modifications to projects as a result of ESA section 7 consultation, and the past 10-year consultation history, we determined the most likely scenario is that agency actions that may affect critical habitat, and thus require ESA section 7 consultation, may also affect listed species, including Atlantic sturgeon. Therefore, designating critical habitat is unlikely to result in an increase in the number of ESA section 7 consultations. Consultation that has been completed may need to be reinitiated if the reinitiation triggers have been met. Reinitiation is required when a new species is listed or critical habitat designated that may be affected by the identified action. We anticipate that consultations will need to be reinitiated once the final rule is effective. However, this does not necessarily mean that permits will be reopened or that actions will need to be modified. Modifications to ongoing activities would only be required where a Federal agency has ongoing discretionary control and when the action is likely to result in the destruction or adverse modification of critical habitat and we issue a biological opinion that includes reasonable and prudent alternatives. It is important to note that in nearly all existing section 7 consultations on Atlantic sturgeon, we have included an analysis of effects to habitat.

We have been working closely with action agencies during the rulemaking process and have provided information on the triggers for reinitiation as well as when conference under section 7(a)(4) of the ESA is necessary. Further information about ESA section 7 consultation is available at *https://www.greateratlantic.fisheries.noaa.gov/protected/section7/index.html.*

Comment 56: The Atlantic States Marine Fisheries Commission stated that we should consider the stock assessment needs and management impacts from ESA section 7 consultations, and conduct ESA section 7 consultations expeditiously to avoid delays in fisheries research or sampling.

Our Response: We acknowledge the concern for the length of time that is sometimes necessary to complete ESA section 7 consultations. We have taken several steps in the past year to address these concerns, including additional online resources for technical assistance, an Expedited Consultation Program, and programmatic approaches to consultations where possible.

Currently, there are two biological opinions for federally funded, authorized, or implemented actions to support fisheries research and sampling in Federal and state waters from Virginia through Maine. These are programmatic consultations for (1) the Northeast Fisheries Science Center's (NEFSC) fisheries and ecosystem research, and (2) surveys undertaken under the USFWS issuance of funds from the Wildlife and Sport Fish Restoration Program to 11 Northeast states and the District of Columbia. Neither of these biological opinions considers effects of the action(s) to proposed critical habitat for any Atlantic sturgeon DPS because the biological opinions were completed before the proposed critical habitat designations.

In a memo to the Greater Atlantic Regional Fisheries Office, the NEFSC determined, following publication of the critical habitat proposed rule, that the actions described in our biological opinion that considered their NEFSC's fisheries and ecosystem research program are not likely to result in the destruction or adverse modification of proposed critical habitat. We concurred with the determination. Therefore, because we do not anticipate any changed circumstances, we do not anticipate the need to reinitiate the NEFSC programmatic consultation at this time. We will continue to work with the NEFSC and the USFWS to expeditiously complete ESA section 7 consultations necessary for fisheries research and fisheries monitoring.

Comment 57: A few commenters, including an industry trade group, expressed concern about potential delays for projects already undergoing consultation that would now have to include an analysis of adverse modification for Atlantic sturgeon critical habitat, as well as previous consultations that may need to be reinitiated based on the new critical habitat designation.

Our Response: We acknowledge delays are possible. We recommend that Federal action agencies work with us to provide the appropriate information as identified at 50 CFR 402.14(c)(1)–(6) to assess impacts to critical habitat as soon as possible to limit delays. We also note that Federal actions undergoing consultation that may affect Atlantic or shortnose sturgeon would already be required to analyze impacts to those species' habitats, whether they are designated as critical habitat or not. Thus, any delays due solely to this rule should not be significant.

Comment 58: The USACE expressed concern that we may be relying on historical (1870s) data that may not reflect current day conditions or documented scientific data, and cautioned that until detailed scientific data are provided that clearly documents the existence of a fall spawning season in the Hudson River upstream of Kingston, New York, no further restriction to the current dredging window is warranted.

Our Response: We do not issue restrictions on the timing of dredging in the Hudson River Federal Navigation Channel. We have worked with the USACE to recommend time of year ''windows'' in which dredging is least likely to interact with listed species, including Atlantic sturgeon.

The features of Atlantic sturgeon critical habitat are expected to be present year-round. Therefore, ''dredge windows'' are more effective for avoiding effects to ESA-listed species than for avoiding effects to Atlantic sturgeon critical habitat. Regardless, we would ensure that any recommendations to the USACE or any other party are based on the best available information.

We included mention of the 1870s era data as part of our review of information for the critical habitat designations, and evidence of fall spawning in rivers where Atlantic sturgeon spawn. However, as we stated in the Background section of the proposed rule, spring is the only currently known spawning period for the New York Bight DPS. There is no information that fall spawning currently occurs in the Hudson River.

Comment 59: A commenter asked if consultation is required even if the Federal action does not destroy or adversely modify current habitat. The commenter further directed us to address whether actions that improve the essential PBFs, such as those for improving water quality, are subject to the consultation provisions of section 7(a)(2) of the ESA, and to identify the earliest stage in the regulatory process that such consultation may be initiated.

Our Response: Current habitat is not the same as designated critical habitat. The ESA and the regulations implementing section 4 of the ESA emphasize that, except in those circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species. Once critical habitat is designated, section 7(a)(2) of the ESA requires that a Federal agency, in consultation with us (or with the USFWS for ESA-listed species under their jurisdiction), insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat.

The Greater Atlantic Region, Protected Resources Division provides information on the ESA section 7 consultation process, including technical assistance, and the Expedited Consultation Program on our Web site. For further information, see *www.greateratlantic.fisheries.noaa.gov/protected/section7/index.html.* Additional information, including links to policies, guidance, and regulations associated with ESA section 7 is available at *www.nmfs.noaa.gov/pr/consultation/.* Briefly, a Federal agency must consult with us if the agency is authorizing, funding or carrying out an action that may affect listed species or critical habitat. An action that results in wholly beneficial effects is not exempt from the requirements of ESA section 7 consultation.

Informal consultation is an optional process that includes all discussions, correspondence, etc., between us and the Federal agency to assist the Federal agency in determining whether formal consultation is required. Informal consultation can be initiated as early as the effects of a proposed Federal action can be identified. We provide information at the web addresses listed above to help Federal agencies determine, at the earliest opportunity, whether and when to initiate consultation with us. We also provide technical assistance to Federal agencies related to questions of whether and where species and designated critical habitat occur to help action agencies determine whether their actions may affect listed species or critical habitat. The ESA section 7 implementing regulations (50 CFR 402.11) address ''early consultation'' as a preliminary consultation requested by a Federal agency on behalf of a prospective permit or license application prior to the filing of an application for a Federal permit or license. The ESA and its implementing regulations do not identify the earliest opportunity for consultation; however, in practice, the earliest opportunity for entering into formal consultation is when there is a proposed action that is far enough along in development that the effects can be predicted and are reasonably certain to occur.

Comment 60: Two commenters requested we engage with the Virginia Department of Environmental Quality (VADEQ) concerning Dominion's Chesterfield Power Station, which they identified as directly adjacent to Atlantic sturgeon spawning habitat on the James River. They commented that the NPDES Permit (issued by VADEQ) would authorize activities at Chesterfield Power Station that are likely to take endangered species and/or significantly degrade or destroy Atlantic sturgeon critical habitat, and these activities resulted in the entrainment of two Atlantic sturgeon larvae at Chesterfield Power Station in October 2015. The commenters also requested that we require Virginia Power and Electric Company (''Dominion'') to submit a habitat conservation plan as soon as possible once the critical habitat designations have been finalized, and that we finalize the proposed rule as soon as practicable.

Our Response: Information posted by the VADEQ provides the background for our response (for the complete text go to *www.deq.virginia.gov/Programs/Water/PermittingCompliance/PollutionDischargeElimination.aspx*). Section 402 of the Clean Water Act established the NPDES program to limit pollutant discharges into streams, rivers, and bays. The U.S. Environmental Protection Agency (EPA) delegates the authority to implement the NPDES program to states where certain conditions have been met. Virginia received authorization from EPA to administer the NPDES base program on March 31, 1975; for Federal facilities on February 9, 1982; for pretreatment on April 14, 1989; and for general permits on May 20, 1991. The VADEQ administers the program as the Virginia Pollutant Discharge Elimination System (VPDES), and issues VPDES permits for all point source discharges to surface waters, to dischargers of stormwater from Municipal Separate Storm Sewer Systems, and to dischargers of storm water from industrial activities. Further, the VADEQ issues Virginia Stormwater Management Program (VSMP) permits to dischargers of stormwater from Construction Activities. The EPA maintains authority to review applications and permits for ''major'' dischargers, a distinction based on discharge quantity and content.

The VADEQ issued a VPDES permit to Dominion Chesterfield Power Station on September 23, 2016. For further information on this permit, go to *http://www.deq.virginia.gov/Programs/Water/PermittingCompliance/VPDESPermitActions.aspx#Chesterfield.* Because issuance of the permit was a state agency action, not a Federal agency action, there is no requirement for ESA section 7 consultation on issuance of the VPDES permit. A non-Federal entity can apply for an ESA section 10(a)(1)(B) Incidental Take Permit to cover otherwise lawful actions that may result in takes of an ESA-listed species.

A representative of Virginia Power and Electric Company notified us of the incidental entrainment of the two Atlantic sturgeon larvae following their identification. We began discussions with their staff regarding application for an ESA section 10(a)(1)(B) Incidental Take Permit, including submission of a Habitat Conservation Plan (HCP), in

June 2015. While a draft HCP has been submitted to us, we cannot predict when the HCP will be finalized or when an Incidental Take Permit will be issued. We will publish a notice in the **Federal Register** and provide an opportunity for public comment when we determine the application is sufficient.

Other Comments on the Process for Designating Critical Habitat and Comments Outside the Scope of This Rulemaking

Comment 61: A commenter stated the driving force behind the proposed critical habitat designations has been the pressure and deadlines of litigation, not the underlying science or an urgent need to designate critical habitat to protect the Atlantic sturgeon. The commenter concluded that NMFS has not taken sufficient time to make careful critical habitat determinations, nor has it afforded the public a sufficient opportunity for meaningful participation.

Our Response: As described in our response to Comment 37, the ESA requires that we designate critical habitat at the time a species is listed or, if not determinable at that time, within 1 year of listing. The only other exception is if designating critical habitat is not prudent for the species. However, this circumstance rarely occurs. We failed to meet this 1-year deadline and are currently subject to a statutory deadline and a court-order to complete the designation. While we agree that litigation has influenced our timeline, we disagree that we have not made careful determinations or provided the public with opportunities for meaningful participation.

The critical habitat designations for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon were proposed more than 4 years after the DPSs were listed as endangered or threatened. We began the process of designating critical habitat in 2012. We initially provided a comment period of 90 days, 30 days longer than typical for critical habitat designations. In response to requests for extension, we reopened the comment period for an additional 15 days of comment, making the total comment period 105 days.

We must hold a public hearing on a proposed critical habitat designation at the request of the public. Despite receiving no such requests, we chose to hold two public hearings and announced those in the proposed rule and on our Web page, in emails sent to our distribution lists, and a newspaper with regional readership. We made the public hearings available by telephone as well as in person to increase opportunities for the interested public that would otherwise have had to travel to the hearing location. We did not receive any public comments during the public hearings, and we did not receive any requests for additional public hearings. We also held four informational meetings during which we provided an overview of the proposed rule as a slide presentation, answered procedural questions to help the public formulate their comments, and clarified the instructions for submitting comments. Additionally, we posted information on our Web page, including the slide deck presented at the public information meetings and public hearings, and held an informational webinar for Federal agencies. We used our discretion to go beyond the requirements of the ESA and its implementing regulations and provided multiple means for public participation.

Comment 62: A commenter stated there is no substantial value to designating critical habitat which requires additional regulatory burden with limited value to increasing population levels of the species. The commenter stated that each Federal action in the Delaware River associated with permitting considers the presence of shortnose and Atlantic sturgeon, and considers how each aspect of a project will affect the species. The commenter notes that consultation is initiated when appropriate and that the opportunity for any additional benefits associated with critical habitat designation would be limited.

Our Response: The ESA requires that we designate critical habitat for each species (including subspecies and DPSs) that we list under the ESA unless designation is not prudent for the listed species. A determination that critical habitat is not prudent is rare and is made only when the species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species, or when designation of critical habitat would not be beneficial to the species.

The designation of critical habitat provides a significant regulatory protection—the requirement that Federal agencies ensure, in consultation with the Services under section 7(a)(2) of the ESA, that their actions are not likely to destroy or adversely modify critical habitat. The Federal Government, through its role in water management, flood control, regulation of resource extraction and other industries, Federal land management, and the funding, authorization, and implementation of myriad other activities, may propose actions that may affect critical habitat. The designation of critical habitat ensures that the Federal Government considers the effects of its actions on habitat important to species' conservation and avoids or modifies those actions that are likely to destroy or adversely modify critical habitat. There are conservation benefits of the critical habitat designations, both to the species and to society. While we cannot quantify or monetize these benefits, we believe they are not negligible and are an incremental effect of the designations.

Comment 63: The commenter acknowledged that spawning occurs for shortnose sturgeon in the upper Delaware River and believes that Atlantic sturgeon possibly spawn in the upper Delaware River but stated actual spawning of Atlantic sturgeon has never been directly documented.

Our Response: Atlantic sturgeon are spawning in the Delaware River. There are several lines of evidence demonstrating spawning occurs. First, Atlantic sturgeon less than 1-to 2-years old are captured in the Delaware River. Atlantic sturgeon this young do not have the salinity tolerance to leave the natal estuary and travel through full saline waters to other lower salinity, estuarine waters that are necessary for rearing. Therefore, presence of Atlantic sturgeon less than 2 years old in the Delaware River is evidence that Atlantic sturgeon are spawning in the Delaware.

Genetic analyses have shown that Atlantic sturgeon natal to the Delaware River have a unique genetic structure. Such uniqueness arises when adults characteristically return to spawn in the river in which they were spawned and mixing with other populations is limited.

Year after year, male and female Atlantic sturgeon in spawning condition occur in the Delaware River in areas and at times when spawning would occur. In addition, the reporting and retrieval of dead large, adult Atlantic sturgeon in the Delaware River, sometimes with evidence of spawning condition such as ripe eggs or milt, occurs more frequently in the spring; the time period when we expect Atlantic sturgeon spawn in the Delaware River.

The opportunity to witness sturgeon spawning is difficult given the environment in which they spawn, and human observation of spawning sturgeon is potentially harmful to sturgeon (*e.g.,* as a result of disrupting spawning). Sturgeon researchers are required to minimize harm to Atlantic sturgeon, including minimizing disruptions of spawning behavior, and

the public is cautioned to not approach areas where spawning may be occurring (*e.g.,* as evidenced by breaching sturgeon). The available information is sufficient to establish that spawning occurs in the Delaware River, despite spawning activity, eggs, or larvae, not being observed in the River.

Comment 64: An industry trade group indicated we made no attempt to establish any connection between the threats to Atlantic sturgeon described in the listing rule and critical habitat. They suggested we have not evaluated or explained how designation of critical habitat will benefit the species, or help address injury/death resulting from inshore trawling or overfishing. Additionally, they indicated we have not explained how the designation of ''these vast areas would provide new or additional minimization of habitat alteration or destruction.''

Our Response: The ESA does not require that critical habitat address the specific threats that led to the listing of the species or avoid injury or death from particular activities. However, in the case of Atlantic sturgeon, designation of critical habitat will help address the present or threatened destruction, modification, or curtailment of the species' habitat or range, which was identified as a threat contributing to the threatened or endangered status for these DPSs. Critical habitat designations identify habitat features and areas essential to the conservation, and thus recovery, of the species. In terms of benefits of critical habitat in providing protection from habitat alteration or destruction, designation of critical habitat also provides significant regulatory protection—the requirement that Federal agencies ensure, during section 7 consultation, that their actions are not likely to destroy or adversely modify critical habitat. Designating critical habitat also identifies areas where Federal agencies can focus their conservation programs and use their authorities under ESA section 7(a)(1) to further the purposes of the ESA by carrying out programs for the conservation of listed species. It also helps focus the conservation efforts of other conservation partners, such as State and local governmental organizations, and individuals. Therefore, we believe that designation of critical habitat for Atlantic sturgeon is beneficial to the species and will directly address habitat alteration and destruction issues.

Comment 65: A commenter stated that even in advance of a final rule, EPA has signaled potential changes to requirements under the Clean Water Act based upon a critical habitat designation that could have a significant effect, along with related costs, on non-Federal government entities, including small governments (municipalities) and private parties. The commenter asked if this will result in unfunded mandates.

Our Response: We are unaware of any changes to the Clean Water Act as a result of a critical habitat designation. We encourage the commenter to discuss their concerns with the EPA.

Comment 66: A commenter stated that development and industrial practices have hindered recovery of Atlantic sturgeon. They stated that there is an immediate need to lower pollution in all tributaries and to eliminate all unnecessary killing of larvae and young sturgeon, and the invertebrates they feed upon and that all facilities that currently draw water from our rivers or bays for cooling purposes should change over to closed-loop operations. In addition, the commenter stated that pollution could be lowered, and DO improved, using natural vegetation in a manner that does not infringe on navigation.

Our Response: We appreciate the information for addressing water quality for Atlantic sturgeon. This comment is beyond the scope of this critical habitat designation. However, once critical habitat is designated, we will work with action agencies if a proposed or ongoing Federal action may affect that habitat. Finally, there are other laws that address water quality, including the Clean Water Act, in areas where Atlantic sturgeon critical habitat occurs. Section 316(b) of the Clean Water Act requires EPA to issue regulations on the design and operation of cooling water intake structures, in order to minimize adverse impacts. Further information can be found on the EPA Web site at *https://www.epa.gov/cooling-water-intakes.*

Comment 67: A commenter stated the Department of Interior must address present-day impacts in Delaware such as beach fill projects, the Delaware River Deepening project, maintenance dredging of the Delaware River for the next 50 years, the proposed ocean outfall off Rehoboth Beach, as well as the impacts of past and present industrial sites which contributed to the decline in water quality. They stated that deepening of the Delaware Bay (2015) and the new USACE sand borrow site Area B (2016) in Delaware have compromised and will undoubtedly continue to compromise the health of the benthic food chain for the sturgeon. The commenter stated that a strong and applicable critical habitat designation and subsequent modification or elimination of the non-Federal project is an essential requirement for preservation and conservation of the species in question.

Our Response: We have been delegated authority from the Secretary of Commerce to carry out the requirements of the ESA for species under our jurisdiction, including the five Atlantic sturgeon DPSs. The consultation process, as described in section 7(a)(2) of the ESA, provides opportunity for us to work with Federal agencies to address impacts of agency actions on the species. If we determine a Federal agency action is likely to jeopardize the continued existence of a listed species (a ''jeopardy biological opinion'') or result in the destruction or adverse modification of critical habitat (a ''destruction or adverse modification'' biological opinion), the biological opinion will include reasonable and prudent alternatives to modify the action to avoid the likelihood that the action will jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat.

Comment 68: A commenter stated that the Final Environmental Impact Statement for the City of Rehoboth Beach proposed ocean outfall incorrectly concludes the outfall will not have an impact on the diversity and density of the benthic region. The commenter stated that establishment of sturgeon critical habitat in this important area should disavow this conclusion, and protect and conserve the benthos.

Our Response: We are not designating critical habitat in marine waters, including marine waters off Rehoboth Beach, Delaware. The marine waters off Rehoboth Beach are part of the geographical area occupied by each of the five Atlantic sturgeon DPSs. To designate critical habitat for one or more of the Atlantic sturgeon DPSs in the marine environment, we must first identify the PBFs essential to the DPSs, and which may require special management considerations or protections. See our response to Comment 20.

Comment 69: A commenter requested that as soon as levels are sustainable, a limited catch and release fishery for Atlantic sturgeon should be established, with a special permit, for once a year use and a high fee, $500 to $1,000, and the fee should be used to enhance that fishery.

Our Response: Consideration of any new Atlantic sturgeon fishery is beyond the scope of this critical habitat designation.

Comment 70: One commenter asked us to ensure that the Salem Nuclear Power Plant, Mercer Generating Station,

and the Delaware City Refinery, which processes 200,000 barrels of petroleum per day, install cooling towers and at the latter refinery, remove intake screens that kill millions of fish and entrains millions more small fish, eggs, and larvae that circulate through the refinery's cooling system pipes and get boiled to death.

Our Response: This comment is beyond the scope of this critical habitat designation. Section 316(b) of the Clean Water Act requires EPA to issue regulations on the design and operation of cooling water intake structures, in order to minimize adverse impacts. Further information can be found on the EPA Web site at *https://www.epa.gov/cooling-water-intakes.*

Comment 71: A commenter representing the interests of two industries provided numerous comments on the recently revised joint Service regulations for designating critical habitat (81 FR 7414; February 11, 2016) and asserted that these critical habitat designations for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon were flawed as a result of relying upon the revised regulations.

Our Response: There was a lengthy public comment period for the revised joint Service regulations. The comments and the Service's responses to the comments were provided with the final rule. It is not within the scope of these critical habitat designations for the Atlantic sturgeon DPSs to revisit the response to comments or recommend changes to the joint Service regulations. All critical habitat designations proposed after March 14, 2016, are required to follow the revised joint Service regulations, and we have done so for the Gulf of Maine, New York Bight, and Chesapeake Bay DPS critical habitat designations.

Comment 72: The U.S. Coast Guard provided comment assuring us that they will consult with us in accordance with section 7 of the ESA for establishing new anchorage grounds on the Hudson River because establishing anchorage grounds may impact Atlantic sturgeon, its habitat, or its critical habitat.

Our Response: We appreciate the U.S. Coast Guard's commitment to ESA section 7 consultation for activities that may affect Atlantic sturgeon and Atlantic sturgeon critical habitat.

Comment 73: A representative of the Rhode Island Department of Environmental Management agreed there are not specific areas within Rhode Island state waters that meet the requirements for designation as critical habitat for Atlantic sturgeon, and concurred with the proposal not to designate any critical habit areas in Rhode Island state waters.

Our Response: We appreciate the input and concurrence from the Department of Environmental Management.

Comments on the Carolina and South Atlantic DPS Critical Habitat Designations (81 FR 36077, June 3, 2016; 81 FR 41926, June 28, 2016)

Comments on Geographical Area Occupied

Comment 74: A few commenters asserted that our designation is inconsistent with section 3(5)(C) of the ESA, which provides that ''except in those circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species.''

Our Response: The areas being designated do not include the entire geographical area which can be occupied, and include only a portion of the ranges of the two DPSs. These areas do not include rivers that do not support spawning but which may be used for foraging, marine habitats, or estuarine habitats below rkm 0 in each designated river.

Comment 75: An industry trade group believed we inappropriately delineated the ''geographical area occupied'' by the species as the entire ''aquatic habitat (*e.g.,* below the high tide line)'' of inland freshwater areas that are currently accessible to the Atlantic sturgeon. These commenters stated that we inappropriately included not just areas where the species has actually been located, but instead we also included wider areas around the species' occurrences and areas that may be used only temporarily or periodically by the species. They stated that ''areas identified as occupied include vast areas where there is no evidence the species even occurs, much less occupies.''

Our Response: See response to Comment 2.

Comments on the Physical or Biological Features (PBFs)

Comment 76: One commenter asserted that the broad nature of the PBFs fails to provide notice to the regulated public whether the PBFs are present in an area without asking NMFS for case-by-case determinations. The commenters further asserted that the broadness of the PBFs renders them not actually essential to the species and provided the example that for the Biological Opinion for Continued Operations of the Indian Point Generating Station, Units 2 and 3, NER 2012–2252 at 42 (Jan. 30, 2013), NMFS characterized one spawning area for Atlantic sturgeon in the Hudson River as being ''freshwater year round with bedrock, silt and clay substrates and water depths of 12–24 m,'' and another area as having ''clay, silt, and sand substrates and water depth of approximately 21–27 meters deep.''

Our Response: As we explained in our final rule, Implementing Changes to the Regulations for Designating Critical Habitat (81 FR 7414; February 11, 2016), broadly-defined PBFs are not necessarily inappropriate. The level of specificity in our description of the PBFs is primarily determined by the state of the best scientific information available for the species at issue. As held by the court in *Arizona Cattle Growers* v. *Kempthorne,* 534 F. Supp. 2d 1013, 1025 (D. AZ 2008), so long as we have used the best available information and endeavored to provide as much notice as is practicable to the public as to the nature of the PBFs, specification of some quantitative aspects of the PBFs may be deferred to the consultation process. The commenter did not point to any available information that we should have considered to provide additional specificity in the definition of the PBFs, or why the PBFs as defined by us are not actually essential. Moreover, the commenter overlooked important details in the PBFs that make them readily discernible. For example, the commenter stated that hard bottom substrate in low salinity waters, aquatic habitat with a gradual downstream salinity gradient of 0.5 to 30 ppt and soft substrate downstream of spawning sites, water of appropriate depth and absent physical barriers to passage, and water with the temperature, salinity, and oxygen values that, combined, support spawning, survival, growth, development, and recruitment, are too broad. But our description of the PBFs is more detailed than that. Hard bottom is described as *rock, cobble, gravel, limestone, boulder, etc.* This hard-bottom substrate must be in low salinity waters specified as *0.0–0.5 ppt,* and the substrate must be of a type that can facilitate settlement of fertilized eggs, and refuge, growth and development of early life stages. Transitional salinity zones with a *gradual* downstream gradient of *0.5–30 ppt,* and sand or mud soft substrate between river mouths and spawning sites is designated for juvenile foraging and physiological development (this final rule clarifies the gradient is from 0.5 *up to* 30 ppt). Water must be of an appropriate depth and lack barriers to passage. Appropriate depths

and lack of barriers are those that allow *unimpeded movement of adults to and from spawning sites, seasonal and physiologically-dependent movement of juveniles to appropriate salinity zones within the river estuary, and staging, resting, or holding of subadults or spawning condition adults.* Appropriate depths are explained as *at least 1.2 m,* to facilitate all life stages of sturgeon including effective adult migration and spawning behavior. Barriers that would eliminate or degrade this feature were described in the proposed rule as, *locks, dams, reservoirs, gear,* and are clarified in this final rule to include thermal plumes, sound, and turbidity. Essential water quality is qualified as temperature and DO, especially in the bottom meter of the water column, and illustrative examples of how variations in these parameters can adversely affect sturgeon are provided. The essential PBFs are all common attributes of aquatic habitat that are easy to understand and readily measurable; the various parameters—depth, temperature, DO, salinity, etc., are typically included in assessments of proposed projects' impacts on the environment. Proponents of future projects within Atlantic sturgeon critical habitat will know without consulting us whether their project has the capacity to affect salinity, hard or soft substrate, water depth, openness of river channels, temperature, and DO. Most, if not all, project proponents will be able to determine whether the PBFs exist in their project area, and what their baseline conditions are, without first consulting us. Thus, we believe the PBFs of Atlantic sturgeon critical habitat have been described with appropriate specificity, based on the best scientific information available.

With respect to the example provided by the commenter, the commenter mischaracterized our use of the language cited from the Indian Point Biological Opinion. We provided the text in the biological opinion and cited the source of the information as part of the review of available literature for Atlantic sturgeon in the Hudson River. The best available information that we used to describe the PBFs of Atlantic sturgeon critical habitat is cited in the Background of this rule and in the Impacts Analysis and Biological Source Document for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs.

Comment 77: An industry trade group asserted that we must revise our proposed designation to explain how each specific critical habitat unit to be designated contains the PBFs essential to the conservation of the species, suggesting that our approach should be the same as that taken in the designation of critical habitat for the Southern DPS of green sturgeon (74 FR 52300; October 9, 2009). They also suggested our proposed designation is overly broad, improperly used ''ephemeral reference points,'' and unsupported by facts or science. The commenters suggested we identified and proposed to designate sweeping areas of occupied habitat that undoubtedly capture many areas that do not have, and likely never will have, physical or biological characteristics essential for the conservation of the species. One commenter suggested it appeared we had merely designated entire rivers from the confluence of the Atlantic Ocean back to either some major tributary or some large impoundment or impassable boundary upstream. Several commenters suggested that areas should not be designated as critical habitat because environmental conditions in certain stretches of rivers are poor and would not support the PBFs. Similarly, other commenters stated we had failed to limit the mapped areas in our proposed designation to areas where we believe the PBFs occur.

Our Response: See response to Comment 8.

Comment 78: The North Carolina Water Quality Association (NCWQA) and the South Carolina Water Quality Association (SCWQA) stated that we must include a natural condition provision to reflect natural instream temperature and DO levels that are outside of the temperature and DO critical elements in the proposed rule. They charged that any regulatory requirements must consider the natural condition and not critical temperature/DO elements that are not naturally present. They also suggested that we should have provided more context regarding whether the proposed PBFs for temperature and DO exist in an area most of the time, some of the time, etc.

Our Response: As we discussed in the proposed rule, values of temperature and DO that provide critical habitat functions to sturgeon will vary interdependently, and vary with changes in salinity. Because we are designating known spawning rivers, we are confident the PBFs are present in each unit at a temporal scale necessary to support sturgeon in their reproductive and developmental activities. We agree that the occurrence of the PBFs will fluctuate across, and even within, rivers, and over time, and can be affected by natural and manmade factors. But these fluctuations and the ephemeral nature of the PBFs make it impractical to describe them as static in condition and location. We agree that consideration of the natural conditions and underlying environmental parameters at a given project location will be important in evaluating the impact, if any, of future projects on critical habitat. In this regard, we believe a meaningful evaluation of the natural baseline condition of project area is best done during the site-specific ESA section 7 consultation and not in this final rule.

Comment 79: The NCWQA and SCWQA suggested that we insert information included in the preamble of the GARFO proposed rule to designate critical habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon (81 FR 35701; June 3, 2016) that makes it clear that the ''specific oxygen concentration and temperature values are provided as examples and guidance'' and that ''areas designated as critical habitat based on the 4 features are not expected'' to have these oxygen concentrations and temperature values ''at all times and within all parts of the area.''

Our Response: We believe our regulatory text for the Carolina DPS and South Atlantic DPS makes it clear that the oxygen concentration and temperature values described are examples, and that the presence of PBFs within a river system may vary temporally. Additionally, the preamble to the proposed rule for the Carolina DPS and South Atlantic DPS discussed the variable and ephemeral nature of these environmental features. However, we have added additional text to the preamble of this rule to clarify that the identified values of the PBFs are not required in all parts of designated areas, at all times.

Comment 80: A few commenters noted that environmental conditions (*i.e.,* levels of DO, salinity, and temperature) as well as the location of spawning habitat may be affected by climatic conditions, which could influence the actual location of suitable habitat from week to week or from year to year. Additionally, a few commenters indicated critical habitat should include suspected spawning grounds and nurseries for Atlantic sturgeon. They also believe that because Atlantic, as well as shortnose, sturgeon are excellent colonizers of available habitat, we should more expansively designate spawning habitat. A report cited by these commenters (Kynard, 2016) states that, ''Given the typical low subpopulation abundance of the species throughout its range, a poor biological understanding of most subpopulations, a lack of identification of rivers with subpopulations, and increasing threats to successful spawning and rearing in rivers, recovery could likely depend on

many rivers with habitat for all life stages being colonized by non-natal adults.'' On this basis, Kynard (2016) states that NMFS should include three types of rivers in the critical habitat designation: (1) All rivers with a subpopulation that has freshwater spawning and nursery habitats and estuarine nursery (natal) habitat; (2) all rivers without a current subpopulation but with a documented historical subpopulation, and having freshwater spawning and nursery habitats, and estuarine nursery habitats that can be colonized by non-natal adults; and (3) rivers with no evidence of current or historical populations, but which have freshwater spawning and nursery habitats, as well as estuarine nursery habitats that can be colonized by non-natal adults. Ultimately, the commenters requested we designate critical habitat as widely as possible, and not limit it to just rivers with spawning and rearing habitat, but for all areas ''that may serve as these habitats with migration of the salt front, DO, and temperature conditions.''

Our Response: As noted in the proposed rule, our conservation objective is to ''increase the abundance of each DPS by facilitating increased survival of all life stages . . . by facilitating adult reproduction and juvenile and subadult recruitment into the adult population.'' Based on the best scientific information available, the biological needs and tolerances of Atlantic sturgeon, and environmental conditions in southeast rivers, we believe we have identified suspected spawning grounds and nursery areas for Atlantic sturgeon; in other words, we do not have reason to suspect Atlantic sturgeon may be spawning and rearing in other rivers. We agree that the conditions and combinations of the PBFs will vary temporally, over short and long timescales. That variation will affect the sturgeon's use of the within-river habitat, including spawning locations, as mentioned by the commenters. Our approach to the designation considered this variation and has included the areas where we anticipate the PBFs occur and will occur. Also, we determined that some areas outside the area occupied by the species are essential to their conservation. We therefore designated unoccupied critical habitats in areas where the spawning portion of the river is limited by dams. We believe we have included rivers in the first two categories Kynard (2016) states should be included in a designation, based on identification of PBFs essential to the species' conservation. We do not believe, however, that inclusion of additional rivers that have no current or historical evidence of supporting spawning is warranted, based on the fidelity of sturgeon to their natal rivers for spawning and because many of the omitted rivers are largely located in the coastal plains and do not provide the range of habitat types known to be used for spawning and juvenile development. Therefore, we are not including additional rivers on the basis of possible future colonization.

Comment 81: Several commenters stated we should designate critical habitat only in areas upriver to a point where flows, eddies, and spawning substrate are available, and we should not designate migratory corridors because they are less critical. One commenter remarked that there is no identified range of water velocity necessary for the conservation of the species, only the need for continuous flow. This commenter asserted that entire stretches of river up to the fall line are not needed to meet the conservation objectives, and that features essential for conservation of the species exist in adequate quantity well downstream of the fall line of some of the rivers.

Our Response: We identified the need to increase the abundance of each DPS by facilitating increased survival of all life stages and facilitating adult reproduction and juvenile and subadult recruitment into the adult population as the conservation objectives for critical habitat. To achieve that objective, we must not only protect upriver spawning sites, but also the in-river habitats that allow adult Atlantic sturgeon to move safely and efficiently to and from those spawning habitats. Additionally, for larval and juvenile Atlantic sturgeon to survive to adulthood and become spawners themselves, habitats downstream from the spawning areas require protection so those life stages can successfully develop. We disagree that we were over-inclusive by setting the unit boundaries to include the fall line (the boundary between an upland region of continental bedrock and an alluvial coastal plain) of the spawning rivers, where applicable, and we realize we were somewhat unclear as to the basis for upstream boundaries on every unit and how that relates to the fall line on each river, so we are clarifying that in this final rule. As we stated in the proposed rule, given the need to maximize the potential for increasing spawning and population sizes, and the fact that Atlantic sturgeon are known to spawn between the salt front and the fall line of large rivers, we endeavored to include the farthest upstream extent of spawning habitat within unit boundaries. The physical characteristics of the fall line provide the conditions that promote successful sturgeon spawning, *e.g.,* well-oxygenated water flowing over hard substrates. Given the severely depressed populations of Atlantic sturgeon, and our conservation objective of facilitating increases in these populations, we believe including all potential spawning areas, up to the fall line as applicable, is appropriate. Finally, we determined that specifying the need for continuous flowing water was more appropriate than attempting to specify water velocities. Water velocity is one specific aspect of flowing water. However, continuous flowing water also influences temperature, oxygen concentrations, turbidity, etc., which are also important features to Atlantic sturgeon. Therefore, given the lack of data on particular velocities that may be needed by Atlantic sturgeon, and the fact that flow regimes vary widely between spawning rivers in the southeast, we believe our focus on continuous flowing water is appropriate.

Comment 82: The North Carolina Department of Transportation (NCDOT) stated that our method for determining areas of critical habitat was flawed because we included areas as critical habitat if any of the PBFs were present, but they believe all PBFs must be present in contiguous segments of rivers for an area to adequately support the life history needs of the species and, thus, be critical to the conservation of the species. They acknowledged there may be specific areas that contain the PBFs essential to conservation of the species, but claim these areas are not specifically identified.

Our Response: All PBFs do not need to be present in a stretch of river for that stretch to be designated as critical habitat. As noted elsewhere, we determined the identified PBFs are essential to the conservation of the DPSs, they may require special management considerations or protection, and they are located on specific areas within the geographical area occupied by the DPSs. There is no requirement that all PBFs occur in a single location or at the same time. Indeed, because our goal was to support all life stages of Atlantic sturgeon, some of our PBFs are mutually exclusive. For example, by definition, the PBF of hard bottom substrate in low salinity (0.0–0.5 ppt) water, can never occur simultaneously with the PBF for transitional salinity zones, inclusive of waters with a gradual downstream gradient of 0.5–up to 30 ppt and soft substrate (*e.g.,* sand, mud) between the

river mouths and spawning sites for juvenile foraging and physiological development. The available scientific evidence on Atlantic sturgeon spawning and spawning behaviors in the designated rivers, and information on habitat characteristics in the ivers, indicates that the PBFs are present in each of the units.

Comment 83: The NCWQA and SCWQA recommended that if we choose to maintain our instantaneous minimum DO levels needed to protect Atlantic sturgeon at 4.3 mg/L, we should revise the temperature trigger for those instantaneous minimum levels from 26 °C to 29 °C. The commenters indicated we justified our selection of 26 °C based on the EPA's 2003 Guidance and two studies cited therein, stating ''shortnose sturgeon are more tolerant of higher temperatures than Atlantic sturgeon and the 'high temperature' for Atlantic sturgeon is actually considered 26 °C[.]'' The commenters indicated that one of the studies we used to support our decision (Secor and Gunderson, 1998) considered the exposure of YOY Atlantic sturgeon to DO concentrations ranging between 2.8 and 3.3 mg/L over a period of 10 days at 26 °C. The commenters believe that because this ''long-term exposure'' occurred at DO concentrations far below and less optimal than those required by North and South Carolina regulations, our benchmarks are overly conservative. The commenters believe additional support for their contention that our 26 °C threshold may be too conservative can be found in the EPA's 2003 Guidance, which explains that the difference in temperature sensitivities between the Atlantic and shortnose sturgeons ''could be because the shortnose sturgeon were from Savannah River progeny and were held at higher temperatures than the Atlantic sturgeon, which came from Hudson River progeny'' (EPA, 2003). The commenters requested that if we choose to maintain an instantaneous DO value (rather than a range of 4.0–4.3 mg/L), we should establish a 29 °C threshold consistent with EPA's 2003 Guidance.

Our Response: We agree with the commenter that Secor and Gunderson (1998) exposed YOY Atlantic sturgeon to DO concentrations ranging between 2.8 and 3.3 mg/L over a period of 10 days at 26 °C. In fact, the experiment actually consisted of two treatments, one in a completely sealed tank and another with access to air at the surface of the tank. Of the 32 YOY exposed to concentrations between 2.8 and 3.3 mg/L over a period of 10 days at 26 °C in the unsealed tanks, only four (12.5 percent) actually survived the entire 10-day trial; 14 (43.8 percent) were dead by Day 4 and 20 (62.5 percent) of the animals were dead by Day 5. Of the 16 YOY exposed to those concentrations in the completely sealed tanks, 15 (93.8 percent) died by the end of Day 1 and all were dead by Day 2. Thus, while the treatments were 10-days, we believe the high mortality rates over the shorter time periods indicate how sensitive small Atlantic sturgeon are to DO. This led to our decision to identify the more conservative value for this endangered species. Similarly, because these mortality rates occurred at the 26 °C temperature threshold, and we have acknowledged that DO and water temperature need to be interdependently assessed, we conclude the PBF as written correctly identifies the environmental conditions necessary to protect this critical life stage.

Comment 84: The NCWQA and SCWQA recommended that if we choose to maintain our instantaneous minimum DO levels needed to protect Atlantic sturgeon at 4.3 mg/L, it should be characterized as an exposure level over a short-term period of several hours, rather than an instantaneous threshold. The commenter indicates the EPA's 2003 Guidance suggests DO levels of greater than 4.3 mg/L for a period of 2 hours at stressful temperatures was found to be protective.

Our Response: First, it must be understood that critical habitat PBFs are essential to the conservation of a species, not just its survival, and a metric that is ''protective'' in a broad, water quality context may still lead to injury and even mortality of individual organisms, and thus may not be the best metric to foster conservation. We agree that exposure time is a critical consideration. We clarify the information provided in EPA (2003) was based primarily on Campbell and Goodman (2003), who evaluated, among other things, the DO concentrations causing mortality in 50 percent or more of shortnose sturgeon (called ''LC_{50}'') held under stressful (29 °C) and non-stressful temperatures (22 to 26 °C). Secor and Niklitschek (2001) report shortnose sturgeon are more tolerant of higher temperatures than Atlantic sturgeon. Campbell and Goodman (2003) considered 29 °C a stressful temperature for shortnose sturgeon. Conversely, Secor and Gunderson (1998) report Atlantic sturgeon becoming stressed at a lower temperature of 26 °C. Based on the information provided in Secor and Gunderson (1998), we consider the stressful temperature for Atlantic sturgeon to be 26 °C. The EPA (2003) calculated DO concentrations they believed would be protective of sturgeon exposed to both non-stressful and stressful temperatures based on findings reported in Campbell and Goodman (2003). They estimated a DO concentration of 4.3 mg/L should be protective under stressful temperatures. The EPA (2003) recognized that the LC_{50} DO concentrations reported in Campbell and Goodman (2003) were not instantaneous but occurred within the first 2 to 4 hours of the tests. However, they concluded using their estimated value of 4.3 mg/L as an instantaneous value would be more protective for the species. Additionally, because the EPA estimates produced thresholds that still led to some level of injury or death, we believe more conservative values are appropriate to promote conservation of Atlantic sturgeon.

Comment 85: The NCWQA and SCWQA recommended we change our PBF associated with the instantaneous minimum DO levels needed to protect Atlantic sturgeon in North and South Carolina from 4.3 mg/L to a range of 4.0–4.3 mg/L because it matches the water quality standards in those states. They claimed this recommended range is appropriate because the North and South Carolina water quality standards for DO are a daily average of 5.0 mg/L and instantaneous minimum of 4.0 mg/L, and that the daily average requirement of 5.0 mg/L is more protective than the 30-day average of 5.0 mg/L in the proposed rule. Because there is significantly less potential daily stress to the sturgeon from the daily average DO criterion, the commenters stated that establishing a short-term instantaneous range of 4.0–4.3 mg/L is appropriate and should be fully protective. The commenters indicated this approach would be even more protective if we changed our temperature threshold to 26 °C rather than 29 °C.

Our Response: The values for water temperature and DO, as part of the water quality PBF, are based on the best available scientific information. As discussed in the previous response, we believe that the 4.3 mg/L value for DO is the best interpretation of the presently available scientific information and best supports the conservation of Atlantic sturgeon. DO requirements are dependent on the associated water temperature, the sturgeon's life stage and physiological condition, and the duration of exposure, and the values included in the PBF are examples of appropriate levels and combinations. We recognize that information on all of these combinations is limited, and additional information is likely to refine our understanding of the different

combinations of required values. While we decline to change the DO values presented in the PBF, we are not necessarily saying that DO values in other combinations with temperature, salinity, water flow, exposure duration, and animal age and condition would be unacceptable, depending on the particular circumstances of a proposed project. Additionally, the rule does link the 4.3 mg/L DO value to a temperature threshold of 26 °C rather than 29 °C.

Comment 86: Two commenters stated we failed to consider in a complete and meaningful way, the role certain aspects of aquatic chemistry play on determining whether a river has suitable spawning habitat. The commenters suggested we should have considered pH and levels of calcium (Ca) and magnesium (Mg) ions. They suggested these chemical characteristics can determine whether Atlantic sturgeon will spawn in a particular reach of river, and thus, it is crucial that these features are given special management consideration in future section 7 consultations and, if need be, protected accordingly.

Our Response: See response to Comment 9.

Comments on Special Management Considerations or Protection

Comment 87: An industry trade group believed we failed to provide any assessment of current management or protections in place and whether those are adequate for the conservation of the Atlantic sturgeon. The commenters claimed we must consider whether any of the proposed critical habitat units are presently under special management or protection for Atlantic sturgeon. The commenters acknowledged we have identified a number of initiatives that could protect Atlantic sturgeon, but they believed we must actually assess these initiatives to determine whether they are sufficient and determine what further management actions may benefit from critical habitat designation. The commenters went on to state we should consider each feature and specific area proposed and assess current management measures in place to make an actual determination as to whether special management may be needed in the reasonably foreseeable future, and if so, what that management would be, and how the critical habitat designation would further that management. The commenters concluded that our discussion of special management considerations is limited to general discussion regarding how barriers, water withdrawals, and dredging can generally affect water flow, quality, and depth and/or alter hard substrate, and that we have made non-specific assertions that special management for the essential PBFs may be required ''as a result of global climate change.''

Our Response: See response to Comment 14.

Comment 88: One commenter requested that we include ''clear guidance for considering the effects of a changing climate on critical habitat designation for species recovery in the final rule.'' The commenter requested we consider ''projected changes to salinity, temperature and DO, including changes in sea level rise'' and further requested that we document the extent that climate change was considered when assessing the need for the inclusion of currently unoccupied habitat in the final rule.

Our Response: See Response to Comment 17.

Comments on Decision Not To Designate Critical Habitat in Estuarine or Marine Environments

Comment 89: One commenter agreed with our decision not to designate any critical habitat in the marine ecosystem; however, other commenters disagreed. Two commenters indicated we should designate estuarine habitat that not only encompasses natal estuaries, but also certain estuaries that are not natal for a subpopulation, because coastally migrating juveniles use estuaries for foraging, including estuaries with and without spawning subpopulations. They asserted we were waiting for ''perfect'' information and being overly restrictive, and that the amount of scientific information currently available is enough to determine PBFs in these areas. They also indicated that all estuaries have human activity that requires special management to preserve the estuarine habitat for sturgeon foraging (*i.e.,* management to avoid impacts from dredging, boat strikes, benthic habitat destruction, sediment contamination, cooling water intakes, etc.).

Our Response: We agree with the commenters that estuaries and nearshore marine waters along the Atlantic Coast are important habitat of Atlantic sturgeon; we specifically discussed them in the proposed rule. However, as we described in the proposed rule, we lack sufficient data to identify the specific features in the marine/estuarine environment Atlantic sturgeon are using. We agree that there is scientific information describing environmental correlates with locations of Atlantic sturgeon; however, we do not believe that it is sufficiently informative of the features being used by sturgeon, or the conservation function they serve. More information is provided in the response to comment 20.

Comment 90: Two municipalities commented that our proposed rule suggests erroneously that offshore data are unavailable to determine essential conservation needs. They noted we failed to mention information gathered from the annual offshore striped bass tagging cruises that have tagged numerous adult sturgeon coincident to the fishing grounds of large offshore trawlers, gillnets, and longline fisheries.

Our Response: We are aware of the offshore striped bass tagging cruises. We carefully examined the information available from this study, which included parameters such as location of capture, size of fish, weight of fish, etc. Unfortunately, that information was insufficient to identify PBFs that are essential to the conservation of the species.

Comment 91: One commenter stated that while the ''Large Coastal Rivers that Lack Essential Features'' section of the proposed rule states: ''. . . short coastal plains rivers . . . most likely do not contain suitable habitat for Atlantic sturgeon,'' these systems may provide foraging habitat for subadult and adult Atlantic sturgeon. The commenter continued by stating that although relatively large numbers of Atlantic sturgeon have been acoustically tagged and their movements recorded in recent years, their numbers are highly depleted relative to historical levels of abundance, and acoustic receiver coverage is relatively sparse. The commenter stated the use of these systems as foraging habitat by subadult and adult fish should not be discounted, once populations are fully restored and population density is higher.

Our Response: We agree that foraging habitat is extremely important. However, as described in the proposed rule, due to the paucity of data on specific habitat or resource utilization, we could not identify any PBFs essential for the conservation of the Carolina and South Atlantic DPSs that support adult and subadult foraging in estuarine or marine environments (see also the response to Comment 20). We did include PBFs related to juvenile foraging and developmental habitat in spawning rivers, downstream of spawning sites, but, as the commenters noted, the non-designated short coastal plain rivers do not support spawning and therefore would not support downstream-migrating, developing juveniles. The limited availability of Atlantic sturgeon tracking data from short coastal plain rivers was not a

factor in our decision not to include those areas in the designation.

Comment 92: Several environmental organizations stated that we incorrectly claimed that we could not designate estuarine or marine areas as critical habitat due to insufficient data and that the best available scientific information supports identification of PBFs in estuarine and marine environments that are essential to Atlantic sturgeon conservation. These commenters said that a growing body of research has identified critical feeding and seasonal aggregation sites, and that the sites identified to date should be designated as critical habitat. The commenters stated there is a scientific consensus that Atlantic sturgeon use marine waters of particular depths as migration corridors; the commenters asserted that available information supports the contention that all 5 DPSs use the same narrow migration corridor and known aggregation sites. The commenters stated that water depth, available prey, substrates, temperature, salinity and seascapes are factors correlated with, and that influence, Atlantic sturgeon use of specific estuarine and marine habitats as feeding or seasonal (winter, summer) aggregations, and migratory corridors, and that these features may require special management considerations or protection. The commenters stated that our regulations, Implementing Changes to the Regulations for Designating Critical Habitat (81 FR 7413, 7414; February 11, 2016), support the use of generally-defined PBFs or an ecosystem approach. Finally, the commenters discussed our previous critical habitat designations for green and Gulf sturgeon as valid models for designating estuarine and marine areas as critical habitat for Atlantic sturgeon.

Our Response: See response to Comment 20.

Comments on Data and Approaches Used in the Proposed Designation, Generally

Comment 93: NCDOT suggested areas of rivers were determined to be critical habitat based on ''knowledge'' instead of documented data.

Our Response: We considered the best available scientific information, including the 2007 Atlantic sturgeon status review (ASSRT, 2007), the ESA listing rule (77 FR 5914; February 6, 2012), scientific research reports, information and data gathered during the peer-review process, and a database developed by the U.S. Geological Survey that mapped environmental parameters within East Coast rivers to identify sturgeon habitat. We also considered information on the location of sturgeon spawning activity from scientific reports, as active spawning or spawning activity in an area would indicate that the PBF(s) necessary for spawning are likely present. Even in places where information is available, those data may represent a snapshot in time and the exact location of a habitat feature may change over time (*e.g.,* water depth fluctuates seasonally, as well as annually, and even hard substrate may shift position). While the best available information was, at many times, location specific, we worked pursuant to our regulations and identified specific areas at the appropriate scale for critical habitat (*i.e.,* specific rivers), taking into consideration the life history of the species, as described in the preamble of the proposed rule.

Comment 94: An industry trade group indicated we made no attempt to establish any connection between the threats to Atlantic sturgeon described in the listing rule and critical habitat. They suggested we have not evaluated or explained how designation of critical habitat will benefit the species, or help address injury/death resulting from inshore trawling or overfishing. Additionally, they indicated we have not explained how the designation of ''these vast areas would provide new or additional minimization of habitat alteration or destruction.''

Our Response: See response to Comment 64.

Comment 95: One commenter asked us to explain more clearly in the final rule, why we stopped the upstream extent of some critical habitat units at locks or dams. The commenter acknowledged that in some cases, manmade barriers occur at a natural barrier (impassable falls), and therefore they would not expect the historical species ranges to extend above the location of those barriers. However, the commenter continued by stating the presence of a barrier, in and of itself, should not constitute the upstream extent of critical habitat. The commenter argued that dams could be removed, which would open up those habitats. The commenter requested we reconsider these reaches as essential, but currently unoccupied habitat.

Our Response: Our approach to establishing the upper boundaries of the units was in the first instance to identify and evaluate the upstream extent of available essential spawning habitat features. We evaluated available information on the nature and distribution of likely spawning habitat up to the first impassable barrier, natural or manmade. We also evaluated available information on historical Atlantic sturgeon spawning or occurrence, and current estimated extent of spawning and estimated population status in each river. Thus, the upstream unit boundaries are fact-specific to each river system. We agree that the presence of a barrier does not necessarily correspond with the historical species ranges. However, the barriers denoting the upstream limit of the designation are the same designators as the upstream limit of the occupied areas and barriers that occur at a critical habitat boundary need to provide an easily recognizable landmark for where critical habitat begins or ends. Non-ephemeral reference points (*e.g.,* dams, bridges) can be used in a textual description of the boundaries of critical habitat, thus we believe it is appropriate to use currently impassable dams as the terminus for occupied critical habitat.

Comment 96: An industry trade group indicated we also failed to map potential threats to the Atlantic sturgeon (*e.g.,* manmade structures, dredging areas).

Our Response: See response to Comment 18.

Comments on Designation of Unoccupied Critical Habitat, Generally

Comment 97: Several commenters, including South Carolina Department of Transportation (SCDOT) and South Carolina Department of Natural Resources (SCDNR), asserted that unoccupied critical habitat should not be designated at this time. Some questioned how we could consider these areas critical if animals are not even using them currently. Others suggested it was premature to designate these areas because passage of animals into unoccupied habitats was uncertain or unproven in some areas. Still others suggested we wait to designate these areas as critical habitat until data show Atlantic sturgeon were successfully being passed up to and were using these areas.

Our Response: ESA section 3(5)(A)(ii) defines critical habitat to include specific areas outside the geographical area occupied if the areas are determined to be essential to the conservation of the species. As described in the proposed rule, we determined that there is insufficient spawning and developmental habitat in *occupied* stretches of three river systems: The Cape Fear, Santee-Cooper, and Savannah, and on this basis determined these areas are essential to the species' conservation. However, based on concerns raised about the impacts and uncertainties associated with these unoccupied units, and

questions the commenters raise about the nature of the conservation value these units provide to sturgeon, we determined that conducting a discretionary exclusion analysis on these units was warranted. As a result of that analysis, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude unoccupied units of critical habitat, including the unoccupied Santee-Cooper unit. We determined the benefits of exclusion (that is, avoiding some or all of the impacts that would result from designation) outweigh the benefits of designation.

Comment 98: North Carolina Wildlife Resources Commission (NCWRC) suggested that until we clarify how we will evaluate projects in the unoccupied critical habitat, we should not designate critical habitat in those areas. SCDNR insisted that we remove all unoccupied habitat areas from consideration. However, they requested that if we still intended to designate unoccupied habitat areas, we should clarify how unoccupied versus occupied critical habitat designations will be handled in regards to section 7 consultations for projects.

Our Response: As stated previously, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude the unoccupied units of critical habitat. Therefore, section 7 consultations will not be required based on impacts solely to these unoccupied areas. Section 7 consultation will still be required to assess potential impacts to shortnose sturgeon and its habitats in the area proposed as the unoccupied Santee-Cooper unit, and consultation will be required if effects of actions in the areas previously proposed as unoccupied have effects to sturgeon or their habitats downstream, in occupied areas.

Comments on Designating Specific River Units or River Areas

Carolina Unit Rivers

Comment 99: NCDOT indicated they do not believe that ''sparse spawning data justifies an extensive proposed area of critical habitat.'' They indicated that literature searches they conducted found that spawning in specific areas in the Southeast is rare. The commenter also stated that the proposed rule says, ''[t]here are large areas of most rivers where data is still lacking'' and ''substrate types can change from year to year.'' Further, the commenter stated in relation to extending ''historical habitat'' into the ''critical area,'' they should not be required to comply with moratoria and limited construction times, based on habitat that may be critical at some future point in time.

Our Response: We agree that site-specific information describing spawning location in the Southeast is relatively rare. We could not compare our information to that referenced by the commenter as they did not provide their search results. We are designating critical habitat by describing PBFs essential to the conservation of the species. The areas we are including in the final rule have one or more of the PBFs present that are essential to the conservation of the species and which may require special management considerations or protection. Additionally, our regulations at 50 CFR 424.02 support the designation of areas that contain PBFs that may be ephemeral or dynamic. We believe the proposed rule clearly outlines our step-wise approach for how we identified each PBF and the rivers in which they are located. Regarding moratoria or construction restrictions, we reiterate that the critical habitat designation does not create any moratoria, refuges, or closed areas.

Comment 100: One commenter suggested we had not used the best scientific information available, and they believed that the positions taken by SCDNR in their public comments support their conclusion. Specifically, the commenter stated: ''[t]he proposed rule was apparently developed with little or no input from [SCDNR] and the scientific data it has collected. SCDNR finds the critical habitat designations to be presumptuous and impertinent. In fact, SCDNR insists that all currently labeled unoccupied habitat be removed.''

Our Response: We disagree that we have not used the best scientific information available in this designation. We believe the commenter mischaracterized SCDNR's statements. The SCDNR suggested critical habitat designations were ''presumptuous'' and ''impertinent'' until further genetic analyses verify the DPS classification of Atlantic sturgeon. SCDNR commented that ''the Carolina DPS is based upon a limited sample of individuals with no representation from the Great Pee Dee, Santee and Cooper Rivers in South Carolina. The samples used to genetically characterize the Carolina DPS were obtained from Albemarle Sound, an area where sturgeon from multiple river basins are known to occur. The limited data input used to define the boundaries of the Carolina DPS causes concern and warrants further genetic sampling to truly define the Carolina DPS. SCDNR finds the critical habitat designations presumptuous and impertinent and advocates that these designations be deferred until further genetic analyses occur to verify the DPS classification of Atlantic sturgeon . . .'' The SCDNR is essentially commenting on the determination of DPS identities and boundaries in the 2012 final rule listing the Carolina DPS. A critical habitat designation is not the vehicle to revisit a species listing determination, and so long as a species has been listed, we have a statutory duty to designate critical habitat for the species. Moreover, we believe the DPS listing determinations continue to represent the best scientific information available on the identity and boundaries of the DPSs.

The commenter seems to believe that because our determinations differ from SCDNR's on certain aspects of the designation, for example the use of shortnose sturgeon as a proxy for Atlantic sturgeon or how to interpret the lack of data regarding Atlantic sturgeon presence in certain stretches of a river, our rule did not use the best scientific information available. Our determinations were based on the 2007 Atlantic sturgeon status review (ASSRT, 2007), the ESA listing rules (77 FR 5914; February 6, 2012), scientific research reports, information and data gathered during the peer-review process, a database developed by the U.S. Geological Survey for mapping environmental parameters within East Coast rivers to identify sturgeon habitat, as well as information on the location of sturgeon spawning activity from scientific reports. We also reviewed reports from a NMFS-funded multi-year, multi-state grant on movement and migration of Atlantic sturgeon that included information collected by the SCDNR. Finally, the SCDNR provided a peer-reviewer to evaluate the biological information that went into the proposed rule. The reviewer provided critiques which were incorporated into the proposed rule. Thus, while the SCDNR may disagree with our approach in certain cases (*e.g.,* critical habitat should not be designated without confirmed sturgeon presence), we disagree with the assertion that we did not use the best scientific information available when developing the rule.

Comment 101: Multiple commenters said they believe the inclusion of extensive river reaches, including ''unoccupied'' areas and reservoirs, for the Carolina DPS of Atlantic sturgeon would result in a poor allocation of conservation resources. They suggested we focus on estuarine environments, spawning aggregations, and fisheries bycatch because it would result in

greater benefits for the conservation of the species.

Our Response: The ESA requires that we designate critical habitat for listed species. As described in the proposed rule, we know Atlantic sturgeon use estuaries for foraging, growth, and movement. We also know subadults and non-spawning adults use estuaries seasonally, likely for foraging. However, the lack of data on specific habitat or resource use by Atlantic sturgeon in the estuaries meant we could not identify any specific PBFs essential for the conservation of the species in these areas. Also, we believe we are protecting the habitat of spawning aggregations with these designations. Because Atlantic sturgeon spawn far upstream on hard bottom substrates in low salinity waters (PBF #1), designating critical habitat protects these habitats. Impacts from fisheries bycatch are direct impacts on the species, not habitat-related effects, and are beyond the scope of critical habitat designation.

As stated previously, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude unoccupied units of critical habitat, including the reservoirs of Lake Moultrie and Lake Marion.

Comment 102: One commenter stated they supported our designation of occupied and unoccupied critical habitat. However, they requested we consider regional datasets and literature sources not cited in the proposed rule that they believe support the inclusion of the Ashepoo River, South Carolina, up to the confluence of Doctors Creek (Route 64 Bridge).

Our Response: We appreciate the commenter bringing these datasets to our attention. We considered designation of the Ashepoo River, South Carolina, as critical habitat. As stated in the proposed rule, our review of the best scientific information available for the Ashepoo (Post *et al.,* 2014) determined it is a short, coastal plain river that most likely does not contain the PBFs suitable to support spawning and juvenile recruitment of Atlantic sturgeon. Although the commenter did not identify which element we failed to fully consider, we evaluated the regional datasets and literature sources suggested by the commenter. Those data sources may show species occurrence in the Ashepoo, but not necessarily sturgeon spawning. We do not disagree that Atlantic sturgeon could use the Ashepoo River; rather we do not believe it contains the necessary PBFs that support our conservation objective for designating critical habitat.

Comment 103: Two municipalities asserted we failed to consider the best available information in the overall analysis because data was only as recent as 2006, and proceeding with critical habitat designations in unconfirmed areas without the benefit of updated and better data is inappropriate. They note that North Carolina has had a gillnet Incidental Take Permit (ITP) for Atlantic sturgeon since around 2012-2013. The commenters stated the Neuse River in North Carolina, described as Area C in the ITP, is allowed very few Atlantic sturgeon interactions prior to closure of the gillnet fishery because of how rare they are in this river system. The commenters state additional information indicated (1) sturgeon abundance, particularly for the Carolina DPS, is far greater than originally believed in areas that have actual, documented spawning aggregations; (2) discard mortality of juveniles taken in traditional fishing gear is very low; and (3) estuarine interactions with adult sturgeon are exceedingly rare as they are not retained in traditional gillnet fishing gear. The commenters concluded that extensive data associated with the ITP were not mentioned in the proposed rule but confirmed there is low Atlantic sturgeon abundance in the Neuse River. Additionally, the commenters concluded that changes in fishing behavior and seasonality have dramatically reduced the potential for bycatch in North Carolina, but this information is also not considered in the proposed rule.

Our Response: When designating critical habitat we are to identify PBFs that are essential to conservation of the species that may require special management considerations or protections, and then identify specific areas in which those PBFs are located. It is unclear how the information the commenter suggests we overlooked (*e.g.,* data on sturgeon abundance, fishing behavior, discard mortality, incidental takes) is in any way informative regarding our PBFs or the areas we are designating as critical habitat. As we have noted, critical habitat designations in occupied areas are based on the presence of PBFs that are essential to a species' conservation, and which may require special management considerations or protections. Specific areas containing these PBFs are then identified, and the impacts of including the specific areas in the designation are considered. Whether sturgeon abundance or interactions with fisheries have changed over time would not affect how we made our critical habitat designations.

Comment 104: Two municipalities stated we provided no evidence of spawning or the presence of Atlantic sturgeon YOY in the Neuse River, North Carolina. They suggested the size of the juveniles collected to date prove nothing in terms of spawning origin as those fish could, and likely did, migrate from other rivers where spawning adult sturgeon have been observed and captured (*e.g.,* Roanoke River, North Carolina). Further, the commenters stated we provided no direct evidence that the Neuse River was used by the Carolina DPS of Atlantic sturgeon when we listed the DPS in 2012, and they suggested there has been no evidence of Atlantic sturgeon in freshwater portions of the river for decades.

Our Response: Following receipt of this comment we had extensive contact with the USFWS staff, as well as with state natural resource managers. They suggested there was additional evidence of YOY occurring in the Neuse River. Specimens available from North Carolina State University indicated three YOY (less than 350 mm) were captured in the Neuse River in 1974 (J. Hightower, NCSU, to A. Herndon, NMFS, pers. comm. March 2017). An additional record of a YOY captured in the Neuse River in 1974, was also provided by the North Carolina Museum of Natural Sciences (G. Hogue, NCMNS, to A. Herndon, NMFS, pers. comm. March 2017). Also, Bain (1997) reports that ''early juveniles'' (20–440 mm FL) remain in their natal rivers until they become ''intermediate juveniles'' (450–630 mm FL) and begin gradually emigrating from the river during periods of rapid growth. Hoff (1980) reports sturgeon studies in the Neuse and Pamlico Rivers and Pamlico Sound captured low numbers of small (400–600 mm TL) sturgeon. The North Carolina Division of Marine Fisheries (NCDMF) also provided information collected via observers and during their Independent Gill Net Survey. From 2001–2012, those sources reported 13 Atlantic sturgeon captured in the Neuse that were less than 440 mm FL size range (M. Loeffler, NCDMF, to A. Herndon, NMFS, pers. comm. March 2017). Based on the information in Bain (1997), we believe these animals are unlikely to have strayed into the Neuse River from other river systems, leading us to conclude they were likely born there. Additionally, the final listing rule (77 FR 5914; February 6, 2012) indicates the Neuse River was used by the Carolina DPS at the time of listing and that spawning may be occurring in the river. Moreover, ''occupied at the time of listing'' in the statute refers to the geographical range, which we have defined to include all marine and freshwaters available to be used by

Atlantic sturgeon, for any life function. Finally, regardless of whether animals have been documented in the freshwater portions of the river, our critical habitat determinations are based on areas where PBF(s) essential to conservation of the species occur; it is not specifically tied to animal presence. Therefore, we believe including the Neuse River in the designation of critical habitat is appropriate.

Comment 105: Two municipalities objected to the designation of proposed critical habitat upstream of rkm 75 on the Neuse River, North Carolina. The commenters stated ''the most westward location of a sturgeon [on the Neuse River, North Carolina] was at rkm 75'' and, in their opinion, Atlantic sturgeon do not use areas upstream of rkm 75 and critical habitat designation would impose an unnecessary administrative burden on municipalities at or above rkm 75.

Our Response: We considered the information presented by the commenters, and we believe our upstream boundary is appropriate. We have identified critical habitat based on areas where PBF(s) essential to conservation of the species are located, not necessarily where individual animals have been documented. Moreover, our data include an observed Atlantic sturgeon around rkm 80 on the Neuse River and likely suitable spawning substrate at the base of the Milburnie Dam. Additionally, the commenter provided no information suggesting the PBFs are absent above rkm 75. For these reasons, we believe our upstream boundary for the Neuse River is correct.

Comment 106: Two municipalities questioned our decision to consider the Neuse River, North Carolina, as spawning habitat for Atlantic sturgeon. They suggested that substantial water quality concerns call into question the notion that the Neuse River could support the spawning of Atlantic sturgeon. They cited our statement that ''hard bottom in fresh water on spawning grounds and sufficient DO are critical needs for spawning success.'' The commenters stated that without any evidence of spawning activity in the Neuse, it is unknown whether the hard bottom criteria are met. They concluded the required physical spawning conditions have not been shown to exist in the Neuse River because no spawning locations have been identified and the water quality conditions are unlikely to favor the survival of larvae and early juveniles. However, they acknowledged that the upper reaches of the Neuse River at the Milburnie Dam do have areas of suitable substrate, but stated that it is far from the salt wedge around New Bern and any measureable salinity for many river miles under normal conditions. On this point, they concluded that any supposition about the availability of suitable substrate with no knowledge of actual spawning location is erroneous. The commenters stated that flow regimes, critical for spawning success, are significantly manipulated in the Neuse River. They acknowledged that while flow regimes of Milburnie Dam have been increased on occasion to simulate natural conditions on the Neuse River, these flow regimes are not permanently established and could change. They suggested unnatural, manipulated flows are unlikely to change in a measureable way in the future, and thus, establishing the Neuse River as critical habitat for Atlantic sturgeon is not supported by the data. The commenters also suggested the proposed rule does not identify how we determined the water of appropriate depth and absent physical barriers to passage between the mouth and spawning sites and water quality conditions that support spawning and recruitment for larval, juvenile and subadult growth PBFs occur in the Neuse. Finally, they stated that to spawn in the Neuse River, the Atlantic sturgeon must pass through the heavily impaired waters of the lower Neuse River and the Neuse Estuary. They also suggested that the newly hatched sturgeon fry must pass through the same waters on their journey to reach estuarine waters immediately after being hatched. They believed both the Neuse and Pamlico portions of the estuary have been subject to seasonal episodes of anoxia that significantly affect the quality of Atlantic sturgeon nursery habitat.

Our Response: We disagree. As noted in the proposed rule and explained in our response to Comment 104, we believe there is evidence that Atlantic sturgeon spawning has occurred in the Neuse River. The commenter supported our determination that the PBF of substrate to support spawning does exist in the Neuse at the Milburnie Dam. The commenters' confirmation that hard bottom substrate in low salinity waters far from the salt wedge exists in the Neuse River validates our determination that PBF # 2 (transitional salinity zones inclusive of waters with a gradual downstream gradient of 0.5-up to 30 ppt and soft substrate) is present. The commenter also expressed concern over the water quality of the Neuse River and estuary, calling into question its suitability as spawning habitat. However, the information provided by the commenters regarding water quality is not specific to DO or temperature; it discusses nitrogen and phosphorus. The information provided gives no indication of how these nutrients may be affecting DO or temperature in the river, or how these nutrients prevent the PBFs from occurring or becoming established in the future. Similarly, the commenters expressed concerns about water flows on the Neuse River, but did not provide any information regarding how past and future flow manipulations of the Neuse River would affect the PBFs. With respect to our approach to determining that the PBFs occur in the Neuse River, we acknowledged in the proposed rule that there are large areas of most rivers where data are still lacking. The available data also may represent a snapshot in time, and the exact location of a habitat feature may change over time (*e.g.,* water depth fluctuates seasonally and annually, and even hard substrate may shift position). As we described, although habitat features may vary even at the same location, if any of the available data regarding a particular feature fell within the suitable range (*e.g.,* salinity of 0–0.5 ppt or hard substrate [gravel, cobble, etc.]), we considered that the essential PBF is present in the area. When data were not available for certain rivers or portions of occupied rivers, we used our general knowledge of Atlantic sturgeon spawning and applied river-specific information to determine the location of PBFs essential to spawning. For these reasons, we believe designation of the Neuse River as critical habitat is appropriate and supported by the available data.

Comment 107: NCDOT said there are no confirmed data to support designating the Cape Fear River, North Carolina, above Lock and Dam # l, if there is sufficient spawning habitat below this point. If the habitat is not accessible at the time of listing it is not critical to the survival of the species.

Our Response: The proposed rule describes the information we used to designate occupied areas on the Cape Fear River Lock and Dam #1 includes a newly constructed fish passage feature, and there have been reports of Atlantic sturgeon above the lock and dam. We therefore included the area between Lock and Dam #1 and Lock and Dam #2 as occupied habitat in our proposed designation (Carolina Unit 4). We had proposed to designate the area between Lock and Dam #2 and Lock and Dam #3 as unoccupied critical habitat because we believed it may provide additional spawning habitat that was essential to the conservation of the species. However, further conversations with

USFWS and state resource managers made us uncertain about the conservation value for this specific stretch of the Cape Fear River between Lock and Dam #2 and Lock and Dam #3. Therefore, while we continue to believe that this habitat is important to Atlantic sturgeon, we do not believe the area between Lock and Dam #2 and Lock and Dam #3 is essential to the conservation of the species based on our current understanding of what habitat is likely there. Additional information would be necessary resolve the uncertainty surrounding what portion, if any, of the Cape Fear River above Lock and Dam #2 is essential for the conservation of the species. Therefore, we are not designating unoccupied critical habitat on the Cape Fear River at this time.

Comment 108: The USFWS recommended changing the upstream terminus of Carolina Unoccupied Unit 1—Cape Fear River, North Carolina, by extending the boundary to Duke Energy's Buckhorn Dam, North Carolina, rather than ending at Huske Lock and Dam (Lock and Dam #3) as proposed. The commenter referenced the recent notice by the National Fish and Wildlife Foundation (NFWF) (reference NFWF Agreement #5406) to Bladen County, North Carolina. The notice indicates Bladen County has been awarded funds through the NFWF-Duke Energy Settlement for the Lock and Dams #2 and #3 Project. The project would conduct an extensive alternative analysis and advanced hydraulic modeling, design a weir wall, support continued tagging/telemetry work by the North Carolina Division of Marine Fisheries, conduct anadromous fish egg sampling at all three Locks and Dams, and support a USACE Rivers and Harbors Act section 408 review and coordination. Based on this, the commenter believed upstream passage is reasonably foreseeable. The commenter believed this reach of the Cape Fear River would, when re-opened, provide suitable spawning and migratory habitats needed to facilitate sturgeon reproduction and recruitment. Thus, they believed it is appropriate to extend this unoccupied unit upstream to the next currently impassable barrier.

Our Response: We appreciate the commenter bringing this development to our attention. We were not aware that passage above Lock and Dam #3 may occur in the reasonably foreseeable future. Following receipt of this comment we had extensive contact with USFWS staff, as well as with state natural resource managers. They reiterated input we received during the development of the rule from a state sturgeon expert who stated the type of river bottom and currents most suitable for Atlantic sturgeon spawning would be found above Lock and Dam #3. They also provided information from historical fishing records that report Atlantic sturgeon had been captured far upstream from Lock and Dam #3. We believe the most likely explanation for why Atlantic sturgeon were captured that far upstream historically is because they were attempting to spawn. The indication that suitable spawning habitat exists above Lock and Dam #3, and the historical evidence suggesting Atlantic sturgeon moved that far upstream, suggests to us that spawning likely occurred there in the past and may again in the future, once the animals have access to the area. This information suggests to us that this stretch of the Cape Fear River may be of high conservation value. However, moving the upstream boundary to Buckhorn Dam would be an increase of 115 rkms. We believe this is a significant change that the public was not aware of and on which it did not have an opportunity to provide comment. Therefore, we are not making the change recommended by the commenter at this time.

Comment 109: One commenter questioned our conclusion regarding Atlantic sturgeon spawning migration in the Cape Fear River, North Carolina, specifically our statement that fish passage present at the dam is successful or that fish pass through the lock at Lock and Dam #1. The commenter indicated that unless the policy has changed very recently, locking for fish passage is not conducted at Lock and Dam #1 and tracking of sonic-tagged Atlantic sturgeon has not shown any upstream movement past Lock and Dam #1. The commenter continued, stating upstream passage at the rock arch ramp at Lock and Dam #1 has been good for American shad but poor for striped bass and while neither species is a perfect proxy for Atlantic sturgeon, the results are mixed regarding effectiveness of this rock arch ramp. The commenter added that intensive gillnet sampling did not detect any Atlantic sturgeon above Lock and Dam #1 in 1996–1997 (Moser *et al.,* 1998). The commenter stated the most likely conclusion is that the locks and dams have long hindered or prevented upstream passage of Atlantic sturgeon in the Cape Fear River (and may have increased the importance of the unobstructed Northeast Cape Fear River).

Our Response: We agree that the locks and dams typically provide limited opportunities for passage of Atlantic sturgeon. However, the best scientific information available indicates that sturgeon are passing above Lock and Dam #1 on the Cape Fear River, even as recently as September 2016, and that would have been either through the lock, or over the rock ramp. Additionally, modifications to the rock ramp at Lock and Dam #1 will be completed by 2019, which is anticipated to increase the efficiency of sturgeon passage above the Lock and Dam #1. Thus, we believe our statement about successful passage is correct.

Comment 110: Two utility companies suggested the best scientific data available do not support designation of the area in the vicinity of the Blewett Falls Dam tailrace on the Pee Dee River because this area has previously been disturbed as a result of necessary hydropower operations and maintenance. As a result, this area does not contain the prescribed PBFs for the key habitat-based conservation objectives for spawning and juvenile development habitat. These commenters stated the biological opinion issued for FERC's issuance of the Yadkin-Pee Dee (YPD) hydropower license requires a spawning and incubation habitat characterization assessment for an 88-mile-long reach of the Pee Dee River, downstream from Blewett Falls Dam. The assessment seeks to determine the amount of suitable sturgeon spawning and incubation habitat created as a result of the spring minimum flow requirements and the actual flows provided by YPD under the new license. The commenters believe the assessment should provide scientific data that can be used to pinpoint areas for designation as critical habitat. Until the initial 10-year phase of this assessment is completed, the commenters requested we refrain from designating the area downstream of Blewett Falls Dam within the YPD project area boundary as critical habitat.

Our Response: The commenters suggest we omit areas within the YPD project boundary from critical habitat, but it is not clear what the YPD project boundary is. We believe that the scale and boundaries of the specific areas that we are including in the critical habitat designation are appropriate. For the Pee Dee River unit, aerial imagery suggests spawning habitat does exist immediately downstream from Blewett Falls Dam. Further, we are required to define each critical habitat unit using easily recognized reference points. We agree that the spawning and incubation habitat characterization assessment is likely to provide additional scientific data that will be useful in determining more precisely the location, timing, etc., of the PBFs, though the studies will only be another snapshot in time and

will not account for temporal variability in location of PBFs. Further, when designating critical habitat, our regulations state that we shall designate, at a scale that we determine to be appropriate, the areas that contain the PBFs essential for the conservation of the species. The areas do not need to be limited to only the precise locations where the PBFs have been specifically determined to exist. We believe that we have appropriately used the best scientific information available at this time and have selected an appropriate scale for these designations. The ESA does not allow us to identify areas containing the PBFs and then decline to designate them until better data become available. In identifying and designating the areas containing the PBFs that are essential to the conservation of the Atlantic sturgeon, we are meeting our statutory and regulatory requirements. For these reasons, we have included as critical habitat on the Pee Dee River the area up to the Blewett Falls Dam.

Comment 111: Two utility companies also suggested that the areas around the intakes for two ''steam-electric plants'' located on the Neuse River, North Carolina, within ''Carolina Unit 3 Neuse Unit'' and one ''steam-electric plant'' located on the Cape Fear River, North Carolina, within ''Carolina Unit 4 (Cape Fear Unit),'' are previously disturbed areas that require dredging in order to maintain the operation of the steam-electric plants, and these areas do not include ''ideal habitat'' for the Carolina DPS of Atlantic sturgeon; in another part of their letter the commenters stated that the intake areas do not provide spawning habitat. The commenters asserted that the areas around the intakes at the steam-electric plants on the Neuse and Cape Fear Rivers should be excluded from critical habitat in order to minimize the potential burden they expect will result from additional and unnecessary regulatory reviews.

Our Response: We disagree that foregoing designation would alleviate additional cost, complexity, and administrative burden of carrying out activities at these plants. As noted previously, we anticipate that designation of critical habitat will impose only minimal administrative burdens and costs that will be added to ESA consultations that would be required to address impacts to the species even in the absence of critical habitat. The commenters requested that we omit discrete areas around the intakes for three plants on the Cape Fear and Neuse River, but they were not specific regarding the location or sizes of the areas that should be excluded. The commenters also were not specific about their statement that the areas are not ideal habitat for Atlantic sturgeon, other than to say the areas do not provide spawning habitat. However, the commenters did not state that all of the other PBFs are absent from these areas. The commenters suggested that dredging would make the areas less than ideal habitat for sturgeon. But based on our experience with the effects of dredging on aquatic habitat, we do not believe dredging would permanently remove the PBFs such that the areas would not provide conservation value to sturgeon in the periods between dredging events. We believe that we have appropriately used the best scientific information available at this time and have selected an appropriate scale for these designations.

Comment 112: SCDNR said that while telemetry data were not available above Pine Tree Landing on the Black River, South Carolina (Carolina Unit 6), they believed the river is extremely braided in this area and likely provides limited ideal habitat for Atlantic sturgeon. They recommended the upstream limit of designated critical habitat in the Black River should stop at June Burn Road, South Carolina.

Our Response: The comment was unclear as to whether telemetry data were not available because no receivers capable of detecting acoustically tagged sturgeon had been deployed above Pine Tree Landing or if receivers were there, but they just had not ever detected a sturgeon. A review of Post *et al.* (2014) confirms the former. Regardless, we reviewed the geospatial information available around June Burn Road, South Carolina, and agree that the main stem of the Black River becomes increasingly difficult to identify in this area. We were able to consistently identify the main stem of the river up to approximately Interstate 95, upstream of which the main stem is no longer discernable. As a result we have modified the upstream boundary of the Black River (Carolina Unit 6) to be the Interstate 95 Bridge, approximately eight miles southwest of Turbeville, South Carolina. This results in a decrease of 50 rkm for this unit. Aerial imagery does not indicate that any hard bottom substrate is being excluded from the unit by changing this upstream boundary, thus the unit will still provide sturgeon access to the maximum upstream extent of spawning habitat, and the change will not affect the conservation value of the unit in facilitating increased survival of all life stages and facilitating adult reproduction and juvenile and subadult recruitment into the adult population. We are not projecting a decrease in impacts in this unit associated with the decrease in length, given the actions predicted to occur here and require consultation are not location-specific and could still occur within the modified unit boundaries.

Comment 113: Two utility companies suggested we had not used the best available information when we determined there is a spawning run or spawning patterns of movement for the Carolina DPS of Atlantic sturgeon in the Santee River below Wilson Dam (or anywhere in the Santee) in South Carolina. They said there is no evidence of spawning in the Santee River, and very little evidence of YOY Atlantic sturgeon using the river, and those specimens that have been captured were thought to be pushed in from Winyah Bay, South Carolina, via the Intracoastal Waterway. The commenters acknowledged the Santee River downstream of Wilson Dam may be used for feeding and refuge, but they reported Post *et al.* (2014) do not support the conclusion that the Santee River supports a spawning run or a pattern of movement for Atlantic sturgeon, and thus does not support the inclusion of the Santee River as critical habitat. SCDNR questioned our assumption that an Atlantic sturgeon captured at the St. Stephen Fish Lift on the Santee River, South Carolina (Carolina Unit 7), had presumably been making a spawning run. They indicated the direction of travel of this individual animal is unknown. SCDNR said that the exit channel of the fish lift is monitored via three video cameras, two of which are underwater and one that captures images through a viewing window of the exit channel in the lift. They concluded that a review of the video footage could not determine whether the sturgeon entered the lift downstream of the dam or if the sturgeon entered the fish lift via the exit channel in Lake Moultrie.

Our Response: We disagree. Sturgeon movement upstream in the Santee River has clearly been restricted due to the Santee-Cooper Navigation and Hydro-Electric Project, and the operational impacts of the St. Stephen hydropower dam have restricted sturgeon access to or ability to use the Santee River below Wilson Dam. But there is evidence of spawning migration as far as fish can move until they are deterred by impacts of the projects. Further, we do not find the unknown direction of travel of the Atlantic sturgeon captured in the St. Stephen fish lift to undermine our assessment that the fish was moving between the upstream freshwater and the downstream estuarine waters.

Whether the animal was trying to get above the St. Stephen Dam or had been above the dam and was moving downstream, either direction suggests spawning movement.

Prior to the construction of the Santee-Cooper Project, the Santee River system supported a significant spawning population of Atlantic sturgeon. As described in the final listing rule (77 FR 5880; February 6, 2012), based on Secor (2002), the Santee-Cooper system had some of the highest historical landings of Atlantic sturgeon in the Southeast. From 1970–1995, 151 subadult Atlantic sturgeon, including age-1 juveniles, were collected from the Santee River (Collins and Smith, 1997). In 2004, 15 subadult Atlantic sturgeon were captured in surveys targeting shortnose sturgeon in the Santee River estuary with a juvenile Atlantic YOY captured the year prior in the Santee River (77 FR 5880; February 6, 2012). These data, considered the best scientific information available, provide evidence of an existing spawning population in the Santee River. The best scientific information available also indicates the PBFs essential to the conservation and recovery of the species occur in the Santee River, including potential spawning habitat in the reach of the river below Wilson Dam. Fish passage that is a requirement of the new hydropower license to the South Carolina Public Service Authority (SCPSA) will provide access to historical spawning grounds once passage is implemented. Thus, an occupied critical habitat designation is appropriate to protect the PBFs existing below the dams.

Comment 114: Two utility companies suggested the designation of the entirety of the 165,000 acres of lakes within the Santee-Cooper system, South Carolina (Lake Moultrie and Lake Marion, along with the 5-mile-long Diversion Canal that joins the reservoirs), is excessive and unnecessary, and this entire area is unlikely to be used by Atlantic sturgeon. They suggested limiting any critical habitat designation in the reservoirs, once occupied, to a corridor for passage, rather than including 165,000 acres of inferior habitat as ''critical habitat,'' would alleviate many of the burdens on these commenters. The commenters also said we had relied on the collection of a single juvenile in the reservoirs to ''verify'' that Lake Moultrie and Lake Marion in South Carolina can support successful recruitment of juvenile shortnose sturgeon.

Our Response: We acknowledge, as the commenter suggests, that portions of these areas may not be used at all times, and possibly not at all. However, the collection of three Atlantic sturgeon carcasses from Lake Moultrie during the 1990s confirms that Atlantic sturgeon use the lakes at least for migration (77 FR 5880; February 6, 2012). More recently, an Atlantic sturgeon was documented in Lake Marion in December 2016; it passed from the Cooper River into Lake Marion via the Pinopolis Dam Lock then presumably made its way into Lake Marion via Lake Moultrie and the Diversion Canal (SCDNR pers com., 2017). Additionally, we believe the persistence of a dam-locked population of shortnose sturgeon, a congeneric, in these reservoirs (Collins *et al.,* 2003), indicates appropriate habitat for Atlantic sturgeon is present. However, as stated previously, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude the unoccupied units of critical habitat including Lake Moultrie and Lake Marion.

Comment 115: Two utility companies stated that we should consider whether designating Lake Moultrie and Lake Marion in South Carolina as ''unoccupied'' critical habitat would preclude any options for fish passage and protection at the Santee-Cooper Project.

Our Response: As part of the re-licensing process for the Santee-Cooper Project, we prescribed fish passage at both the Wilson and Pinopolis Dams. The Federal Power Act (FPA) requires FERC to make fish passage prescriptions mandatory conditions of licenses. We are currently in section 7 consultation with FERC regarding the re-licensing of the Santee-Cooper Project, and that consultation must treat the fish passage prescription as part of the proposed action. Thus, nothing about this rulemaking will affect the fish passage prescription. Regardless, as we stated previously, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude the unoccupied units of critical habitat including Lake Moultrie and Lake Marion.

Comment 116: Several commenters questioned our conclusion that there is ''a good deal of data'' on sturgeon spawning in the Broad, Congaree, and Wateree Rivers in South Carolina. Other commenters, including SCDNR, questioned our decision to use shortnose sturgeon behavior or likely habitat preferences as a proxy for Atlantic sturgeon when designating critical habitat. We also received comments from SCDNR indicating the only documented shortnose sturgeon spawning was in the Congaree River and none has been documented in the Wateree or Broad Rivers. The commenters stated the evidence we used to support designating unoccupied habitat above the Wilson and Pinopolis Dams in South Carolina as suitable spawning habitat and juvenile habitat for Atlantic sturgeon was based on extremely limited evidence and conjecture. Specifically, they felt we overemphasized the value of the Wateree River as spawning habitat, and inappropriately used information related to shortnose sturgeon spawning in the Congaree River, South Carolina, to assume that the conditions in the Wateree River support spawning of Atlantic sturgeon.

Our Response: We used the best scientific information available (*e.g.,* Collins *et al.,* 2003; Cooke and Leach, 2003; Leach and Cooke, 2006; Shortnose Sturgeon Status Review Team, 2010; conversations with South Carolina state biologists) on habitat preferences and spawning behaviors of shortnose sturgeon to inform our conclusions regarding available spawning habitat and activity in the Broad, Congaree, and Wateree Rivers in South Carolina. We did not mean to suggest there is a good deal of information on spawning per se, but we included spawning type activity and behavior in our assessment. Additionally, because the likely spawning habitats for shortnose sturgeon (Dadswell, 1979; Squires *et al.,* 1993; Kieffer and Kynard, 2011) and Atlantic sturgeon are the same or highly similar (Gilbert, 1989; Smith and Clugston, 1997), we believe it is appropriate to use information available from the shortnose sturgeon to identify Atlantic sturgeon habitat. We acknowledge there is limited information on actual spawning by Atlantic and shortnose sturgeon in the Broad, Congaree, and Wateree Rivers. We also acknowledge the exact location of spawning sites on many rivers in the Southeast is not known and even when known generally, may change from time to time as water depth and substrate availability changes. However, aerial imagery confirms the presence of hard bottom habitat in the Wateree River, and in our biological opinion for the relicensing of the Catawba-Wateree project (NMFS, 2013), we concluded that given the fish passage requirements at the Santee-Cooper project, Atlantic and shortnose sturgeon presence in the Wateree River below the Wateree Dam is reasonably certain to occur. Suitable spawning habitat has been documented in several locations below the Wateree Dam. The flow releases required under the new license were specifically based, in part, on providing more extensive and better quality spawning habitat for

sturgeon. Duke Energy is required to quantify and map spawning habitat available to sturgeon below the Wateree Dam, with implementation of the new flows, as a term and condition of the biological opinion.

Additionally, in March 2011, SCDNR captured 19 adult shortnose sturgeon in the tailrace of the Pinopolis Dam and tagged 18 with acoustic telemetry tags and released them; the other fish had been tagged previously. Two of the tagged shortnose sturgeon moved through Pinopolis Lock, through Lakes Marion and Moultrie, and both fish entered the Wateree River. One shortnose sturgeon was recorded on the receiver at the Wateree Tailrace (approximately ¼ mile [0.4 km] downstream from the Wateree Dam) on both March 16 and 18, 2011, and spent 8 days in the Wateree River. The other was recorded within 4 miles (6.4 km) of the Wateree Dam, and spent 14 days in the Wateree River (NMFS, 2013). This movement is indicative of attempted spawning behavior. Because we have evidence that shortnose sturgeon released near the Pinopolis Dam have moved up to this spawning habitat below the Wateree Dam, we believe Atlantic sturgeon in the future will also use that existing spawning habitat.

There is little information on sturgeon movement in the Congaree River and Broad River. However, biological information was available for us to prescribe sturgeon passage when relicensing the Columbia Hydropower Project in 2002 given: (1) The 1.758 acres (7,115 square meters) of shoal habitats that exist above the project, and (2) the Broad River was likely an important spawning habitat for sturgeons (DOC, 2002).

However, as stated previously, we have decided to exercise our discretion under section 4(b)(2) of the ESA and exclude these unoccupied areas from the designation.

Comment 117: One commenter stated that, based on the assumption that Atlantic sturgeon spawning habitat requirements are likely similar to shortnose sturgeon and because shortnose sturgeon are known to spawn in the Congaree River, South Carolina, downstream of the Interstate 77 bridge, Atlantic sturgeon would likely use spawning habitat in the Congaree River below Interstate 77 as well. Thus, the commenter suggested there is sufficient spawning habitat in the Congaree already, and the Broad River above the Columbia Dam should not be considered essential to the conservation of the species.

Our Response: As stated previously, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude the unoccupied units of critical habitat. Therefore, the areas on the Congaree and Broad rivers are not included in the designation.

Comment 118: One commenter noted that the biological opinion for the Catawba-Wateree Hydroelectric Project requires Duke Energy Carolinas (NMFS, 2013) to quantify and map potential spawning habitat under the new flow regime approved in the project license from the Wateree Dam to the confluence with the Congaree River. The commenter suggested we delay designating critical habitat in this reach until Atlantic sturgeon are present and the information required by the biological opinion has been developed.

Our Response: We agree that the information collected during this study will likely provide additional scientific data that will be useful in determining more precisely the location, timing, etc., of the spawning habitat. Also, as stated previously, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude these unoccupied areas from the critical habitat designation.

Comment 119: Several commenters asserted that we should not designate the Broad River in South Carolina upstream of the Columbia Dam as unoccupied critical habitat because the dam is at the fall line and we said animals do not go above the fall line.

Our Response: The commenter is correct, generally, in that we do believe Atlantic sturgeon cannot pass dams or natural features such as waterfalls and rapids found at the fall line of rivers. However, the geology of the southeastern United States is such that in some cases the fall line is not as pronounced as other areas within the range of the species. We clarified in this final rule where these conditions led to an upstream boundary above the fall line. On the Broad River, we believe the fall line likely did not act as an impediment to sturgeon migration historically. Rather, only manmade features (*e.g.,* dams) are likely blocking access to the historical spawning grounds on this river. However, as stated previously, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude the unoccupied units of critical habitat.

Comment 120: Two utility companies asserted the information in the proposed rule was insufficient to conclude that the failure to designate the ''unoccupied'' reaches of the Santee and Wateree Rivers in South Carolina as critical habitat will result in the extinction of the species. Similarly, another commenter said not only had we ''failed to demonstrate why the proposed unoccupied critical habitat areas are essential to the conservation of the species,'' but we also ''failed to demonstrate why the proposed occupied habitat is inadequate to ensure the conservation of the species.''

Our Response: These commenters have applied the wrong standards for unoccupied critical habitat: That unoccupied critical habitat can only be designated if omitting the area will result in the extinction of the species, and that designating unoccupied critical habitat may only occur after first determining that occupied habitat is inadequate to support conservation. ESA section 3(5)(A) defines critical habitat as: The specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and any specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. The ESA imposes no requirement that we must determine the species will go extinct without unoccupied critical habitat. Similarly, there is no step-wise requirement that we first determine occupied critical habitat is somehow insufficient before designating unoccupied critical habitat. Admittedly, our previous regulations had incorporated such an approach. However, NMFS and the USFWS (the Services) concluded that a rigid step-wise approach does not necessarily serve the best conservation strategy for species. Regardless, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude the unoccupied units of critical habitat.

Comment 121: The Department of the Navy stated that the Final Joint Base Charleston (JBC) INRMP demonstrates a conservation benefit to Atlantic sturgeon and requested critical habitat not be designated in those areas of the Cooper River, South Carolina (Carolina Unit 7), adjacent to JBC properties pursuant to ESA section 4(a)(3)(B).

Our Response: We appreciate the Navy developing an INRMP that includes benefits to Atlantic and shortnose sturgeon. We reviewed the information provided during the comment period and agree the INRMP demonstrates an applicable conservation benefit, as defined in our regulations at 50 CFR 424.12(h). Section 4(a)(3)(B)(i) of the ESA states that we may not designate as critical habitat any

lands or other geographical areas owned or controlled by the DOD, or designated for its use, that are subject to an INRMP prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation. The ESA further states that this provision does not affect the requirement to consult under section 7(a)(2), nor does it affect the obligation of the DOD to comply with section 9. We have provided our detailed evaluation of the JBC INRMP and how it meets our regulatory requirements in the Application of ESA Section 4(a)(3)(B)(i) (Military Lands) section of this final rule.

Comment 122: The Navy stated that designation of critical habitat in Carolina Unit 3 would affect its ability to conduct training exercises at the Lower Neuse River Small Boat Training Area in North Carolina, forcing units to travel to Norfolk, Virginia, or Camp Lejeune, North Carolina, which increases costs and reduces time for training. They stated this would ultimately cause adverse impacts to national security.

Our Response: Based on the information provided by the Navy, we could not determine the route of effect (*i.e.,* the aspect of the action that could cause direct or indirect impacts on critical habitat) the training exercises would have on any of the PBFs. Therefore, we do not believe that the designation of critical habitat will require consultation under the ESA, and thus, there will be no impact to this training or to national security from this designation.

South Atlantic Unit Rivers

Comment 123: SCDNR and another commenter stated the upstream limits of the Edisto River (South Atlantic Unit 1) should be moved downstream to U.S. Hwy 301. They believed this is appropriate based on telemetry data from 2010–2016 that showed 84 Atlantic sturgeon tagged in the Edisto River did not pass above this area. Similarly, SCDNR said the upstream limits of the Combahee-Salkehatchie River unit (South Atlantic Unit 2) should be moved downstream to U.S. Hwy 21, because they believed the telemetry data from 2010–2014 showed five Atlantic sturgeon tagged in the Combahee River did not pass above this area.

Our Response: It is quite possible no acoustically tagged Atlantic sturgeon have been detected above U.S. Hwy 301. An illustration of acoustic receivers on the Edisto River in Post *et al.* (2014) shows no receivers even reach to U.S. Hwy 301 on the North Fork of the Edisto River. The same illustration does show four receivers at or above U.S. Hwy 301 on the South Fork of the Edisto River. Based on this information, we do not believe a lack of detections on the Edisto above U.S. Hwy 301 is entirely surprising, nor indicative that our upstream boundary is incorrect. Moreover, we determine critical habitat boundaries based on areas where PBF(s) essential to conservation of the species are located, not necessarily where individual animals have been documented. Our data indicate historical spawning likely occurred upstream of U.S. Hwy 301 and suitable spawning substrate likely exists near the fall line in both the North and South Forks of the Edisto River. The commenter provided no information suggesting the PBFs are absent above U.S. Hwy 301. For these reasons, we believe our upstream boundary for the Edisto River is appropriate.

For similar reasons, we believe our upstream boundary on the Combahee-Salkehatchie River is correct. Post *et al.* (2014) reports there are no acoustic receivers above Interstate 95, approximately two miles (3.2 km) (upstream from U.S. Hwy 21). Given the lack of receivers farther upstream, it is not possible to validate the commenter's assertion that sturgeon do not pass U.S. Hwy 21. Additionally, the commenter provided no information contradicting our determination that the PBFs extend above U.S. Hwy 21. For these reasons, we believe our upstream boundary for the Combahee-Salkehatchie River is appropriate.

Comment 124: SCDNR suggested that while it was possible two individual Atlantic sturgeon successfully passed through the NSBL&D on the Savannah River at the Georgia/South Carolina border in 2011, they believed these incidental successes are rare and inconsistent with the fishway description in section 18 of the FPA and the ruling found in section 1701(b) of the National Energy Policy Act that indicate a fishway should be safe, timely, and effective for all life stages of such fish. As a result, the commenter recommended that the upper extent of the critical habitat designation on the Savannah River should be limited to ''occupied'' habitat ending at the NSBL&D. Additionally, one commenter suggested the area upstream of the NSBL&D should not be considered essential to the conservation of the species because they believed Atlantic sturgeon spawn downstream of NSBL&D between rkm 213 and rkm 301 (Post *et al.,* 2014; Collins and Smith, 1997). This commenter concluded that if Atlantic sturgeon are able to spawn and produce larvae downstream of NSBL&D, then habitat upstream of the dam should not be considered essential to the conservation of the species.

Our Response: As we discussed in the proposed rule, sturgeon are currently frequently seen at the base of the NSBL&D during spawning season, indicating either crowding below the dam or individual motivation to spawn farther upriver, or both. Regardless, as stated previously, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude the unoccupied units of critical habitat.

Comment 125: One commenter pointed out that the proposed rule states Atlantic sturgeon typically cannot pass dams or natural features such as waterfalls and rapids found at the fall line of rivers. Based on this statement, they asserted that if any area upstream of NSBL&D becomes accessible to Atlantic sturgeon, then the fall line near the Interstate 20 Bridge should be considered the upstream limit of Atlantic sturgeon spawning habitat. The commenter concluded that unless the best available information indicates that some other landmark should be used, the fall line should be considered the upper limit of spawning habitat.

Our Response: As we explained in the proposed rule, our objective was to include the farthest upstream extent of spawning habitat essential features within critical habitat unit boundaries. Generally, Atlantic sturgeon cannot pass dams or natural features such as waterfalls and rapids found at the fall line of rivers. However, the geology of the southeastern United States is such that in some cases the fall line is not as pronounced as in other areas within the range of the species and suitable spawning habitat for sturgeon is present above this zone, and we have clarified this reasoning in this final rule. On the Savannah River, we believe the fall line is not likely to act as an impediment to sturgeon migration. Rather, only manmade features (*e.g.,* dams) are likely blocking access to historical spawning grounds. We believe once above NSBL&D, Atlantic sturgeon will be able to continue upstream until the next manmade impediment (*i.e.,* Augusta Diversion Dam). Aerial imagery confirms there are large areas of hard bottom substrate above the Interstate 20 Bridge and at the base of the Augusta Diversion Dam. Once sturgeon gain access to this area in the future, it will likely provide spawning habitat. However, as stated previously, we do not believe the benefits of designating this area as unoccupied critical habitat

at this time will outweigh the benefits of excluding this area from the designation. Thus, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude this area of unoccupied critical habitat.

Comment 126: The Georgia Department of Natural Resources (GADNR) had objections to our upstream boundary on the Ogeechee River, Georgia. They said that the river becomes very shallow and impassable by boats during droughts and low flow periods, and it is possible that sturgeon move upstream of Louisville, Georgia, but only during high flow years. Further, they said they had documented some limited rocky habitat upstream of the U.S. 1 Bridge in Louisville. The commenter also reported two potential physical impediments to sturgeon passage, upstream of State Road 88, at a steep shoal at Shoals, Georgia, (33.253671 degrees lat., −82.756736 degrees long.) where flows do not create 1.2 m depths at any point in the channel and at Mayfield Mill Dam, which is not passable by sturgeon (33.364799 degrees lat., −82.805872 degrees long.). They requested we consider revising the upstream boundary to the crossing at State Road 88 near Davisboro, Georgia.

Our Response: After reviewing the information provided by the commenter, we agree that our upstream boundary should be adjusted downstream by 28 rkm for South Atlantic Unit 4 (Ogeechee River) to the base of the Mayfield Mill Dam (33.364799 degrees lat., −82.805872 degrees long.), north of Mayfield, Georgia. We confirmed the dam is likely to be an impediment to upstream movement of Atlantic sturgeon and fish passage at the dam is not foreseeable. The commenter suggested the shoals at Shoals, Georgia, could act as an impediment to Atlantic sturgeon passage under certain flow conditions; these shoals are located at the fall line. While potentially an impediment, we believe passage could occur during higher flow conditions. Conversely, the Mayfield Mill Dam is impassable and likely represents the extent of upstream spawning habitat on the Ogeechee River. For these reasons, we do not believe Atlantic sturgeon can access habitat above the dam now, or in the foreseeable future. Moreover, the fall line and associated spawning habitat is about 20 rkm downstream of the Mayfield Mill Dam and thus, excluding areas above the dam from critical habitat will not affect our conservation objective for this unit. The commenter suggested we move our upstream boundary to the crossing at State Road 88 near Davisboro, Georgia. However, we could not clearly identify what information they based that suggestion upon. In the absence of clear information suggesting that would be the appropriate boundary, we chose the Mayfield Mill Dam as our revised upstream boundary. Based on this information, we have modified the location of the upstream extent of South Atlantic Unit 4 (Ogeechee River). We are not projecting a decrease in impacts in this unit associated with decreasing the length of the unit; given that the activities we predict will occur and require consultation are not location-specific, they could still occur within the modified unit boundaries.

Comment 127: The GADNR also suggested including the lower Canoochee River, Georgia, up to the confluence of Canoochee Creek at Fort Stewart, Georgia, as critical habitat. The commenter suggested this area because of its large size (''medium-main stem river''), because adult Atlantic sturgeon have been observed in the Canoochee River, and juvenile Atlantic sturgeon have been observed downstream in the Ogeechee River. They stated they believe the Canoochee River has sufficient depth for movement of adult Atlantic sturgeon.

Our Response: We reviewed the information provided by the commenter. We also conferred with state resource agency staff and academic researchers to evaluate the addition of the Canoochee River as critical habitat. We followed the same process in assessing the designation of the Canoochee River as we did with other rivers. To be considered critical habitat, the Canoochee River needed to have information supporting one or more of the following: (1) Capture location and/or tracking locations of Atlantic sturgeon identified to its DPS by genetic analysis; (2) capture location and/or tracking locations of adult Atlantic sturgeon identified to its DPS based on the presence of a tag that was applied when the sturgeon was captured as a juvenile in its natal estuary; (3) capture or detection location of adults in spawning condition (*i.e.,* extruding eggs or milt) or post-spawning condition (*e.g.,* concave abdomen for females); (4) capture or detection of YOY and other juvenile age classes; and (5) collection of eggs or larvae. While the information reviewed and opinions expressed by experts suggested that Atlantic sturgeon may use the Canoochee River, none of these necessary criteria were met for the Canoochee River. Thus, we did not consider it as having met our criteria for a spawning river or for designation as critical habitat.

Comment 128: The GADNR suggested the upstream extents of the Ogeechee, Satilla, and St. Marys Rivers proposed for designation in Georgia were inappropriate because they likely do not contain hard bottom substrate and/or water of appropriate depth that is free of barriers. They referred to a river classification framework developed by the Southeast Aquatic Resources Partnership that classified rivers (from smallest to largest) based on upstream drainage and/or mean annual flow as: Headwaters, Creeks, Small Rivers, Medium Tributary Rivers, Medium Mainstem Rivers, Large Rivers and Great Rivers (*http://southeastaquatics.net/sarps-programs/sifn/instream-flow-resources/river-classification-framework-2*). GADNR stated waterbody size is correlated with river depths and can help approximate the distribution of potential spawning habitat, which occurs ''below the fall line of large rivers'' as described in the proposed rule. They added that the smallest water body size that Atlantic sturgeon are known to spawn in and migrate through in Georgia is the ''medium-main stem river'' category in the upper Oconee and Ocmulgee Rivers in Georgia. The commenter indicated some of the upstream reaches we proposed for designation in the Ogeechee and Satilla Rivers in Georgia, and St. Marys Rivers, Florida, are categorized as ''small rivers,'' which is two categories smaller than ''medium-main stem river.'' The commenter suggested the appropriate boundary for the St. Marys River, Florida, should be the confluence with Boone Creek, approximately 5 miles (8 km) north-northeast of St. George, Georgia. The commenter recommended we change the upstream boundary of the Satilla River, Georgia, to the confluence with Hog Creek, approximately 1 mile (1.6 km) east of Talmo, Georgia.

Our Response: Our use of ''large'' rivers in the proposed rule was not intended to imply a specific classification system. It was meant more colloquially as a way to differentiate the main stem of significant coastal rivers from their smaller tributaries. Our determinations are based on the likelihood that one or more PBFs are present, not on a specific river classification system. GADNR did not provide any site-specific information that the PBFs are not present in these areas, and therefore we are not changing the upstream boundaries on these rivers.

Comment 129: One commenter supported our designation of occupied and unoccupied critical habitat. However, they requested we consider regional datasets including the: Southeastern Aquatic Connectivity

Assessment Project, the National Fish Habitat Partnership (NFHAP) database (Crawford *et al.,* 2016), the Multistate Aquatic Resources Information System (MARIS *http://www.marisdata.org/*), and the North Carolina Museum Collection data (*http://collections.naturalsciences.org/*). They also asked us to consider additional literature sources including Martin *et al.* (2014), ASMFC (2004), and Esselman *et al.* (2013), which they believe support the inclusion of the Satilla River, Georgia, up to its headwater above Route 32 in Georgia.

Our Response: We evaluated the regional datasets and literature sources suggested by the commenter. While the commenter suggested we review ASMFC (2004) and Esselman *et al.* (2013), they did not provide the citation for these references; thus, we could not review those documents. Generally, we found the regional datasets the commenter suggested either referred to species occurrence information (*i.e.,* North Carolina Museum Collection) or wide-ranging subject matter (*i.e.,* MARIS). Both NFHP and Martin *et al.* (2014) provided information focusing on disturbances such as urban land use, dams, crop land use, and impervious surface cover, but neither discuss the proposed PBFs specifically. None of the references provided information indicating the PBFs occur anywhere outside our current designation. The best available information from U.S. Geological Survey (*http://viewer.nationalmap.gov/viewer/*) shows the main stem of the Satilla River runs out well before the fall line. Thus, we believe the upstream extent of spawning habitat in the river is at the confluence of the Satilla and Wiggins Creeks approximately 2 miles (3.2 km) north of the State Route 158 in Georgia, and that the proposed boundaries for critical habitat on the Satilla River are appropriate.

Comment 130: Two commenters suggested our decision not to designate inaccessible parts of the St. Johns River, Florida, is inconsistent with our treatment of other rivers that we designated based on the existence of historical spawning habitat being temporarily blocked by dams, including on the Cape Fear River, North Carolina, the Broad and Wateree Rivers in South Carolina, and the Savannah River at the Georgia/South Carolina border.

In requesting that we designate the St. Johns River, Florida as critical habitat, the commenters contend: (1) The St. Johns River may have historically had a subpopulation of Atlantic sturgeon; (2) freshwater spawning and rearing habitats are available in the Ocklawaha River, a tributary to the St. Johns River; and (3) spawning habitat exists above the Kirkpatrick Dam on the St. Johns River, which would become accessible if the dam were breached or removed. To this latter point, the commenters provided a letter from the U.S. Forest Service indicating the removal of the dam infrastructure and restoration of the Ocklawaha River would result in substantial downstream and upstream benefits. The commenters indicated that while they could not predict exactly when the Ocklawaha River would be accessible to Atlantic sturgeon, the U.S. Forest Service's support for the removal of the dam and restoration of the river creates a reasonable assumption that the Kirkpatrick Dam will be ''passable in the future.'' Further, they suggested designating the area as critical habitat may hasten the restoration of the river to its natural course.

The same commenters also stated the South Atlantic DPS is endangered with only nine rivers listed to produce juveniles over the entire DPS range but listing a tenth (the St. Johns) river would add another river with the potential to produce juveniles in the DPS. They also suggest colonizing juveniles (and adults) are available from the Altamaha River, which is within easy swimming range (about 200 miles; 321 km) from the St. Johns River. Finally, they indicated that fish in the southernmost rivers in the species' range will likely have adaptations important for the entire range of subpopulations in the DPS during the future period of climate warming. They stated, ''Subpopulations in the South Atlantic can share genetic adaptations within their DPS and with more northerly DPS during spawning to more quickly adapt the species to a changing environment.''

Our Response: Based on available information, the St. Johns River does not meet the criteria we established for inclusion of rivers in this critical habitat designation, outlined in our response to Comment 127. We found historical and/or current information indicating Atlantic sturgeon are using the Cape Fear River, North Carolina, the Santee-Cooper System in South Carolina, and the Savannah River at the Georgia/South Carolina border to spawn. In contrast, we could find no such information for the St. Johns River, Florida, and the commenters did not provide any new information. Thus, the St. Johns River does not meet the criteria to be considered critical habitat for Atlantic sturgeon.

Comments on Impacts Analysis

Comment 131: An industry trade group pointed to our determinations that the majority of the section 7 consultation costs would already be incurred based on the listing of the Atlantic sturgeon itself and that ''[i]t is extremely unlikely that [project] modifications that would be required to avoid destruction or adverse modification of critical habitat would not also be required because of adverse effects to the species.'' They wondered, if there are no categories of permits or other Federal activities that would be impacted solely or even primarily by consultation over impacts to designated critical habitat (rather than impacts to the listed species), what is the purpose of designating critical habitat? They went on to state that if designation of critical habitat is ''not prudent,'' we should not make such a designation.

Our Response: See response to Comment 49.

Comment 132: An industry trade group suggested we had failed to perform the requisite analysis of whether certain areas should be excluded. They believe that to comply with our statutory mandate to consider whether the benefits of excluding areas from the critical habitat designation outweigh the benefits of designation, we must provide some specific analysis of the conservation benefits derived from designating specific areas compared to the economic costs of designating those areas. They indicated we made no attempt to carve out less valuable areas based on economic, national security, or other relevant impacts. They claimed our analysis is cursory and grossly inadequate because we do not evaluate whether the benefits of exclusion outweigh the economic costs of designation for particular areas that will be designated (aside from areas of concern to the Navy).

Our Response: The commenters' argument misstates the requirements of the ESA. The ESA does not require the use of any particular methodology in the consideration of impacts. The ESA also does not require that we carve out ''less valuable'' areas of critical habitat. However, section 4(b)(2) of the ESA provides that the Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat. This is true unless he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned. The legislative

history regarding section 4(b)(2) exclusion analyses suggests that the consideration and weight given to impacts is within the Secretary's discretion (H.R. 95–1625) and the Secretary is not required to give economic or any other 'relevant impact' predominant consideration in his specification of critical habitat. In our proposed rule, we explained our preliminary determination that we would not exercise our discretion to consider exclusions. However, based on input received during the public review process, we determined that conducting a discretionary exclusion analysis for areas of unoccupied habitat within the range of the Carolina and South Atlantic DPS was warranted (given that occupied units are currently used by Atlantic sturgeon for reproduction and recruitment, and due to the severely depressed levels of all river populations, occupied units are far too valuable to both the conservation and the continuing survival of Atlantic sturgeon to be considered for exclusion).

Based on that analysis, we have elected to exclude the Santee-Cooper river system (CU1) and Savannah River (SAU1) unoccupied units of critical habitat. We determined the benefits of exclusion (that is, avoiding some or all of the impacts that would result from designation) outweigh the benefits of designation.

Comment 133: Several commenters suggested our DIA was incomplete and largely ignored the costs to permittees associated with ESA consultation. They also believed the DIA underestimated the costs associated with implementing and maintaining changes to facilities and operations required to prevent destruction or degradation of critical habitat. The commenters suggested instead that the DIA focused on the administrative costs to NMFS created by the designation while underestimating the costs incurred by the regulated community and by responsible state agencies. Specifically, one commenter estimated additional costs of $10,000 to $70,000 (related to preparing for and holding stakeholder meetings, developing and executing field studies, etc.) would be incurred during the hydropower relicensing process if the proposed designation were adopted without changes.

Our Response: We do not believe the DIA underestimated the potential costs to state agencies, permittees, or other members of the regulated communities. Economic impacts of the critical habitat designation result through implementation of section 7 of the ESA in consultations with Federal agencies to ensure their proposed actions are not likely to destroy or adversely modify critical habitat. These economic impacts may include both administrative and project modification costs. As stated previously, we examined the ESA section 7 consultation record over the last 10 years to identify the types of Federal activities that may adversely affect proposed Atlantic sturgeon critical habitat. In addition, we contacted Federal agencies that conduct, permit or fund activities in the areas covered by critical habitat and asked them whether our assessment of the types and numbers of activities likely to require consultation over the next 10 years appeared accurate. The only agency that identified specific actions that we should add to our analysis was EPA, and we have added consultations on approval of state water quality standards to the Impacts Analysis.

In terms of costs to permittees, we took a conservative approach in estimating that each type of Federal action that could involve a third-party permittee, would actually involve a permittee in the future, and included estimated administrative costs for those entities in our analysis (see IA, Section 3.3.1).

Our review determined no category of future Federal action would have routes of effects solely to the PBF(s) of critical habitat and not also have potential routes of adverse effects to Atlantic and/or shortnose sturgeon. However, in the case of USACE issuance of permits under section 404 of the CWA or section 10 of the Rivers and Harbors Act (RHA), we conservatively estimated that every one of these future actions would result in incremental impacts because these types of actions could in theory be implemented while migratory sturgeon are not present in a project's action area. Regarding the specific types of costs mentioned by the commenter, it is not clear that these costs would be attributable incrementally to the ESA, and would not instead be a baseline requirement of the FPA that governs the re-licensing process. If the types of activities are identified by FERC as required to comply with the ESA, it is likely that these studies and meetings would address potential impacts to both sturgeon and critical habitat, and as such these costs are part of the baseline requirement to consult to evaluate potential impacts to these species. Thus, we do not agree that designation of critical habitat would create the additional, incremental costs suggested by the commenter.

Comment 134: Two utility companies believed we grossly underestimated both the economic cost and the administrative burden that will be caused by designation of the unoccupied reaches of the Santee River, Lake Moultrie, Lake Marion and, to a lesser extent, the Wateree River in South Carolina. The commenters stated Santee Cooper and Duke Energy Carolinas are responsible for administering FERC licenses for their respective projects. They indicated all FERC licenses include a standard land use article that allows licensees to authorize certain types of use and occupancy of project lands and waters. This standard land use article also allows licensees to grant easements, rights-of-way, or leases of project lands and waters for a number of activities. The standard land use article also allows for more significant types of use and occupancy on project lands or waters if 60-day prior notice is provided to FERC. The commenters stated the proposed rule is unclear on whether FERC and the licensee are protected by any incidental take statement included in the licensee's biological opinion issued for the relicensing of the projects or whether section 7 consultation under the ESA is required for each discrete activity. The commenter suggested that if the latter is the case, then licensees and their designees will be required to prepare the equivalent of a biological assessment to submit a 60-day prior notice to FERC for each of the prior notice activities contemplated by the standard land use article that could affect critical habitat, and FERC will be required to assess the impacts and determine if consultation with us is warranted within this time period. The commenters indicated they believe this could include hundreds of activities over a license term. At a minimum, the commenters request that we clarify that an incidental take statement, issued as part of the FERC licensing process, covers all activities authorized or required pursuant to the FERC license, including activities conducted pursuant to the standard land use article, maintenance activities, and installation of required fish passage. Otherwise, the commenters suggested we must analyze the burden on licensees and agencies in our DIA.

Our Response: Incidental take statements included in biological opinions issued at the conclusion of a formal ESA section 7 consultation pertain to the incidental taking of threatened or endangered species, not for impacts to critical habitat. In any event, when we consult on FERC's proposed issuance of a hydropower license, the incidental take contemplated should include any take associated with the activities the commenter describes, if FERC or the

applicant have identified those types of activities as part of the scope of the action being consulted on. FERC will need to determine whether reinitiation of consultation is required for any biological opinions we have issued, based on determining whether the ongoing action may affect newly-designated critical habitat. Because consultations on a listed species must also evaluate impacts to their habitat, whether designated as critical habitat or not, most or all biological opinions issued may evaluate impacts to habitat features now being included in the critical habitat designation. To be conservative, in our Impacts Analysis we assumed reinitiation would be required on FERC actions. During any reinitiated consultation that they request, FERC should include the standard land use article that allows licensees to authorize certain types of use and occupancy of project lands and waters as part of the Federal action, in which case any impacts from activities under the article over the term of the license would be analyzed under the associated biological opinion and would not require separate consultation. However, as stated previously, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude the unoccupied reaches of the Santee River, Lake Moultrie, Lake Marion and the Wateree River from the designation.

Comment 135: Two commenters suggested the benefits we describe as likely to occur with the proposed designation of ''Carolina Unoccupied Unit 2'' as critical habitat (*e.g.,* conservation benefit of species recovery, ecosystem health benefits, ecosystem service benefits, use benefits such as commercial and recreational fishing of sturgeon and tourism) are ''illusory or likely will not accrue for some time into the future'' because Atlantic sturgeon are not currently present in the ''unoccupied'' reaches of the Wateree and Santee Rivers in South Carolina, and the reservoirs. They further stated many of the ecosystem health and service benefits we identified are already being provided as a result of the requirements of other Federal licenses or state/Federal permit authorizations. They claimed designation would impose considerable economic, administrative, and other burdens on industry and resource agencies. Thus, they believed we should determine that the benefits of excluding ''Carolina Unoccupied Unit 2'' far outweigh any minor, incremental benefits associated with designation of these areas.

Our Response: When we designate critical habitat we must evaluate the impacts of that designation, both positive (benefits) and negative (costs), whether or not the benefits are immediately realized. We are not required to determine that benefits, or positive impacts, of designation will be significant or accrue over any particular timeframe; however, if we determine it is appropriate to conduct an exclusion analysis on some or all areas of a designation, it is our general practice to exclude areas under section 4(b)2 when the benefits of exclusion outweigh the benefits of inclusion. Following our consideration of the costs and benefits of designating unoccupied critical habitat, we have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude those areas, which includes Carolina Unoccupied Unit 2.

Comment 136: The USACE suggested our DIA does not adequately address the potential increase in informal consultations. They said the DIA concluded most of the projects considered under General Permits (Nationwide/Regional/Programmatic) issued by the USACE are very small-scale, and the impacts to listed species and designated critical habitat from these types of projects have already been considered under programmatic biological opinions. As a result, future projects will generally not require individual section 7 consultation. The commenter stated that this assumption is not true for every USACE District; not all Districts have programmatic biological opinions in place. They stated the USACE makes effects determinations based on the effect the activity would have on the species and/or critical habitat, not on the type of authorization. Thus, they seemed to indicate some future projects in proposed critical habitat would not have required consultation for potential effects to Atlantic sturgeon, but would now require consultation to consider potential effects to Atlantic sturgeon critical habitat. They suggested our estimate of 20 CWA section 404/RHA section 10 projects permitting construction or dredge and fill in proposed Atlantic sturgeon critical habitat in the DIA is an underestimate. They claimed their information suggests the new designation would lead to at least 20 additional consultations per year in the USACE's Savannah District and at least 17 in the Wilmington, North Carolina, and Charleston, South Carolina Districts per year, or 370 new consultations over a 10-year period across those 3 districts.

Our Response: We used the best scientific information available when determining the likely future section 7 consultations for Federal actions in critical habitat. As noted previously, we queried PCTS, going back 10 years, to identify relevant consultations that occurred in each of the proposed critical habitat areas or units that, if implemented in the future, could affect one or more of the proposed PBF(s), or could affect both the critical habitat and Atlantic sturgeon. We also requested that Federal action agencies, including the USACE, provide us with information on future consultations if we omitted any future actions likely to affect the proposed critical habitat. The USACE's comment enumerates numbers of consultations by USACE district, but not whether those numbers include actions that may occur solely in marine and estuarine environments. It is also unclear from the information provided by the commenter whether the actions they referenced have been ongoing and would affect both the species and critical habitat in the future, but were simply not consulted on for effects to the species. It is also unclear whether these projects were not consulted on because the action agency determined there would be no effect to Atlantic or shortnose sturgeon. The USACE has not provided us tangible information with which to modify our Impacts Analysis. Simply stating that more consultations are expected is not sufficient. As a result, we believe our final Impacts Analysis still accurately reflects the likely number of future consultations.

Comment 137: The NCWQA and SCWQA stated the DIA does not discuss the impacts of the proposed designation on NPDES permit programs, state water quality standards, or Total Maximum Daily Load (TMDL) determinations. They pointed out that these potential impacts were discussed in GARFO's proposed rule to designate critical habitat for the Gulf of Maine, New York Bight and Chesapeake Bay DPSs of Atlantic sturgeon (81 FR 35701; June 3, 2016), and because we did not mention them in our DIA we must republish the ''North Carolina proposal.''

Our Response: We disagree. Our query of the PCTS database returned no TMDL or NPDES consultations in the southeast within the last 10 years. There are differences between GARFO's and SERO's impacts analyses regarding the potential impacts of critical habitat designation on NPDES permit programs, state water quality standards, or TMDL determinations. Those differences are appropriate due to differences in whether the EPA has delegated authority to particular states to administer programs under the CWA. In the Southeast, the EPA has delegated the authority to administer NPDES programs to the States of Florida, Georgia, South Carolina, and North

Carolina. Upon authorization to states, those NPDES activities are no longer Federal actions. Similarly, the TMDL programs are largely implemented by states, meaning they too are not Federal actions that require consultation. Our DIA determined the primary source of impacts of critical habitat designation is the cost of section 7 consultations. Because ESA section 7 consultations are only required for Federal actions, non-Federal activities are not affected, and were not considered in our DIA or final Impacts Analysis. Additionally, we also contacted the EPA to determine if we had missed any categories of activities likely to occur in the next 10 years that were not reflected in results of PCTS query. The EPA indicated they were not aware of any NPDES permit program or TMDL consultations that should be included in our analysis for southeast rivers. However, they did anticipate 9 nationwide pesticide consultations and an additional 12 consultations over the next 10 years to address state water quality standards; the final Impacts Analysis reflects these consultations. The commenter did not provide any information on potential NPDES permit actions or TMDL approvals that may require consultation in the southeast critical habitat units.

Comment 138: A utility company suggested we failed to mention the additional analysis that may be required to consider critical habitat when they seek to obtain an NPDES permit for the intake and discharge of water by the Cross station into and from Lake Moultrie pursuant to section 316 of the CWA. It was concerned that if ''unoccupied'' critical habitat is designated near the station, it may be required to prepare an unnecessary biological assessment to ensure that this unoccupied critical habitat is not affected by the activities authorized in the NPDES permit. A separate utility company expressed similar concerns. It suggested we had not identified the power plants described in Comment 111 in our DIA and had not discussed the permitting associated with the plants and the anticipated increase in consultation and delay costs associated with permits issued pursuant to section 316 of the CWA concerning intakes and thermal discharges from power plants through the state NPDES programs. Similarly, two utility companies indicated there can be a lengthy process for review by NMFS with additional time potentially required to find a compromise if the state agency issuing the section 316 permit disagrees with our recommendations. They expressed concern that because a section 7 consultation may include measures to minimize take, but the section 316/NPDES permit does not authorize incidental take, the owners/operators of these plants may also need to obtain a section 10 permit under the ESA authorizing such incidental take if there is any doubt as to whether power plant intakes or discharges may be adversely modifying critical habitat.

Our Response: As noted previously, our DIA and final Impacts Analysis do not consider NPDES activities because they are not Federal actions, thus there would be no consultations and no impacts resulting from this designation associated with NPDES activities.

Section 316(b) of the CWA requires cooling water intake structures (CWIS) to reflect the best technology available (BTA) for minimizing adverse environmental impacts. Adverse environmental impacts include, but are not limited to, impingement and entrainment of organisms at CWIS, and changes in flow regime, caused by the withdrawal of water. Under section 316(b), the EPA is required to issue regulations on the design and operation of intake structures to minimize adverse impacts. The EPA issued its Final Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities on August 15, 2014 (79 FR 48300). The following is a summary of EPA's description of the main components of the rule as follows. First, existing facilities that withdraw at least 25 percent of their water from an adjacent waterbody exclusively for cooling purposes and have a design intake flow of greater than 2 million gallons (7.6 million liters) per day (MGD) are required to reduce fish impingement under the final regulations. To ensure flexibility, the owner or operator of the facility will be able to choose one of seven options for meeting best technology available requirements for reducing impingement. Second, existing facilities that withdraw very large amounts of water—at least 125 MGD (473 million liters per day)—are required to conduct studies to help their permitting authority determine whether and what site-specific controls, if any, would be required to reduce the number of aquatic organisms entrained by cooling water systems. This decision process would include public input. Third, new units that add electrical generation capacity at an existing facility are required to add technology that achieves one of two alternatives under the national BTA standards for entrainment for new units at existing facilities. Under the first alternative new unit entrainment standard, the owner or operator of a facility must reduce actual intake flow (AIF) at the new unit, at a minimum, to a level commensurate with that which can be attained by the use of a closed-cycle recirculating system. Under the second alternative new units entrainment standard, the owner or operator of a facility must demonstrate to the permit issuer (*e.g.,* a state) that it has installed, and will operate and maintain, technological or other control measures for each intake at the new unit that achieves a prescribed reduction in entrainment mortality of all stages of fish and shellfish that pass through a sieve with a maximum opening dimension of 0.56 inches.

The commenters did not provide information for us to determine whether and to what extent they are affected by EPA's section 316(b) regulations. Nonetheless, we do not believe this critical habitat designation will increase any impacts to commenters related to section 316(b), for the following reasons. The Services consulted with EPA on the impacts of its nationwide application of the section 316(b) rule and issued a biological opinion concluding the rule would not jeopardize any listed species or destroy or adversely modify any critical habitat under the Services' jurisdictions (USFWS and NMFS, 2014). No additional consultations are required under the biological opinion and EPA's rule; instead, the Services are engaged by permit issuers (EPA, or state or Tribal governments) in a 60-day review of permits under consideration, prior to the permits being published for public comment. A provision of EPA's rule requires affected permit applicants to include threatened or endangered species or critical habitat that may be in the action area of their facilities in the assessments required for their permit applications. The Services may provide recommendations on measures to protect listed species, including measures that would minimize any incidental take of listed species, and/or avoid likely jeopardy to a listed species or destruction or adverse modification of critical habitat. If we reviewed a 316(b) permit application for a CWIS in Atlantic sturgeon critical habitat, we would first evaluate whether there are any routes of adverse effects to listed species or to the critical habitat. Conceivably, CWIS could affect the water quality essential features of water depth, temperature, DO and salinity values, depending on the amount and timing of the water withdrawals/discharges. However, any such effects would also affect listed species including Atlantic and shortnose

sturgeon, and any measures we would recommend to avoid such effects would not be incremental impacts, including delay, attributable to the critical habitat designation. Therefore, any future ESA section 7 or section 10 requirements related to CWA section 316 or NPDES consultation requests for critical habitat would be coextensive to consultations for the listed species; thus, we do not believe there would be any significant delay or costs incurred for the consultations assessing impacts to critical habitat. The commenters' concern about the lack of authorization of incidental take of listed species through the 316/NPDES permit is not a critical habitat issue, and thus there are no impacts attributable to this rule.

Comment 139: A farm-industry trade group expressed concern that the DIA did not comprehensively evaluate the potential economic impacts to private landowners, particularly farmers. They were specifically concerned farmers would bear the burden of additional permit review and regulatory requirements under the ESA, including EPA prohibitions of certain crop protection products, permits for minor impacts to wetlands, and potentially even curtailment of water withdrawals.

Our Response: The requirements to consider potential adverse effects to critical habitat in section 7 consultations only apply to activities funded, carried out, or authorized by Federal agencies. Because these requirements only apply to activities with a ''Federal nexus,'' we do not anticipate the designation of critical habitat to result in additional costs or burden to strictly private or state activities. The commenter is correct that some additional review may be required during Federal permitting to consider the potential effects of a Federal action on designated critical habitat. However, as noted previously, we anticipate any Federal action potentially affecting Atlantic sturgeon critical habitat would have already required ESA section 7 consultation to consider the potential impacts to Atlantic or shortnose sturgeon, and thus any added burden due solely to this rule will be minimal. Our analysis includes a conservative estimate of the consultation impacts due to EPA's authorization of pesticides over the next 10 years, noting these are national consultations that will require evaluating impacts on all NMFS listed species and designated critical habitat. Our conservative estimate is that these consultations would result in $1,474.84 per unit attributable to Atlantic sturgeon critical habitat over 10 years, for Federal agencies and permittees combined. The commenter did not provide information on any particular water withdrawals of concern and whether those would have a Federal nexus to potentially trigger consultation requirements. Similarly, no information on minor impacts to wetlands that may affect Atlantic sturgeon critical habitat and require consultation was provided. If projects with a Federal nexus that impacted wetlands occurred in the past in areas being included in the critical habitat units and required consultation, it would be included in our database and would be included in this analysis, likely under the USACE CWA section 404/RHA section 10 permitting—dredge, fill, construction category. We conservatively assumed these actions could result in fully incremental informal consultations in the future, and assigned them a cost of $7,200 per consultation. Of this, a permittee could incur $1,500-$3,000, depending on whether a biological assessment is required and is prepared by the permittee (see, Impacts Analysis Table 3–19).

Comment 140: Two commenters stated that the area immediately downstream from Blewett Falls Dam on the Pee Dee River at the North Carolina/South Carolina border (Carolina Unit 5) should be excluded from designation as critical habitat. The commenters asserted this area does not offer suitable spawning habitat, and exclusion would alleviate the additional cost, complexity, and administrative burden of carrying out activities authorized or required by the YPD license, including fish passage activities.

Our Response: We disagree. As discussed in our response to Comment 110 above, potential spawning habitat does exist immediately downstream from Blewett Falls Dam, and it was appropriate to set the upstream boundary of the unit at the dam. We also disagree that foregoing designation would alleviate additional cost, complexity, and administrative burden of carrying out activities authorized or required by the YPD license. As noted previously, we do not anticipate the designation of critical habitat will impose additional administrative burdens or costs that would not have already been associated with ESA section 7 consultations to address impacts to Atlantic and shortnose sturgeon.

Comment 141: An industry trade group suggested we had significantly underestimated the true costs to a permittee, because we had not included potential costs associated with employing biologists, other consultants, or legal support they believe may be necessary to navigate the consultation process. They went on to state that consultation could cause project modifications, impose additional avoidance measures, or require additional mitigation above what was required by the action agency. The commenters reported Sundig (2003) estimated the direct, out-of-pocket costs of section 7 consultation for a single-family housing project to be several thousand dollars per house. Beyond the consultation process itself, the commenters suggested requirements to avoid or mitigate impacts to critical habitat could result in economic losses of millions of dollars. The commenters concluded that by severely underestimating the number of consultations that will be triggered by the proposed designations and the costs of those consultations, we failed to provide a meaningful analysis of section 7 consultation costs.

Our Response: We disagree. As explained in our responses to comments 52, 133, 135 and 136 above, we believe our estimate of the numbers of future consultations is correct, and commenters provided no information to the contrary.

Comment 142: Several commenters, including GADNR, SCDNR, and NCDOT, expressed concern that requirements to consult under section 7 of the ESA would increase administrative costs/burdens and cause long delays potentially affecting project costs, timelines, and fisheries management activities.

Our Response: As outlined in the Impacts Analysis and described previously, our review of all Federal actions that may adversely affect designated Atlantic sturgeon critical habitat indicates that none of those types of actions would solely affect the PBFs of critical habitat and not also have potential routes of adverse effects to Atlantic and/or shortnose sturgeon. We acknowledge that actions occurring within designated critical habitat will require an analysis and additional administrative cost to ensure Federal actions are not destroying or adversely modifying critical habitat. Yet, those additional analyses will be added to consultations that would occur anyway to consider potential impacts to sturgeon. Therefore, the designation of critical habitat is not anticipated to cause the significant additional costs or delays suggested by the commenter.

Comment 143: The Navy also expressed concern about potential delays and administrative costs/burdens associated with the designation. The Navy also questioned our determination that impacts of dredging are coextensive with the listing rather than incremental

impacts of this rule, and they identified some areas on the Neuse River that they believe will lead to impacts to national security due to impacts of the designation on training conducted in those areas.

Our Response: See our response to Comment 142 above regarding costs and delays generally. As we discussed in the proposed rule, dredging to maintain navigation channels may affect several of the essential PBFs of Atlantic sturgeon critical habitat. Dredging to deepen or widen navigation channels may involve removing rock, gravel, or soft substrate that is providing adult sturgeon spawning habitat or juvenile foraging habitat. Extensive dredging for harbor expansion may allow saltwater to intrude farther up a river, and adversely impact the area containing the salinity range necessary for young sturgeon. Other potential effects of dredging projects on the essential PBFs of Atlantic sturgeon critical habitat are increased siltation on spawning substrate, and the blockage of migratory pathways through channels and inlets.

At the same time, dredging may adversely affect Atlantic and shortnose sturgeon. The types of adverse effects are not likely to be temporary and limited to periods of sturgeon absence, and they are likely to be implemented in lower parts of the units where sturgeon can be expected to be present year-round. Thus, adverse effects of navigation maintenance dredging activities are likely to involve coextensive formal consultations to address impacts to both the species and the essential PBFs. Removal or covering of spawning substrate could interfere with the services this PBF is designed to provide—settlement of fertilized eggs and refuge, growth and development of early life stages. These effects to the essential PBF would also be adverse effects to sturgeon eggs, larvae and early life stages that were not able to settle, grow, develop or seek refuge. Project modifications to address both these impacts to the PBF and the sturgeon could involve limiting the amount or location of substrate removed, or turbidity controls to prevent sediment deposition on hard substrate. Similarly, adverse effects of dredging in removing the soft substrate PBF that would interfere with provision of juvenile foraging services, could also injure or kill juveniles seeking to use that foraging habitat. Coextensive project modifications might be similar to those mentioned for impacts to the hard substrate feature. Changing the salinity regime by deepening harbors and parts of rivers would remove portions of the transitional salinity zone feature that is being designated to provide foraging and developmental habitat services to juveniles; loss of portions of this habitat could impede development of juveniles using the remaining habitat, or prevent the habitat from supporting some juveniles. Coextensive project modifications that might be required to prevent or lessen these impacts could involve changes in the depth of deepening a harbor, port, or river. The deepening of harbors and ports may also create hypoxic zones which would impact the water quality PBF that is designed to ensure survival of sturgeon. Coextensive project modifications that might be required to prevent hypoxic zones could include limiting the amount of deepening or requiring the use of aeration systems. Thus, we did not assert there would be no project modifications to avoid adverse effects to critical habitat, but as described above, project modifications would address adverse impacts to both critical habitat and sturgeon, thus the costs of such modifications would not be incremental impacts of this rule.

The Navy described training activities that occur on the lower Neuse River as including small boat launch and recovery, high-speed boat tactics training, small boat defense drills, and small arms fire. We do not see a route of potential effects from these activities to the PBFs of critical habitat, and thus there would be no additional consultation burdens beyond any requirements to address impacts to the species. Thus, the designation would not impact military training related to national security in these areas.

Comment 144: Several commenters, including SCDNR, asserted that designation of critical habitat (both unoccupied and occupied) means projects that previously would have qualified for USACE Nationwide Permits or General Permits would no longer qualify, resulting in individual project review/analysis/certification.

Our Response: Whether a project is permitted by the USACE under a Nationwide or General Permit or another permitting mechanism, the USACE must assess the effects of the project on listed species and critical habitat and consult with us if listed species and/or designated critical habitat may be affected. As previously stated, our review of all previously consulted-on Federal actions that may adversely affect designated Atlantic sturgeon critical habitat determined that none of those types of actions would solely affect the PBFs of critical habitat and not also have potential routes of adverse effects to Atlantic and/or shortnose sturgeon. We acknowledge that actions occurring within designated critical habitat will require an analysis to ensure Federal actions are not likely to destroy or adversely modify critical habitat. Yet, those additional analyses will be added to consultations that would be required anyway, to consider potential impacts to sturgeon.

Comment 145: NCWRC and SCDOT requested that we develop programmatic ESA section 7 consultations or allocate additional resources to reduce the time associated with addressing new consultations.

Our Response: We cannot require a Federal action agency to consult on a programmatic basis, as it is up to the action agency to define the scope of a programmatic activity. However, we are committed to continue working with our Federal partners as we have in the past to identify opportunities for streamlining consultations or ways to increase efficiencies in the consultation process. Within SERO, we are already fully committing the available resources to ESA section 7 consultations, and we agree that investigating the possibility for programmatic consultations is a valuable tool.

Comment 146: A few commenters, including an industry trade group, expressed concern about potential delays for projects already undergoing consultation that would now have to include an analysis of adverse modification for Atlantic sturgeon critical habitat, as well as previous consultations that may need to be reinitiated based on the new critical habitat designation.

Our Response: See response to Comment 57.

Comment 147: One commenter worried that important research projects funded through time-limited Federal grants, occurring within proposed critical habitat units, may be delayed. The commenter expressed concern over the length of time required to complete section 7 consultations. The commenter expressed the belief that the timely completion of section 7 consultations will help to ensure these projects can provide data under the grant deadlines.

Our Response: We agree with the commenter that delays of important research projects within proposed critical habitat units should be avoided if possible. We are committed to working with action agencies to complete section 7 consultations as a quickly as possible.

Comment 148: SCDNR requested that we develop guidance and Best Management Practices for how in-water work should be conducted in critical habitat.

Our Response: We appreciate the recommendation.

Comment 149: SCDNR recommended we establish a list of activities authorized by the USACE Nationwide Permits that would not affect this species or its critical habitat and thus not require the section 7 consultation.

Our Response: It is the responsibility of the USACE, as the Federal action agency for the Nationwide Permits, to make determinations about their actions and request consultation if species and/or critical habitat may be affected. We are available to provide technical assistance and consultation, if requested by the USACE or other action agencies. We have information readily available on our Web sites for all Federal action agencies, and the public, providing guidance on effects determinations. Additionally, SERO and GARFO are jointly drafting a consultation framework specific to analyzing impacts to Atlantic sturgeon critical habitat to assist USACE and other agencies with consultations.

Comment 150: NCDMF and North Carolina Division of Coastal Management (NCDCM) suggested that even minor modifications to trawl sampling designs can affect the comparability of survey results across time series, which may span multiple decades. They requested we consider the importance of maintaining consistency across sampling programs if any new consultations are required due to the proposed critical habitat designations. The commenter also expressed concern that other bottom disturbing activities such as cultch planting and artificial reef and oyster reef construction could be impacted by our habitat designation. They concluded that while the critical habitat designations may not impact these activities, additional consultations for critical habitat (either formal or informal) will be required.

Our Response: We agree that there is great value in consistency across sampling programs and do not seek to change them without cause. However, if we determine through section 7 consultation that a sampling program funded or permitted by a Federal agency may adversely affect sturgeon or their habitats, including critical habitat, the Federal agency is required to ensure the action is not likely to jeopardize listed species or destroy or adversely modify critical habitat. In the extreme case that a sampling program is found to be likely to destroy or adversely modify critical habitat, we would be required to work with the parties involved to develop a reasonable and prudent alternative to that program, that would still achieve the sampling program's objectives but avoid destruction or adverse modification of the critical habitat.

With respect to the consultation requirements for the bottom disturbing activities identified, as outlined in the IA, our review of all Federal actions that may adversely affect designated Atlantic sturgeon critical habitat determined none of those types of actions, including federally-permitted fishery research, would solely affect the PBFs of critical habitat and not also have potential routes of adverse effects to Atlantic and/or shortnose sturgeon. We acknowledge that actions occurring within designated critical habitat will require an analysis and additional administrative cost to ensure Federal actions are not likely to destroy or adversely modify critical habitat. Yet, those additional analyses will be added to consultations that would occur anyway, to consider potential impacts to sturgeon. Therefore, the designation of critical habitat is not anticipated to cause the significant additional costs or delays suggested by the commenter.

Comment 151: One commenter expressed concern that the proposed designation could prevent in-water construction, dredging and bridge work needed to: (1) Maintain safety margins for large, ocean-going vessels navigating into and out of port, (2) transit near or under bridges, and (3) moor/unmoor safely at marine terminals, from receiving Federal funding. The commenter stated that section 7(a)(2) of the ESA requires Federal agencies to ensure actions they fund, authorize, or carry out are not likely to destroy or adversely modify that habitat, and pointed out we have determined a wide variety of activities may affect critical habitat. The commenter seems to imply that because we have indicated one or more of the activities above may have effects to critical habitat, we could impose a blanket moratorium on any such activity and/or block those activities from gaining Federal funding in the future. They believed stopping these projects would not only have a dramatic economic impact, but would also have a severe negative impact on navigation safety. The commenter requested we explicitly state in the final rule that all ''federally-improved dredged channels'' and areas adjacent to marine terminals are excluded from critical habitat.

Our Response: We agree that the proper maintenance of bridges, shipping channels, and marinas is not only important to ensure the flow of commerce, but also to ensure safety. The commenter is also correct that the ESA requires Federal agencies to ensure that actions they fund, authorize, or carry out are not likely to destroy or adversely modify critical habitat. However, section 7 of the ESA is written to ensure that federally-funded projects go forward, so long as they do not destroy or adversely modify critical habitat. Even if a proposed action is likely to destroy or adversely modify critical habitat, the section 7 consultation process is specifically designed so that a reasonable and prudent alternative, consistent with intended scope of proposed action, could be identified that would allow the action to proceed but without the same degree of impact to critical habitat. Thus, we do not believe it is necessary to exclude all ''federally-improved dredged channels'' and areas adjacent to marine terminals from critical habitat on the basis that such actions may be prevented from being implemented in the future.

Comment 152: The EPA stated we underestimated the number of section 7 consultations, and associated costs, likely to occur by failing to include their triennial state water quality standard reviews.

Our Response: After reviewing the information provided by the EPA regarding future water quality standard consultations, per their request we added three consultations for each of the states covered by this designation to the impacts analysis.

Comment 153: An electric cooperative requested that we confirm that the proposed rule does not contemplate any change in flow regime for the USACE's projects on the Roanoke River, North Carolina, and the Savannah River at the South Carolina/Georgia Border. They stated that any changes to the flow regimes would require an update or revision to the Water Control Manuals, which in turn would require an analysis of the environmental impact of the proposed rule under the National Environmental Policy Act (NEPA). They asked for this confirmation because they believe our DIA makes a number of references to the relation of river flows to critical habitat needs without providing any details on whether the rule specifically contemplates changes to flow regimes.

Our Response: The designation of critical habitat would impose no direct regulatory requirements and would not, in and of itself, have any effect on existing flow patterns. It is possible that flows may need to be altered to address adverse effects to critical habitat if such effects were identified during ESA section 7 consultation on a new or ongoing Federal action that affects water flows in a way that also affects the PBFs of critical habitat. Additionally,

environmental analysis under NEPA is not required for critical habitat designations (see, *Markle Interests, L.L.C.* v. *U.S. Fish and Wildlife Serv.,* 827 F.3d 452 (5th Cir. 2016); *Bldg. Indus. Ass'n of the Bay Area* v. *U.S. Dept. of Commerce,* 792 F.3d 1027 (9th Cir. 2015); *Douglas County* v. *Babbitt,* 48 F.3d 1495 (9th Cir. 1995), cert. denied, 116 S.Ct. 698 (1996)).

Comment 154: One commenter suggested the proposed rule was unclear regarding whether hydropower projects occurring outside, but upstream, of proposed critical habitat units may need to be altered to facilitate the objective of the critical habitat designation. The commenter asserted that if we intended to require alterations to existing flow patterns in the geographical units currently under consideration for designation as critical habitat, then our analysis in the proposal was deficient. They requested that we clarify our intentions on this point.

Our Response: Dams and regulation of water releases upstream of occupied critical habitat could affect the PBFs downstream, even if the dams themselves are not located within the critical habitat area. However, these downstream impacts occurring within occupied critical habitat units will also affect sturgeon, and consultation would be required even without the designation. In all of our past consultations on dams immediately above habitat used by sturgeon, we found that only the structure operated or authorized by the action agency at hand and undergoing consultation would have adverse effects on sturgeon and their habitats. Thus, but for additional administrative costs, the majority of the costs of these consultations are not incremental impacts of this rule. It is possible that flow regimes may need to be altered if current regimes are adversely affecting sturgeon and the essential PBFs of critical habitat, if such effects are identified during ESA section 7 consultation.

We evaluated all existing dams and other structures that are upstream of the proposed upper boundaries of all of the critical habitat units. We found that for the specific existing facilities at issue, dams outside of critical habitat and upstream from a dam that forms the boundary of critical habitat are not expected to have adverse effects to either unoccupied or occupied critical habitat and would not require consultation. This is due to large distances between upstream dams and the dams that form the boundary of critical habitat, and the presence of intervening structures, dams, or water bodies that dilute the effects of upstream dams relative to the effects of dams on the border of critical habitat.

Comment 155: The Navy expressed concern over our determination that consultations for effects of dredging on critical habitat will be fully coextensive with consultations to address impacts to Atlantic sturgeon. They believe designation of critical habitat can or will result in an additional commitment of resources and expected requirements to modify proposed actions to prevent adverse effects to critical habitat.

Our Response: We believe dredging may affect critical habitat, but we believe consultations to consider those effects on critical habitat will be fully-coextensive with consultations to address impacts to sturgeon (both shortnose and Atlantic). The effects of dredging on the PBF(s) would also result in injury or death to individual sturgeon, and thus constitute take. Removal or covering of spawning substrate could prevent effective spawning or result in death of eggs or larvae that are spawned. Changing the salinity regime by deepening harbors and parts of rivers could result in permanent decreases of available foraging and developmental habitat for juveniles. These types of adverse effects are not likely to be temporary and limited to periods of sturgeon absence. Thus, adverse effects of dredging activities identified by the Navy would be likely to be coextensive in formal consultations to address impacts to both the species and the PBF(s), and thus no new requirements or project modifications are anticipated as a result of the critical habitat designation.

In our long history of past and ongoing consultations, we have considered the effects that in-river activities (including dredging) would have on both Atlantic and shortnose sturgeon and their shared habitats, where applicable. A main focus of all our past consultations on Federal actions in rivers (*e.g.,* dredging, hydropower permitting) has been on expected impacts to these species' habitats. Adverse effects to habitat, including critical habitat, that will result in either injury or mortality of individual sturgeon of any life stage constitute take of the species. We have regularly determined that projects with adverse effects to sturgeon habitat will result in take of the species. It is this consultation history and experience that leads us to project that if actions in areas occupied by Atlantic and/or shortnose sturgeon affect their habitats, those actions would have the same effects on Atlantic sturgeon critical habitat, and the consultations and impacts would be largely coextensive.

Comments on Our Coastal Zone Management Act Determinations

Comment 156: NCDMF–NCDCM suggested our consistency determination regarding designating critical habitat is incomplete and does not meet the requirements of the Coastal Zone Management Act, 16 U.S.C. 1451, *et seq.* (CZMA) and its implementing regulations. They maintained that we submitted an incomplete negative determination, because we had not provided an evaluation of the North Carolina coastal program's enforceable policies.

Our Response: We disagree. While we recognize the State's goals of coastal resource protection and economic development, we determined that any effects of the proposed action on North Carolina's coastal uses and resources are not reasonably foreseeable at this time. As indicated in our negative determination, this designation of critical habitat will not restrict any coastal uses, affect land ownership, or establish a refuge or other conservation area; rather, the designation only affects the ESA section 7 consultation process for Federal actions. Through the ESA consultation process, we will receive information on proposed Federal actions and their effects on listed species and this critical habitat upon which we base our biological opinions. It will then be up to the Federal action agencies to decide how to comply with the ESA in light of our opinion, as well as to ensure that their actions comply with the CZMA's Federal consistency requirement.

Comments on Executive Order 13211—Statement of Energy Effects

Comment 157: One commenter indicated we failed to meet the requirements of Executive Order 13211 to prepare a Statement of Energy Effects. The commenter indicated changes in utility facilities and operations required by Federal ESA section 7 consultations, as a result of this critical habitat designation, have the potential to adversely affect in a material way the productivity and prices in the energy sector within the region.

Our Response: We disagree. The commenter provided no information, aside from the conclusion that the designation has the potential to adversely affect in a material way, productivity and prices in the energy sector within the region, on which we can base changes in our impacts analysis. The only Federal actions on which we may consult that have

material effects on energy are FERC hydropower licensing actions. These actions have the potential to adversely affect sturgeon as well as critical habitat, and thus most of the impacts of these consultations will result from the ESA listing of the Atlantic sturgeon rather than incremental impacts of the designation. Moreover, the FPA, which FERC implements in issuing hydropower licenses, has independent requirements to avoid adverse effects on fisheries resources and habitats, and thus modifications to hydropower facilities to avoid impacts to critical habitat may also be coextensive with the FPA, rather than from incremental impacts of the designation.

General Support or Disapproval of the Proposed Designation

Comment 158: We received five comments from the general public that were generally unsupportive of protecting sturgeon, their habitats, or their ecosystem.

Our Response: We appreciate the time these commenters took to provide input to us.

Comment 159: We received approximately 300 comments from the general public that were generally supportive of protecting sturgeon, their habitats, or their ecosystem. We received an additional two comments of general support from non-governmental organizations.

Our Response: We appreciate the supportive feedback received from these commenters.

Necessary Editorial Changes

Comment 160: One commenter pointed out that we cited Flowers and Hightower (2015) but that reference was not included in the list of references.

Our Response: We agree with the commenter. We erroneously omitted that reference from our list of references. We have updated the list of references to include this citation.

Comment 161: One commenter pointed out that we cited Smith *et al.* (2014) in several locations, but the reference did not appear in the list of references; however, Smith *et al.* (2015) does. The commenter suggested we may have erroneously referred to Smith *et al.* (2014) as Smith *et al.* (2015), in which case the citation needed to be updated, or the former is missing from the list of references and should be added.

Our Response: We appreciate the commenter bringing this discrepancy to our attention. While cited differently, both citations actually refer to the same document. This final rule has been updated to reflect the proper citation as Smith *et al.* (2015). As a result of this comment, we reviewed the final rule to ensure the literature cited section was accurate and complete, and made changes when necessary.

Comment 162: One commenter pointed out that we had erroneously cited them as a source of information in a personal communication, when the source was someone else.

Our Response: We agree with the commenter and apologize. We erroneously cited the commenter as the source for information indicating that Atlantic sturgeon had passed above Lock and Dam #1 on the Cape Fear River, North Carolina, and we have corrected that error in this final rule.

Comment 163: SCDNR and another commenter pointed out that we stated: ''The capture of 151 subadults, including age-one fish in 1997 indicates a population exists in the Santee River (Collins and Smith, 1997).'' They indicated that the Collins and Smith's 1997 publication was a synthesis of all historical and recent records of both Atlantic and shortnose sturgeons in South Carolina waters from 1970–1995. Thus, the number reported, 151, was not collected in a single year, 1997, but instead was a sum of all Atlantic sturgeon records from 1970–1995.

Our Response: We agree with the commenters. We erroneously characterized the capture of 151 subadults, including age-1 fish, as occurring in a single year when those captures actually occurred from 1970–1995 and we have corrected this error.

Comment 164: SCDNR noted the difference between the Columbia Dam and the Columbia Canal Diversion Dam, indicating the names are not interchangeable and both are part of the Columbia Hydroelectric Project. They stated ''the Columbia Dam has a constructed fishway that allows for the passage of American shad, blueback herring and American eel; although 'sturgeon-friendly' features were incorporated in its design, to date, no sturgeon have been documented utilizing this fishway nor have sturgeon been documented in surveys above the Columbia Dam.''

Our Response: We appreciate the commenter bringing this to our attention. We believe we properly referred to the Columbia Dam and associated fish passage in the proposed rule.

Comment 165: SCDNR pointed out that the proposed rule erroneously stated the St. Stephen Powerhouse was on the Santee River, South Carolina, when it is actually located on the Rediversion Canal.

Our Response: We appreciate the commenter bringing this discrepancy to our attention. We have updated the final rule to reflect this correction.

Summary of Changes From the Proposed Rules

Based on the comments received for the proposed rule, Designation of Critical Habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic Sturgeon (81 FR 35701; June 3, 2016), we have made several changes in the final rule:

1. The boundary for the upstream extent of the Pamunkey River, has been moved upstream by 14 rkm. This change was based on a comment we received from the Virginia Institute of Marine Science that, based on new data, the area with suitable hard bottom substrate and used by spawning Atlantic sturgeon in the York River System extends farther upstream on the Pamunkey River than what we proposed. This supplements the existing data we relied upon for the proposed rule. We determined that the additional 14 km of Pamunkey River habitat was essential to the conservation of the Chesapeake Bay DPS and should be part of the designated critical habitat for the York River System. The York River System critical habitat unit now includes 206 rkm instead of 192 rkm.

2. The 16 rkm of the proposed Susquehanna River Critical Habitat Unit are not designated as critical habitat. We received comments requesting removal of the Susquehanna River critical habitat unit and comments requesting inclusion of the upper Chesapeake Bay. Upon review, we determined that PBF number 2 (a salinity gradient to support juvenile growth and physiological development) is not present in the Susquehanna River unit, and is not likely to be present in the future. Therefore, because we determined that the coexistence of all four features is essential to reproduction and recruitment, based on the information available, the lowermost 16 rkm of the Susquehanna River do not contain the PBFs essential to the reproduction or recruitment of the Chesapeake Bay DPS and we are not designating this area as Chesapeake Bay DPS critical habitat.

3. The 60 rkm of the Nanticoke River from the Maryland State Route 313 Bridge crossing near Sharptown, MD, to where the main stem discharges at its mouth into the Chesapeake Bay as well as Marshyhope Creek from its confluence with the Nanticoke River and upriver to the Maryland State Route 318 Bridge crossing near Federalsburg, MD, are designated as critical habitat for the Chesapeake Bay DPS, and it will be called the Nanticoke River critical habitat unit. We announced in the supplementary document for the

proposed rule that we did not have substrate information for the Nanticoke River and Marshyhope Creek, MD, but that a study was ongoing to obtain that information. We received the information through public comment from the MD DNR. Based on the new information and existing information discussed in the proposed rule related to the presence of Atlantic surgeon in spawning condition at a time spawning would occur, we determined that portions of the Nanticoke River and Marshyhope Creek are essential to the conservation of the Chesapeake Bay DPS and should be designated as critical habitat.

4. We corrected the map for the James River critical habitat unit. The map used in the proposed rule incorrectly placed the downriver boundary of critical habitat in the area of Hampton Roads. The textual description of the James River critical habitat in the proposed rule was correct.

5. The table describing the states and counties in which critical habitat is being designated has been updated. It now includes Dorchester and Wicomico Counties on the Nanticoke River.

6. The description of PBF number 2 includes two changes. The phrase ''between the river mouths and spawning sites'' replaces ''downstream of spawning sites.'' As previously written, we were concerned the public might construe ''downstream of spawning sites'' to include bays or sounds below rkm 0; this was not our intent. We believe the change more accurately reflects the boundaries of critical habitat. Additionally, the words ''up to as high as '' were added after 0.5 and before 30 to clarify acceptable salinity ranges. Because the freshwater inputs vary from year to year, and river to river, it is possible that during a high freshwater flow year, the salinity levels within a unit may never reach 30 ppt. As previously written, the wording suggested that the gradual downstream gradient would have to encompass the entire 0.5–30 ppt salinity range; this was not our intent. This change is meant to acknowledge that the entire salinity range is not required.

7. In PBF number 3, the examples of what may constitute barriers were expanded, and the phrase ''at least 1.2 m'' replaces ''≥1.2 m'' for clarity.

8. The phrase ''between the river mouths and spawning sites'' was inserted in the language of PBF number 4. This change clarifies the areas designated as critical habitat as described under PBF number 2. Additionally, for clarity of the example, the phrase ''6 mg/L DO or greater'' replaces ''6 mg/L dissolved oxygen.''

9. We have included and clarified in regulatory provisions for all five DPSs that manmade structures that do not provide the essential PBFs are not included in critical habitat.

Based on the comments received for the proposed rule, Critical Habitat for the Endangered Carolina and South Atlantic DPSs of Atlantic Sturgeon (81 FR 36077; June 3 2016), we have made several changes in the final rule:

10. The boundary for the upstream extent of the Ogeechee River has been moved downstream by 28 rkm, from the confluence of North Fork and South Fork Ogeechee Rivers to Mayfield Mill Dam; the Unit now includes 420 rkm instead of 448 rkm.

11. The boundary for the upstream extent of the Black River, South Carolina, has been moved downstream by 50 rkm from Interstate Highway 20 to Interstate Highway 95; the Unit now includes 203 rkm instead of 253 rkm.

12. The description of South Atlantic Unit 3 has been updated to include a number of significant branches of the Savannah River that we intended to be considered critical habitat, and were included in the maps of the critical habitat unit, but were not specifically mentioned in the regulatory text. The unit description now includes: The Back River, Middle River, Front River, Little Back River, South River, Steamboat River, and McCoy's Cut.

13. Carolina Unoccupied Unit 1 has been removed due to uncertainty regarding whether that stretch of the Cape Fear River contains spawning habitat that would make it essential to the conservation of the species.

14. We have chosen to exercise our discretion under section 4(b)(2) of the ESA and exclude Carolina Unoccupied Unit 2 and South Atlantic Unoccupied 1,

15. The table describing the states and counties in which critical habitat is being designated has been updated. It now includes Monroe and Wilcox counties on the Ocmulgee River, Treutlen County on the Oconee River, and Warren County on the Ogeechee River. All four counties occur in Georgia and were inadvertently omitted from the table. Additionally, we changed the upstream boundary of the Black River, South Carolina, and the Ogeechee River, Georgia, and removed all three unoccupied critical habitat units entirely. As a result of these changes, Calhoun, Fairfield, Kershaw, Lee, Lexington, New Berry, Sumter, Orangeburg, and Richland counties, South Carolina; Columbia, Edgefield and Taliaferro counties, Georgia; and Bladen County, North Carolina, will no longer be affected; those counties have been removed from the table. We also removed Irwin and Jasper counties, Georgia, from the list because they are not affected by any critical habitat unit.

16. The description of PBF number 1 initially referred to ''suitable hard bottom substrate (*e.g.,* rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (*i.e.,* 0.0–0.5 parts per thousand [ppt] range) . . .'' The word ''suitable'' was dropped because the term suggests there may be hard bottom that is unsuitable for spawning, which is not the case.

17. The description of PBF number 2 includes three changes. Initially it said ''[t]ransitional salinity zones inclusive of waters with a gradual downstream gradient of 0.5–30 ppt and soft substrate (*e.g.,* sand, mud) downstream of spawning sites for juvenile foraging and physiological development.'' The phrase ''aquatic habitat'' replaces the phrase ''transitional salinity zone'' because the latter was redundant with ''gradual downstream gradient,'' and we believe the revision better illustrates the river areas we intended to include. Additionally, the phrase ''between the river mouths and spawning sites'' replaces ''downstream of spawning sites.'' As previously written, we were concerned the public might construe ''downstream of spawning sites'' to included bays or sounds below rkm 0; this was not our intent. We believe the change more accurately reflects the boundaries of critical habitat. Finally, the words ''up to as high as'' were added after 0.5 and before 30 to clarify acceptable salinity ranges. Because the freshwater inputs vary from year to year, and river to river, it is possible that during a high freshwater flow year, the salinity levels within a unit may never reach 30 ppt. As previously written, the wording suggested that the gradual downstream gradient would have to encompass the entire 0.5–30 ppt salinity range; this was not our intent. This change is meant to acknowledge that the entire salinity range is not required.

18. In PBF number 3, we were concerned the term ''physical'' might be confusing to the public with regards to the full suite of potential barriers that can impede sturgeon movement. As a result, we provided additional examples of physical barriers, including thermal plumes, turbidity, and sound.

19. The phrase ''between the river mouths and spawning sites'' replaces ''downstream of spawning sites'' in the language of PBF number 4. This change clarifies the areas designated as critical habitat as described under PBF number 2.

20. For the Carolina and South Atlantic DPSs, paragraph (iii) of PBF

number 4 initially used the terms ''optimal'' and ''suboptimal'' when discussing DO and temperature range examples. We were concerned the use of those terms may be misinterpreted as establishing specific, exclusive values. Because there is no single DO level or temperature range that is best for Atlantic sturgeon in terms of habitat avoidance or use, we replaced those terms. The example now states ''For example, 6.0 mg/L DO or greater likely supports juvenile rearing habitat, whereas DO less than 5.0 mg/L for longer than 30 days is less likely to support rearing when water temperature is greater than 25 °C.'' Our example language for temperature ranges has also been updated to state: ''Temperatures of 13 to 26 °C likely support spawning habitat.''

Additionally, an example used in paragraph (iii) of PBF number 4 referenced a single value of DO that was likely to support juvenile rearing habitat (*i.e.,* ''For example, 6.0 mg/L DO for juvenile rearing habitat . . .''). The modifier ''or greater'' has been added to ''6.0 mg/L DO'' because without it, the current language suggests only a single value of DO is likely to support juvenile rearing habitat, whereas anything above 6.0 mg/L would also be beneficial for the species as discussed in the preamble of the proposed rule.

21. Seven rkms of the Cooper River, South Carolina, are no longer being designated as critical habitat pursuant to section 4(a)(3)(B) of the ESA. Our analysis determined the Joint Base Charleston base has an INRMP that provides an applicable benefit to the species that would have been otherwise afforded by critical habitat, and therefore the area of the Cooper River is not eligible for designation as critical habitat for Atlantic sturgeon.

22. We have clarified our reasoning for determining the upstream extent of each unit in the descriptions of each river.

Critical Habitat Identification and Designation

We used the same approach to identify and designate critical habitat for the five DPSs of Atlantic sturgeon. However, our approach for designating critical habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon was described in the supplemental information to the Impacts Analysis, whereas our approach for designating critical habitat for the Carolina and South Atlantic DPSs of Atlantic Sturgeon was described in the proposed rule (81 FR 36077; June 3, 2016). Therefore, much of the information in the Impacts Analysis and proposed rule is repeated in this final rule that designates critical habitat for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon to show that we used the same approach for all five DPSs.

Critical habitat represents the habitat that contains the PBFs that are essential to the conservation of the listed species and that may require special management considerations or protection (78 FR 53058; August 28, 2013). For example, specifying the geographical location of critical habitat facilitates implementation of section 7(a)(1) of the ESA by identifying areas where Federal agencies can focus their conservation programs and use their authorities to further the purposes of the ESA by carrying out programs for the conservation of listed species. Designating critical habitat also provides a significant regulatory protection by ensuring that the Federal Government considers the effects of its actions in accordance with section 7(a)(2) of the ESA and avoids or modifies those actions that are likely to destroy or adversely modify critical habitat. This requirement is in addition to the section 7 requirement that Federal agencies ensure that their actions are not likely to jeopardize the continued existence of ESA-listed species. Critical habitat requirements do not apply to citizens engaged in activities on private land that do not involve a Federal agency. However, designating critical habitat can help focus the efforts of other conservation partners (*e.g.,* State and local governments, individuals and nongovernmental organizations).

Critical habitat is defined by section 3 of the ESA as (1) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species (16 U.S.C. 1532(5)(A)). Conservation is defined in section 3 of the ESA as ''to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary'' (16 U.S.C. 1532(3)). Therefore, critical habitat includes specific areas within the occupied geographical area of the species at the time of listing that contains the features essential for the species' recovery. Critical habitat may also include unoccupied areas determined to be essential to species' conservation and recovery. However, section 3(5)(C) of the ESA clarifies that except in those circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species.

To identify and designate critical habitat, we considered information on the distribution of Atlantic sturgeon, the major life stages, habitat requirements of those life stages, and conservation objectives that can be supported by identifiable PBFs. In the final rule listing the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon (77 FR 5880; February 6, 2012), destruction, modification or curtailment of habitat, overutilization, lack of regulatory mechanisms for protecting the fish, and other natural or manmade factors (*e.g.,* vessel strikes) were found to be the threats contributing to the threatened status of the Gulf of Maine DPS, and the endangered status of the New York Bight and Chesapeake Bay DPS. In the final rule listing the Carolina and South Atlantic DPSs of Atlantic sturgeon (77 FR 5978; February 6, 2012), habitat curtailment and alteration, bycatch in commercial fisheries, and inadequacy of existing regulatory mechanisms were found to be the threats contributing to the endangered status of both DPSs. The Carolina and South Atlantic DPSs were found to be at 3 percent and 6 percent of their historical abundances, respectively, due to these threats. Therefore, we evaluated PBFs of the marine, estuarine, and riverine habitats of Atlantic sturgeon to determine what PBFs are essential to the conservation of each DPS.

Accordingly, our step-wise approach for identifying potential critical habitat areas for the five Atlantic sturgeon DPSs was to determine: The geographical area occupied by each DPS at the time of listing; the PBFs essential to the conservation of the DPSs; whether those PBFs may require special management considerations or protection; the specific areas of the occupied geographical area where these PBFs occur; and, whether any unoccupied areas are essential to the conservation of any DPS.

Geographical Area Occupied by the Species

''Geographical area occupied by the species'' in the definition of critical habitat is interpreted to mean the entire

range of the species at the time it was listed, inclusive of all areas they use and move through seasonally (81 FR 7413; February 11, 2016). The marine ranges of the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon extend from the Hamilton Inlet, Labrador, Canada, to Cape Canaveral, Florida, USA (77 FR 5880 and 77 FR 5978; February 6, 2012). We did not consider geographical areas within Canadian jurisdiction (*e.g.,* Minas Basin, Bay of Fundy), because we cannot designate critical habitat areas outside of U.S. jurisdiction (50 CFR 424.12(g)).

The listing rules identified the known spawning rivers for each of the Atlantic sturgeon DPSs but did not describe the in-river ranges for the DPSs. The river ranges of each DPS consist of all areas downstream of the first obstacle to upstream migration (*e.g.,* the lowest dam without fish passage for sturgeon or significant waterfalls at the fall line) on each river within the range of the DPS. We identified the Gulf of Maine DPS in-river range as occurring in the 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, Massachusetts. We identified the New York Bight DPS in-river range as occurring in the watersheds that drain into coastal waters, including Long Island Sound, the New York Bight, and Delaware Bay, from Chatham, Massachusetts to the Delaware-Maryland border on Fenwick Island. We identified the Chesapeake Bay DPS in-river range as occurring in the watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, Virginia. We identified the Carolina DPS in-river range as occurring in the watersheds (including all the rivers and tributaries) from Albemarle Sound, North Carolina, to Charleston Harbor, South Carolina. We identified the South Atlantic DPS in-river range as occurring in the watersheds (including all the rivers and tributaries) from the Ashepoo-Combahee-Edisto (ACE) Basin in South Carolina to the St. Johns River, Florida.

Physical or Biological Features Essential for Conservation That May Require Special Management Considerations or Protection

Within the geographical area occupied by the species, critical habitat consists of specific areas on which are found those PBFs essential to the conservation of the species and that may require special management considerations or protection. PBFs are defined as the features that support the life-history needs of the species, including water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity (50 CFR 424.02).

The ability of subadults to find and access food is necessary for continued survival, growth, and physiological development to the adult life stage. Likewise, given that Atlantic sturgeon mature late and do not necessarily spawn annually, increased adult survival would improve the chances that adult Atlantic sturgeon spawn more than once. We determined that facilitating increased survival of all Atlantic sturgeon life stages as well as successful adult reproduction, and juvenile and subadult recruitment into the adult population, would likely increase the abundance of each DPS. We considered these conservation objectives to help us identify the physical or biological features of the critical habitat designations when we reviewed the literature describing the various types of habitat used by the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon for the various life functions.

Within the area occupied by Atlantic sturgeon, we considered the various types of habitat used by the DPSs for various life functions. Atlantic sturgeon spend the majority of their adult lives in offshore marine waters. They are known to travel extensively up and down the East Coast. As summarized in a number of summary documents, including the Atlantic Sturgeon Status Review (ASSRT, 2007) and the ASMFC's review of Atlantic coast diadromous fish habitat (Green *et al.,* 2009), Atlantic sturgeon are benthic foragers and prey upon a variety of species in marine and estuarine environments (Bigelow and Schroeder, 1953; Scott and Crossman, 1973; Johnson *et al.,* 1997; Guilbard *et al.,* 2007; Savoy, 2007; Dzaugis, 2013; McLean *et al.,* 2013). In the ocean, Atlantic sturgeon typically occur in waters less than 50 m deep, travel long distances, exhibit seasonal coastal movements, and aggregate in estuarine and ocean waters at certain times of the year (Vladykov and Greeley, 1963; Holland and Yelverton 1973; Dovel and Berggren, 1983; Dadswell *et al.,* 1984; Gilbert, 1989; Johnson *et al.,* 1997; Rochard *et al.,* 1997; Kynard *et al.,* 2000; Savoy and Pacileo, 2003; Eyler *et al.,* 2004; Stein *et al.,* 2004; Dadswell, 2006; Eyler, 2006; Laney *et al.,* 2007; ASSRT, 2007; Dunton *et al.,* 2010; Erickson *et al.,* 2011; Dunton *et al.,* 2012; Oliver *et al.,* 2013; Wirgin *et al.,* 2015). Several winter congregations of Atlantic sturgeon in the marine environment are known to occur, though the exact location and importance of those areas in the southeast is not known, nor whether Atlantic sturgeon are drawn to particular areas based on PBFs of the habitat. While we can identify general movement patterns and behavior in the marine environment (*e.g.,* aggregating behavior), due to the paucity of data on the DPSs' offshore needs and specific habitat utilization, we could not at this time identify PBFs essential to conservation in the marine environment for any of the DPSs.

Atlantic sturgeon use estuarine areas for foraging, growth, and movement. Atlantic sturgeon subadults and adults in non-spawning condition use estuarine waters seasonally, presumably for foraging opportunities, although evidence in the form of stomach content collection and analysis is limited (Savoy and Pacileo, 2003; Dzaugis, 2013). We considered all studies that have collected Atlantic sturgeon stomach contents. All of the prey species identified are indicative of benthic foraging, but different types of prey were consumed and different substrates were identified for the areas where Atlantic sturgeon were foraging (Bigelow and Schroeder, 1953; Johnson *et al.,* 1997; ASSRT, 2007; Guilbard *et al.,* 2007; Savoy, 2007; Dzaugis, 2013; McLean *et al.,* 2013). Adding to our uncertainty of the PBF(s) that support successful foraging for growth and survival of subadults and adults, Atlantic sturgeon move between estuarine environments in the spring through fall and can occur in estuarine environments during the winter as well (Collins *et al.,* 2000; Savoy and Pacileo, 2003; Simpson, 2008; Balazik *et al.,* 2012). Subadult Atlantic sturgeon spawned in one riverine system may use multiple estuaries for foraging and growth, including those not directly connected to their natal river. The benthic invertebrates that comprise the diet of Atlantic sturgeon are found in soft substrates that are common and widespread in most estuaries. Limited data are available to differentiate areas of preferred prey items or higher prey abundance within or across estuaries. Due to the paucity of data on specific

habitat or resource utilization, we could not at this time identify any specific PBFs essential for the conservation of any of the DPSs that support adult and subadult foraging in estuarine or marine environments.

Atlantic sturgeon spawning behavior and early life history have been extensively studied and are fairly well understood, though the exact location of spawning sites on many rivers (particularly in the Southeast) is not known or can change from time to time as water depth and substrate availability changes. However, there is substantial information in the scientific literature indicating the physical characteristics of Atlantic sturgeon spawning and early life history habitat. Therefore, to evaluate potential critical habitat, we focused on identifying the PBFs that support Atlantic sturgeon reproduction and survival of early life stages.

The scientific literature indicates that Atlantic sturgeon spawning occurs well upstream, at or near the fall line of rivers, over hard substrate consisting of rock, pebbles, gravel, cobble, limestone, or boulders (Gilbert, 1989; Smith and Clugston, 1997). Hard substrate is required so that highly adhesive Atlantic sturgeon eggs have a surface to adhere to during their initial development and young fry can use the interstitial spaces between rocks, pebbles, cobble, etc., to hide from predators during downstream movement and maturation (Gilbert, 1989; Smith and Clugston, 1997).

Very low salinity (*i.e.,* 0.0–0.5 ppt) is another important feature of Atlantic sturgeon spawning habitat. Exposure to even low levels of salinity can kill Atlantic sturgeon during their first few weeks of life; thus, their downstream movement is limited until they can endure brackish waters (Bain *et al.,* 2000). Shortnose sturgeon tend to spawn 200–300 km upriver, preventing the youngest life stages from salt exposure too early in their development (Parker and Kynard, 2005; Kynard, 1997). Parker and Kynard (2005) also noted that long larval/early juvenile downstream movement is common in both shortnose sturgeon from the Savannah River and Gulf sturgeon (a sub-species of Atlantic sturgeon), and that this may be a widespread adaptation of sturgeon inhabiting river systems in the southern United States. Due to their similar life history, Atlantic sturgeon most likely adapted a similar spawning strategy. Therefore, it is essential that the spawning area has low salinity, and that the spawning location is far enough upstream to allow newly-spawned Atlantic sturgeon to develop and mature during their downstream movement before encountering saline water. During their downstream movement, it is important for developing fish to forage in areas of soft substrate and to encounter transitional salinity zones to allow physiological adaptations to higher salinity waters.

Minimum water depths for Atlantic sturgeon spawning are necessary to: (1) Allow adult fish to access spawning substrate, (2) adequately hydrate and aerate newly deposited eggs, and (3) facilitate successful development and downstream movement of newly spawned Atlantic sturgeon. However, water depth at these important spawning areas in the Southeast can be dynamic and portions of rivers may be dry or have little water at times due to natural seasonal river fluctuations, temporary drought conditions, and/or regulation by manmade structures such as dams; thus, these sites require protection to provide consistent services for sturgeon. The scientific literature indicates that Atlantic sturgeon spawn in water depths from 3–27 m (9.8–88.6 ft) (Borodin, 1925; Leland, 1968; Scott and Crossman, 1973; Crance, 1987; Bain *et al.,* 2000). However, much of this information is derived from studies of Atlantic sturgeon in northern United States and Canadian river systems. Atlantic sturgeon in the Southeast are likely spawning in much shallower water depths based on repeated observations by biologists of sturgeon with lacerations on their undersides from moving into extremely shallow water to spawn on hard substrate. Based on the available information, and the body depth and spawning behavior of Atlantic sturgeon, water depths of at least 1.2 m (4 ft) are deep enough to accommodate Atlantic sturgeon spawning.

We considered fluid dynamic features as another potential essential feature of Atlantic sturgeon spawning critical habitat. The scientific literature provides information on the importance of appropriate water velocity within Atlantic sturgeon spawning habitat and provides optimal flows for some rivers. Atlantic sturgeon spawn directly on top of gravel in fast flowing sections often containing eddies or other current breaks. Eddies promote position holding between spawning individuals, trap gametes facilitating fertilization, and diminish the probability of egg dislocation by currents—facilitating immediate adhesion of eggs to the gravel substrate (Sulak and Clugston, 1999). However, velocity data are lacking for many rivers, and where data are available, the wide fluctuations in velocity rates on a daily, monthly, seasonal, and annual basis make it difficult to identify a range of water velocity necessary for the conservation of the species. However, we do know that water flow must be continuous.

Adult Atlantic sturgeon must be able to safely and efficiently move from downstream areas into upstream spawning habitats in order to successfully spawn. In addition, larvae and juvenile Atlantic sturgeon must be able to safely and efficiently travel from the upstream spawning areas downstream to nursery and foraging habitat. Therefore, an essential PBF for Atlantic sturgeon spawning is unobstructed migratory pathways for safe movement of adults to and from upstream spawning areas as well as safe movement for the larvae and juveniles moving downstream. An unobstructed migratory pathway means an unobstructed river or a dammed river that still allows for passage.

Water quality can be a critically limiting factor to Atlantic sturgeon in the shallow, warm, poorly oxygenated rivers of the southeast United States. Conditions in these river systems can change rapidly, particularly in rivers managed for hydropower production, and conditions can quickly become suboptimal or lethal for sturgeon. We considered essential water quality PBFs that support movement and spawning of adults and growth and development of juvenile Atlantic sturgeon. The distribution of Atlantic sturgeon juveniles in the natal estuary is a function of physiological development and habitat selection based on water quality factors of temperature, salinity, and DO, which are inter-related environmental variables. In laboratory studies with salinities of 8 to 15 ppt and temperatures of 12 and 20 °C, juveniles less than a year old had reduced growth at 40 percent DO saturation, grew best at 70 percent DO saturation, and selected conditions that supported growth (Niklitschek and Secor, 2009 I; Niklitschek and Secor, 2009 II). Results obtained for age-1 juveniles (*i.e.,* greater than 1 year old and less than 2 years old) indicated that they can tolerate salinities of 33 ppt (*i.e.,* a salinity level associated with seawater), but grow faster in lower salinity waters (Niklitschek and Secor, 2009 I; Allen *et al.,* 2014). The best growth for both age groups occurred at DO concentrations greater than 6.5 mg/L. While specific DO concentrations at temperatures considered stressful for Atlantic sturgeon are not available, instantaneous minimum concentrations of 4.3 mg/L protect survival of shortnose sturgeon at temperatures greater than 29 °C (EPA, 2003). Secor and Niklitschek (2001) report shortnose sturgeon are

more tolerant of higher temperatures than Atlantic sturgeon. This is why Campbell and Goodman (2003) considered 29 °C a stressful temperature for shortnose sturgeon, while Secor and Gunderson (1998) report Atlantic sturgeon becoming stressed at a lower threshold of 26 °C.

In summary, within the area occupied by Atlantic sturgeon, we considered the various types of habitat used by the species for various life functions. We determined that Atlantic sturgeon spend the majority of their adult lives in offshore marine waters where they are known to travel extensively up and down the East Coast. However, we could not identify any PBFs in marine waters essential to the conservation of the species. We also determined Atlantic sturgeon subadults and adults use estuarine areas for foraging, growth, and movement. The ability of subadults to find and access food is necessary for continued survival, growth, and physiological development to the adult life stage. Likewise, given that Atlantic sturgeon mature late and do not necessarily spawn annually, increased adult survival would improve the chances that adult Atlantic sturgeon spawn more than once. Therefore, we determined a conservation objective for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs is to increase the abundance of each DPS by facilitating increased survival of all life stages. After examining the information available on spawning and early life history behavior and habitat, we also concluded that facilitating adult reproduction and juvenile and subadult recruitment into the adult population are other conservation objectives for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon. We could not identify any specific PBFs essential to the conservation of the species that support adult and subadult foraging in estuarine or marine environments. We determined that protecting spawning areas, juvenile development habitat, the in-river habitats that allow adults to reach the spawning areas and newly spawned sturgeon to make a safe downstream migration, and water quality to support all life stages, will facilitate meeting the conservation objectives discussed above.

Given the biological needs and tolerances, and environmental conditions for Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon as summarized previously, and the habitat-based conservation objectives, we identified the following PBFs essential to their conservation. As we have discussed, these PBFs may be ephemeral or vary spatially across time. Thus, areas designated as critical habitat are not required to have the indicated values at all times and within all parts of the area:

- Hard bottom substrate (*e.g.,* rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (*i.e.,* 0.0–0.5 ppt range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- Aquatic habitat with a gradual downstream salinity gradient of 0.5 up to as high as 30 ppt and soft substrate (*e.g.,* sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development;
- Water of appropriate depth and absent physical barriers to passage (*e.g.,* locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support: Unimpeded movements of adults to and from spawning sites; seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary, and; staging, resting, or holding of subadults or Spawning condition adults. Water depths in main river channels must also be deep enough (*e.g.,* at least 1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river, and
- Water, between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support: Spawning; annual and interannual adult, subadult, larval, and juvenile survival; and larval, juvenile, and subadult growth, development, and recruitment (*e.g.,* 13 °C to 26 °C for spawning habitat and no more than 30 °C for juvenile rearing habitat, and 6 mg/L or greater DO for juvenile rearing habitat).

Given the biological needs and tolerances, and environmental conditions for Atlantic sturgeon in rivers of the Southeast as summarized previously, and the habitat-based conservation objectives, we identified the following PBFs essential to Atlantic sturgeon conservation. As we have discussed, these PBFs may be ephemeral or vary spatially across time. Thus, areas designated as critical habitat are not required to have the indicated values at all times and within all parts of the area:

- Hard bottom substrate (*e.g.,* rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (*i.e.,* 0.0–0.5 ppt range) for settlement of fertilized eggs and refuge, growth, and development of early life stages;
- Aquatic habitat inclusive of waters with a gradual downstream gradient of 0.5 up to as high as 30 ppt and soft substrate (*e.g.,* sand, mud) between the river mouths and spawning sites for juvenile foraging and physiological development;
- Water of appropriate depth and absent physical barriers to passage (*e.g.,* locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support: (1) Unimpeded movement of adults to and from spawning sites; (2) seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and (3) staging, resting, or holding of subadults and spawning condition adults. Water depths in main river channels must also be deep enough (at least 1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river.
- Water quality conditions, especially in the bottom meter of the water column, between the river mouths and spawning sites with temperature and oxygen values that support: (1) Spawning; (2) annual and inter-annual adult, subadult, larval, and juvenile survival; and (3) larval, juvenile, and subadult growth, development, and recruitment. Appropriate temperature and oxygen values will vary interdependently, and depending on salinity in a particular habitat. For example, 6.0 mg/L DO or greater likely supports juvenile rearing habitat, whereas DO less than 5.0 mg/L for longer than 30 days is less likely to support rearing when water temperature is greater than 25 °C. In temperatures greater than 26 °C, DO greater than 4.3 mg/L is needed to protect survival and growth. Temperatures of 13 to 26 °C likely support spawning habitat.

Specific Areas Containing the Essential Features Within the Geographical Area Occupied by the Species

The definition of critical habitat instructs us to identify specific areas on which the PBFs essential to the species' conservation are found. Our regulations state that critical habitat will be defined by specific limits using reference points and lines on standard topographic maps of the area, and referencing each area by the state, county, or other local governmental unit in which it is located (50 CFR 424.12(c)). To identify where the PBF(s) occur within areas occupied by Atlantic sturgeon, we reviewed the best scientific information available,

including the 2007 Atlantic sturgeon status review (ASSRT, 2007), the ESA listing rules (77 FR 5880 and 77 FR 5914; February 6, 2012), scientific research reports, information and data gathered during the peer-review process, and a database developed by the U.S. Geological Survey for mapping environmental parameters within East Coast rivers to identify sturgeon habitat. We also considered information on the location of sturgeon spawning activity from scientific reports, as active spawning in an area would indicate that the PBF(s) necessary for spawning are likely present. As noted previously, while we used the same approach for designating critical habitat for the five DPSs, the Impacts Analysis and Biological Source Document for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs describes that approach for those DPSs and therefore is not repeated here. Because the critical habitat designation approach and information on specific rivers within the range of the Carolina and South Atlantic DPSs was described in the proposed rule, and not in a separate document, it is provided here for reference.

Information on documented spawning in specific areas in the Southeast is rare, but some does exist. For example, large sections of the Altamaha River have been found to support Atlantic sturgeon spawning activities for many years (Peterson *et al.,* 2006; Peterson *et al.,* 2008). We reviewed reports from a NMFS-funded multi-year, multi-state research project on movement and migration of Atlantic sturgeon (Species Recovery Grant number NA10NMF4720036, Post *et al.,* 2014). In these reports, researchers determined which portions of Southeastern rivers support spawning activities by looking at the upriver extent of sturgeon movements during spawning season.

There are large areas of most rivers where data are still lacking. The available data also may represent a snapshot in time, while the exact location of a habitat feature may change over time (*e.g.,* water depth fluctuates seasonally, as well as annually, and even hard substrate may shift position). For example, some data indicate a change in substrate type within a given location from year to year (*e.g.,* from sand to gravel). It is not always clear whether such changes are due to an actual shift in substrate sediments or if the substrate sample was collected in a slightly different location between samplings. Although the habitat features may vary even at the same location, if any of the available data regarding a particular feature fell within the suitable range (*e.g.,* salinity of 0–0.5 ppt or hard substrate [gravel, cobble, etc.]), we considered that the essential PBF is present in the area.

For Southeast rivers, when data were not available for certain rivers or portions of occupied rivers, we used our general knowledge of Atlantic sturgeon spawning and applied river-specific information to determine the location of PBFs essential to spawning. We considered salinity tolerance during the earliest life stages to determine appropriate habitat for larvae to develop as they mature. Available telemetry data suggest that most Atlantic sturgeon spawning activity in the Savannah and Altamaha Rivers starts around rkm 100 (Post *et al.,* 2014). Similar evidence from the Edisto, Neuse, and Tar-Pamlico Rivers indicates spawning activity starts around rkm 80. Peer review comments on the Draft Economic and Biological Information to Inform Atlantic Sturgeon Critical Habitat Designation (for the Carolina and Southeast DPSs) indicated that Atlantic sturgeon spawn below the fall line, unlike shortnose sturgeon that may spawn well above the fall line.

To encompass all areas important for Atlantic sturgeon spawning, reproduction, and recruitment within rivers where spawning is believed to occur or may occur, we identified specific areas of critical habitat from the mouth (rkm 0) of each spawning river to the upstream extent of the spawning habitat. For rivers that are not dammed and do not reach the fall line, an easily identifiable landmark (*e.g.,* a dam or a bridge) was located to serve as the upstream boundary of the units. Similarly, the ordinary high water mark on the banks of the rivers encompasses all areas that are expected to contain one or more of the PBFs and provides an easily identifiable lateral boundary for the units.

To identify specific habitats used by an Atlantic sturgeon DPS in occupied rivers, we considered the best scientific information available that described: (1) Capture location and/or tracking locations of Atlantic sturgeon identified to its DPS by genetic analysis; (2) capture location and/or tracking locations of adult Atlantic sturgeon identified to its DPS based on the presence of a tag that was applied when the sturgeon was captured as a juvenile in its natal estuary; (3) capture or detection location of adults in spawning condition (*i.e.,* extruding eggs or milt) or post-spawning condition (*e.g.,* concave abdomen for females); (4) capture or detection of YOY and other juvenile age classes; and (5) collection of eggs or larvae.

Several large coastal rivers within the geographical area occupied by the Carolina and South Atlantic DPSs of Atlantic sturgeon do not appear to support spawning and juvenile recruitment or to contain suitable habitat features to support spawning. These rivers are the Chowan and New Rivers in North Carolina; the Waccamaw (above its confluence with Bull Creek which links it to the Pee Dee River), Sampit, Ashley, Ashepoo, and Broad-Coosawhatchie Rivers in South Carolina; and the St. Johns River in Florida. We have no information, current or historical, of Atlantic sturgeon using the Chowan and New Rivers in North Carolina. Recent telemetry work by Post *et al.* (2014) indicates that Atlantic sturgeon do not use the Sampit, Ashley, Ashepoo, and Broad-Coosawhatchie Rivers in South Carolina. These rivers are short, coastal plains rivers that most likely do not contain suitable habitat for Atlantic sturgeon. Post *et al.* (2014) also found Atlantic sturgeon only use the portion of the Waccamaw River downstream of Bull Creek. Due to manmade structures and alterations, spawning areas in the St. Johns River are not accessible and therefore do not support a reproducing population. For these reasons, we are not designating these coastal rivers, or portions of the rivers, as critical habitat. For rivers we are proposing to designate as critical habitat, we have historical or current information that they support spawning and juvenile recruitment as described below.

Roanoke River

The Roanoke River was identified as a spawning river for Atlantic sturgeon based on the capture of juveniles, the collection of eggs, and the tracking location of adults. Further, there was information indicating the historical use of the Roanoke River by Atlantic sturgeon.

Atlantic sturgeon were historically abundant in the Roanoke River and Albemarle Sound, but declined dramatically in response to intense fishing effort in the late 1800s (Armstrong and Hightower, 2002). There is still a population present in the Albemarle Sound and Roanoke River (Armstrong and Hightower, 2002; Smith *et al.,* 2015). DNA analyses of juveniles captured in Albemarle Sound indicate that these fish are genetically distinct from Atlantic sturgeon collected in other systems (Wirgin *et al.,* 2000; King *et al.,* 2001).

Historical records and recent research provide accounts of Atlantic sturgeon spawning within the fall zone (rkm 204–242) of the Roanoke River (Yarrow, 1874; Worth, 1904; Armstrong and Hightower, 2002; Smith *et al.,* 2015).

Atlantic sturgeon remains from archaeological sites on the Roanoke River have been found as far upstream as rkm 261, approximately 19 miles (30.5 km) above the upper end of the fall zone (VanDerwarker, 2001; Armstrong and Hightower, 2002); however, that was prior to the construction of dams now located throughout the river. The farthest downstream dam, the Roanoke Rapids Dam, is located near the fall line at rkm 221. No fish passage exists at this dam, so all Atlantic sturgeon are restricted to the lower 17 rkm of fall zone habitat, which extends from the Roanoke Rapids Dam to Weldon, North Carolina at rkm 204 (Armstrong and Hightower, 2002; Smith *et al.,* 2015).

Historical and current data indicate that spawning occurs in the Roanoke River, where both adults and small juveniles have been captured. Since 1990, the NCDMF has conducted the Albemarle Sound Independent Gill Net Survey (IGNS). From 1990 to 2006, 842 sturgeon were captured ranging from 15.3 to 100 cm fork length (FL), averaging 47.2 cm FL. One hundred and thirty-three (16 percent) of the 842 sturgeon captured were classified as YOY (41 cm total length (TL), 35 cm FL); the others were subadults (ASSRT, 2007). A recent study by Smith *et al.* (2015), using acoustic telemetry data and egg collection during the fall of 2013, identified a spawning location near Weldon, North Carolina (rkm 204). The location contains the first shoals encountered by Atlantic sturgeon as they move upstream to spawn (Smith *et al.,* 2015). The channel in this area is approximately 100 m wide and the substrate is primarily bedrock, along with fine gravel and coarse sediments in low-flow areas (Smith *et al.,* 2015). During the study, 38 eggs were collected during 21 days that spawning pads were deployed (Smith *et al.,* 2015).

A scientific survey also shows the presence of adult Atlantic sturgeon in the Roanoke River. Using side-scan sonar, Flowers and Hightower (2015) conducted surveys near the freshwater-saltwater interface with repeated surveys performed over 3 days. The surveys detected 4 Atlantic sturgeon greater than 1 m TL. Based on these detections, an abundance estimate for riverine Atlantic sturgeon of 10.9 (95 percent confidence interval 3–36) fish greater than 1 m was calculated for the Roanoke River. This estimate does not account for fish less than 1 m TL, occurring in riverine reaches not surveyed, or in marine waters.

Tar-Pamlico River

The Tar-Pamlico River was identified as a spawning river for Atlantic sturgeon based on the evidence of spawning and the capture of juveniles. The Tar-Pamlico River, one of two major tributaries to Pamlico Sound, is dammed. However, all riverine spawning habitat is accessible to Atlantic sturgeon in the Tar-Pamlico River, because the lower-most dam, the Rocky Mount Mill Pond Dam (rkm 199), is located at the fall line.

Evidence of spawning was reported by Hoff (1980), after the capture of very young juveniles in the Tar River. Two juveniles were observed dead on the bank of Banjo Creek, a tributary to the Pamlico System (ASSRT, 2007). A sampling program similar to the Albemarle Sound IGNS collected 14 Atlantic sturgeon in 2004. These fish ranged in size from 460 to 802 mm FL and averaged 575 mm FL. The NCDMF Observer Program reported the capture of 12 Atlantic sturgeon in the Pamlico Sound from April 2004 to December 2005; these fish averaged 600 mm TL (ASSRT, 2007).

Neuse River

The Neuse River was identified as a spawning river for Atlantic sturgeon based on the capture of small juveniles. Bain (1997) reports that ''early juveniles'' (20–440 mm FL) remain in their natal rivers until they become ''intermediate juveniles'' (450–630 mm FL) and begin gradually emigrating from the river during periods of rapid growth. Hoff (1980) reports sturgeon studies in the Neuse and Pamlico Rivers and Pamlico Sound captured low numbers of small (400–600 mm TL) sturgeon. The NCDMF Observer Program and an independent gill net survey report the captures of Atlantic sturgeon in the Neuse River were low during the period 2001–2003, ranging from zero to one fish/year. However, in 2004, this survey collected 5 Atlantic sturgeon ranging from 470–802 mm FL; none could be classified as early juveniles and 3 could be classified as intermediate juveniles. In 2005, 23 Atlantic sturgeon were captured ranging from 365–650 mm FL; 9 could be classified as early juveniles and 14 could be classified as intermediate juveniles. From 2006–2013, another nine Atlantic sturgeon were captured ranging in size from 480–2,300 mm FL; the most caught in any given year during that period was four (2004). Of those nine animals, none would be classified as early juveniles but four could be classified as intermediate juveniles. One 720 mm TL Atlantic sturgeon was captured in 2014. Seventeen Atlantic sturgeon were caught in 2015 ranging in size from 365–1,435 mm FL; four could be classified as early juveniles and eight could be classified as intermediate juveniles. In 2016, three Atlantic sturgeon were captured ranging in size from 464–656 mm FL; none could be classified as early juveniles and two could be classified as intermediate juveniles (M. Loeffler, NCDMF, to A. Herndon, NMFS, pers. comm. March 2017). From 2002–2003, four Atlantic sturgeon (561–992 mm FL) were captured by North Carolina State University personnel sampling in the Neuse River (Oakley, 2003). Similarly, the NCDMF Observer Program documented the capture of 12 Atlantic sturgeon in the Pamlico Sound from April 2004 to December 2005; none of these were YOY or spawning adults, averaging approximately 600 mm TL (ASSRT, 2007). Three additional specimens of YOY captured in the Neuse River in 1974 were found in a collection at North Carolina State University (J. Hightower, NCSU, to A. Herndon, NMFS, pers. comm. March 2017). An additional record of a YOY captured in the Neuse River in 1974, was provided by the North Carolina Museum of Natural Sciences (G. Hogue, NCMNS, to A. Herndon, NMFS, pers. comm. March 2017). Because sturgeon cannot pass above the Milburnie Dam, we believe that dam is likely the farthest upstream extent of spawning habitat accessible to Atlantic sturgeon.

Cape Fear River System

The Cape Fear and Northeast Cape Fear Rivers were identified as spawning rivers for Atlantic sturgeon based on the capture of juveniles, the capture of adults in spawning condition, and the tracking location of adults, and information indicating the historical use by Atlantic sturgeon. In the late 1800s, the Cape Fear River had the largest landings of sturgeon in the southeastern United States (Moser and Ross, 1995). While species identification (*i.e.,* shortnose or Atlantic sturgeon) is not possible, these landings suggest large populations of both species. The Cape Fear River is tidally influenced by diurnal tides up to at least rkm 96, and is also dredged extensively to maintain a depth of 12 m up to rkm 49 and then a depth of 4 m up to Lock and Dam #1. There are numerous deep holes (>10 m) throughout this extent.

A gill net survey for adult shortnose and juvenile Atlantic sturgeon was conducted in the Cape Fear River drainage from 1990 to 1992, and replicated from 1997 to 2005. Each sampling period included two overnight sets. The 1990–1992 survey captured 100 Atlantic sturgeon below Lock and Dam #1 (rkm 95). In 1997, 16 Atlantic sturgeon were captured below Lock and

Dam #1, an additional 60 Atlantic sturgeon were caught in the Brunswick (a tributary of the Cape Fear River), and 12 were caught in the Northeast Cape Fear River (Moser *et al.* 1998). Additionally, Ross *et al.* (1988 in Moser and Ross, 1995) reported the capture of a gravid female in the Cape Fear River.

Recent telemetry work conducted in the Cape Fear and Northeast Cape Fear Rivers showed that subadult Atlantic sturgeon movement and distribution followed seasonal patterns (Loeffler and Collier in Post *et al.,* 2014). During summer months, Atlantic sturgeon distribution was shifted upriver with limited large-scale movements; during the coldest time of year, subadult fish were absent from the rivers and had migrated to the estuary or ocean (Loeffler and Collier in Post *et al.,* 2014). The high inter-annual return rates of tagged fish to the system demonstrate that Atlantic sturgeon have fidelity to these rivers; this implies that the Cape Fear River system may be the natal system for these fish (Loeffler and Collier in Post *et al.,* 2014).

Further evidence of the importance of this system is demonstrated by the movement patterns of one of five adult Atlantic sturgeon tagged during the study that has shown site fidelity. This individual fish was in ripe and running condition at the time of tagging. This fish subsequently returned to the Cape Fear River system each of the following years (2013 and 2014) and has been detected farther upstream in both the Cape Fear (rkm 95) and Northeast Cape Fear (rkm 132) rivers than any tagged subadult fish during this study. This fish did not use the fish passage rock arch ramp at Lock and Dam #1; however, at the time when it was present at the base of the dam, the rock arch ramp structure was only partially complete. In all years of the study this fish had movement patterns that are consistent with spawning behavior, and this demonstrates that both the Northeast Cape Fear and Cape Fear Rivers may be important spawning areas. While telemetry data have not indicated Atlantic sturgeon presence above Lock and Dam #1, we believe the fish passage present at the dam is successful or that fish pass through the lock. We base this determination on reports of Atlantic sturgeon above Lock and Dam #1 (F. Rohde, NMFS, pers. comm. to J. Rueter, NMFS, July 14, 2015). Because sturgeon cannot currently pass above the Lock and Dam #2, we believe that dam is likely the farthest upstream extent of spawning habitat currently accessible to Atlantic sturgeon in the occupied unit of the river. The Northeast Cape River is not dammed and does not extend all the way to the fall line. For these reasons we used an easily identifiable landmark (*e.g.,* upstream side of Rones Chapel Road Bridge) to serve as the upstream boundary.

Pee Dee River System

The Pee Dee River System was identified as providing spawning habitat used by Atlantic sturgeon based on the capture of juveniles, the capture of adults in spawning condition, and the tracking location of adults. Captures of age-1 juveniles from the Waccamaw River during the early 1980s suggest that a reproducing population of Atlantic sturgeon existed in that river, although the fish could have been from the nearby Pee Dee River (Collins and Smith 1997). Additionally, telemetry data from tagged adult Atlantic sturgeon appear to show individuals making spawning runs into the Pee Dee River by traveling up the Waccamaw River, through Bull Creek, and into the Pee Dee River. (B. Post, SCDNR, pers. comm. to J. Rueter, NMFS, July 9, 2015).

Based on preliminary analyses of sturgeon detections during their study, Post *et al.* (2014) concluded the Pee Dee River system appears to be used by Atlantic sturgeon for summer/winter seasonal habitat as well as for spawning. From 2011 to 2014, 41 sturgeon were detected in upstream areas of the Pee Dee River that were considered to be spawning areas. All 10 Atlantic sturgeon that were originally implanted with transmitters in the Pee Dee System were later detected displaying upstream and downstream movement. Distinct movement patterns were evident for these fish as similar patterns were observed each year of the study period. Two of the 10 fish originally tagged in the Pee Dee System and many tagged fish from other systems made spawning runs in the Pee Dee River (Post *et al.,* 2014). The fall line is located approximately 35 rkm below Blewett Falls Dam, which is impassable to sturgeon. Thus, we believe the dam represents the upstream extent of spawning habitat accessible to Atlantic sturgeon on the Pee Dee River system.

Black River, South Carolina

The Black River was identified as a spawning river for Atlantic sturgeon based on the capture of juveniles and the tracking location of adults. During a telemetry study from 2011 to 2014, Post *et al.* (2014) detected 10 juveniles and 10 adults using the Black River. An adult male was detected at the last receiver station in the river one year (rkm 70.4) and the next to last receiver station in a subsequent year. While the receiver stations were not at the fall line, they were very far upriver, and it is likely that the only reason this fish traveled so far upriver was to spawn (B. Post, SCDNR, pers. comm. to J. Rueter, NMFS PRD, July 9, 2015). Juveniles were located as far upstream as rkm 42.1, suggesting the Black River is also an important foraging/refuge habitat. The main stem of the Black River becomes braided before reaching the fall line and is no longer identifiable above Interstate Highway 95. Thus, setting the boundary at that highway includes the upstream extent of spawning habitat within the unit.

Santee and Cooper Rivers

The Santee-Cooper River system was identified as a spawning river system for Atlantic sturgeon based on the capture of YOY. The Santee River basin is the second largest watershed on the Atlantic Coast of the United States; however, with the completion of Wilson Dam in the 1940s, upstream fish migrations were restricted to the lowermost 145 rkms of the Santee River. Following construction of the Wilson and Pinopolis Dams, the connectivity between the coastal plain and piedmont was lost. In the 1980s, a fish passage facility at the St. Stephen powerhouse, designed to pass American shad and blueback herring, was completed that attempted to restore connectivity throughout the system. The passage facility has not been successful for Atlantic sturgeon (Post *et al.,* 2014). However, in 2007 an Atlantic sturgeon entered the fish passage facility at the fishway to the lift, presumably in an attempt to migrate upstream to spawn, and was subsequently physically removed and then released downstream into the Santee River (A. Crosby, SCDNR, pers. comm.).

Historically, the Cooper River was a small coastal plain river that fed into Charleston Harbor. The completion of the Santee Cooper hydropower project in the 1940s dramatically changed river discharge in the Cooper River. From the 1940s into the 1980s, nearly all river discharge of the Santee River was diverted through the Santee Cooper project, run through the hydroelectric units in Pinopolis Dam, and discharged down the Tailrace Canal and into the Cooper River. In the 1980s, the Rediversion Project redirected part of the system's discharge back to the Santee River; however, a significant discharge of freshwater still flows into the Cooper River. The Cooper River provides the dominant freshwater input for the Charleston Harbor and provides 77 rkm of riverine habitat (Post *et al.,* 2014).

The capture of 151 subadults, including age-1 fish, from 1970–1995 indicates a population exists in the Santee River (Collins and Smith, 1997). Four juvenile Atlantic sturgeon, including YOY, were captured in the winter of 2003, one in the Santee and three in the Cooper Rivers (McCord, 2004). These data support the existence of a spawning population, but SCDNR biologists working in the Santee-Cooper system believe the smaller fish are pushed into the system from the Pee Dee and/or Waccamaw Rivers during flooding conditions (McCord, 2004). This hypothesis is based on the lack of access to suitable spawning habitat due to the locations of the Wilson Dam on the Santee River, the St. Stephen Powerhouse on the Rediversion Canal, and the Pinopolis Dam on the Cooper River. Nonetheless, the Santee-Cooper River system appears to be important foraging and refuge habitat and could serve as important spawning habitat once access to historical spawning grounds is restored through a fishway prescription under the FPA (NMFS, 2007). In addition, hard substrate that could be used for spawning exists in the reach of the Santee River below the Wilson Dam, but has been rendered inaccessible by inadequate flow regimes below the dam. We anticipate this will be addressed in the new hydropower license for the Santee-Cooper project.

In a recent telemetry study by Post *et al.* (2014), four Atlantic sturgeon were tagged in the Santee River from 2011 to 2014. Of these four, one was detected in the river, one was detected at the mouth of the river, and the other two have not been detected in the Santee River system since being tagged. There was no detectable spawning run or pattern of movement for the tagged fish that remained in the Santee River (Post *et al.,* 2014). There were no Atlantic sturgeon captured in the Cooper River during the Post *et al.* (2014) study. There were seven Atlantic sturgeon detected in the Cooper River that had been tagged in other systems. The Atlantic sturgeon that were detected in the Cooper River were more commonly detected in the saltwater tidal zone, with the exception of one that made a presumed spawning run to Pinopolis Dam in the fall of 2013 (Post *et al.,* 2014). The upstream extents of potential spawning habitat available to Atlantic sturgeon in the occupied portions of the Santee and Cooper Rivers are at the Wilson and Pinopolis Dams, respectively.

Edisto River

The Edisto is the largest river in the Ashepoo, Combahee, Edisto (ACE) Basin. It begins in the transition zone between piedmont and coastal plain and is unimpeded for its entire length. It is the longest free flowing blackwater river in South Carolina. During excessive rainy seasons it will inundate lowlands and swamps, and the flow basin increases to a mile (1.6 km) wide or more. The Edisto River was identified as a spawning river for Atlantic sturgeon based on the capture of an adult in spawning condition and capture location and tracking of adults.

Spawning adults (39 in 1998) and YOY (1,331 from 1994–2001) have been captured in the ACE basin (Collins and Smith, 1997; ASSRT, 2007). One gravid female was captured in the Edisto River during sampling efforts in 1997 (ASSRT, 2007). Seventy-six Atlantic sturgeon were tagged in the Edisto River during a 2011 to 2014 telemetry study (Post *et al.,* 2014). After tagging, 58 of the 76 Atlantic sturgeon tagged were detected again in the Edisto River during the study. Distinct movement patterns of Atlantic sturgeon were evident. Fish entered the river between April and June and were detected in the saltwater tidal zone until water temperature decreased below 25 °C. They then moved into the freshwater tidal area, and some fish made presumed spawning migrations in the fall around September–October. Spawning migrations were thought to be occurring based on fish movements upstream to the presumed spawning zone between rkm 78 and 210. Fish stayed in these presumed spawning zones for an average of 22 days. The tagged Atlantic sturgeon left the river system by November. A number of tagged individuals were detected making such movements during multiple years of the study. Only those fish that were tagged in the Edisto River were detected upstream near presumed spawning grounds, while fish detected in the Edisto River, but tagged elsewhere, were not detected near the presumed spawning areas. In the winter and spring, Atlantic sturgeon were generally absent from the system except for a few fish that remained in the saltwater tidal zone (Post *et al.,* 2014). The North and South Forks of the Edisto River represent the upstream boundary for the Edisto River. Both forks occur at or very near the fall line, and likely represent the upstream extent of spawning habitat accessible to Atlantic sturgeon on the Edisto River.

Combahee-Salkehatchie River

The Combahee-Salkehatchie River was identified as a spawning river for Atlantic sturgeon based on capture location and tracking locations of adults and the spawning condition of an adult. Spawning adults (39 in 1998) and YOY (1,331 from 1994–2001) have been captured in the ACE basin (Collins and Smith, 1997; ASSRT, 2007). One running ripe male was captured in the Combahee River during a sampling program in 1997 (ASSRT, 2007). Seven Atlantic sturgeon were captured and five were tagged during a 2010 and 2011 telemetry study (Post *et al.,* 2014). Atlantic sturgeon that were tagged in the Combahee River were absent from the system for the majority of the study period. An Atlantic sturgeon that was tagged in June of 2011 left the system in the fall of 2011, returned in July 2012 and left the system again in the fall of 2012. This fish was detected the farthest upstream of any tagged Atlantic sturgeon in the Combahee River (rkm 56). Another individual was identified as a running ripe male at capture in the Combahee River in March 2011, was detected again exhibiting spawning behavior in the North East Cape Fear River, North Carolina, in March 2012, and in 2014 was detected from February–April in the Pee Dee System. The main stem of the Combahee-Salkehatchie River runs out well before the fall line. Thus, we believe the upstream extent of spawning habitat in the rivers is at the confluence of the Buck and Rosemary Creeks, which also marks the upstream boundary for the Combahee-Salkehatchie River.

Savannah River

The Savannah River was identified as a spawning river for Atlantic sturgeon based on capture location and tracking locations of adults and the collection of larvae. Forty-three Atlantic sturgeon larvae were collected in upstream locations (rkm 113–283) near presumed spawning locations (Collins and Smith, 1997). Seven Atlantic sturgeon were also tagged from 2011 to 2014 and distinct movement patterns were evident (Post *et al.,* 2014). In 2011, one individual was detected travelling upstream in mid-April and remained at a presumed spawning area (rkm 200–301) through mid-September. Two Atlantic sturgeon migrated into the system and upstream to presumed spawning grounds in 2012. The first entered the system in mid-August and returned downriver in mid-September; the other entered the system in mid-September and returned downriver in mid-October. Four Atlantic sturgeon entered the Savannah River and migrated upstream during the late summer and fall months in 2013. Two Atlantic sturgeon previously tagged in the Savannah River made upstream spawning movements; this was the second year (2011) one of these fish was

detected making similar upstream movements. These two fish were also detected immediately upstream of the NSBL&D (rkm 301). It is unknown if they passed through the lock or swam over the dam during high flows. There is a strong possibility that one fish may have been detected by the receiver directly upstream while still remaining downstream of the dam and while flow control gates were in a full open position. Atlantic sturgeon in the Savannah River were documented displaying similar behavior 3 years in a row—migrating upstream during the fall and then being absent from the system during spring and summer. Because sturgeon cannot currently pass above the NSBL&D, we believe that dam is the farthest upstream extent of spawning habitat accessible to Atlantic sturgeon in the occupied reaches of the river.

Ogeechee River

The Ogeechee River was identified as a spawning river for Atlantic sturgeon based on tracking of adults and YOY. Seventeen Atlantic sturgeon (each measuring less than 30 cm TL) considered to be YOY were collected in 2003 by the Army's Environmental and Natural Resources Division (AENRD) at Fort Stewart, Georgia. An additional 137 fish were captured by the AENRD in 2004. Nine of these fish measured less than 41 cm TL and were considered YOY. During a telemetry study from 2011 to 2014, there were no capture or tagging efforts conducted in the Ogeechee River; however, 40 Atlantic sturgeon were detected in the Ogeechee River (Ingram and Peterson, 2016). A rock shoal exists at the fall line on the Ogeechee River. However, it is possible that during certain high flow periods Atlantic sturgeon could pass above those shoals. Instead, the impassable Mayfield Mill Dam likely represents the extent of upstream spawning habitat accessible to Atlantic sturgeon on the Ogeechee River.

Altamaha River

The Altamaha River and its major tributaries, the Oconee and Ocmulgee Rivers, were identified as spawning rivers for Atlantic sturgeon based on capture location and tracking of adults and the capture of adults in spawning condition. The Altamaha River supports one of the healthiest Atlantic sturgeon subpopulations in the Southeast, with over 2,000 subadults captured in trammel nets in a 2003–2005 study, 800 of which were nominally age-1 as indicated by size (ASSRT, 2007). A survey targeting Atlantic sturgeon was initiated in 2003 by the University of Georgia. By October 2005, 1,022 Atlantic sturgeon had been captured using trammel and large gill nets. Two hundred and sixty-seven of these fish were collected during the spring spawning run in 2004 (74 adults) and 2005 (139 adults). From these captures, 308 (2004) and 378 (2005) adults were estimated to have participated in the spring spawning run, representing 1.5 percent of Georgia's historical spawning stock (females) as estimated from U.S. Fish Commission landing records (Schueller and Peterson, 2006; Secor 2002).

In a telemetry study by Peterson *et al.* (2006), most tagged adult Atlantic sturgeon were found between rkm 215 and 420 in October and November when water temperatures were appropriate for spawning. There are swift currents and rocky substrates throughout this stretch of river (Peterson *et al.,* 2006). Two hundred thirteen adults in spawning condition were captured in the Altamaha system in 2004–2005 (Peterson *et al.,* 2006).

Forty-five adult Atlantic sturgeon were captured and tagged from 2011 to 2013 (Ingram and Peterson, 2016). Telemetry data from the tagged individuals indicated that the fish were present in the system from April through December. Twenty-six fish made significant (>160 rkm) migrations upstream with eight fish making the migration in at least two of the years and four making the migration in all three years of the study. No site fidelity was apparent based on these data; however, an upriver site near the confluence of the Ocmulgee (rkm 340–350) was visited by multiple fish in multiple years. Fish migrated upstream into both the Ocmulgee and Oconee Rivers, but the majority entered the Ocmulgee River. The maximum extent of these upriver migrations was rkm 408 in the Ocmulgee River and rkm 356 in the Oconee River (Ingram and Peterson, 2016).

Two general migration patterns were observed for fish in this system. Early upriver migrations that began in April–May typically occurred in two steps, with fish remaining at mid-river locations during the summer months before continuing upstream in the fall. The late-year migrations, however, were typically initiated in August or September and were generally non-stop. Regardless of which migration pattern was used during upstream migration, all fish exhibited a one-step pattern of migrating downstream in December and early January (Ingram and Peterson, 2016). Sinclair Dam is approximately 15 rkm above the fall line on the Oconee River and represents the upstream boundary of critical habitat on the river. The Juliette Dam on the Ocmulgee River is approximately 40 rkm above the fall line and represents the upstream boundary of critical habitat on the river.

Satilla River

The Satilla River was identified as a spawning river for Atlantic sturgeon based on the capture of adults in spawning condition. Ong *et al.* (1996) captured four reproductively mature Atlantic sturgeon on spawning grounds during the spawning season in the Satilla River. The main stem of the Satilla River runs out well before the fall line. Thus, we believe the upstream extent of spawning habitat in the river is at the confluence of the Satilla and Wiggins Creeks.

St. Marys River

The St. Marys River was identified as a spawning river for Atlantic sturgeon based on the capture of YOY Atlantic sturgeon. Atlantic sturgeon were once thought to be extirpated in the St. Marys River. However, nine Atlantic sturgeon were captured in sampling efforts between May 19 and June 9, 2014. Captured fish ranged in size from 293 mm (YOY) to 932 mm (subadult). This is a possible indication of a slow and protracted recovery in the St. Marys (D. Peterson, UGA, pers. comm. to J. Rueter, NMFS PRD, July 8, 2015). The main stem of the St. Marys River runs out well before the fall line. Thus, we believe the upstream extent of spawning habitat in the river is at the confluence of the Middle Prong St. Marys and St. Marys Rivers.

Using this information, we identified 14 areas within the geographical area occupied by the Carolina and South Atlantic DPSs, at the time of listing, that contain the PBFs essential to conservation of the species. Our descriptions of the critical habitat units and PBFs for the Carolina and South Atlantic DPSs use both the terms ''river mouth'' and ''rkm 0.'' Those terms are interchangeable and we use them as such.

The ordinary high water mark on each bank of the river and shorelines is the lateral extent of the following occupied critical habitat units:

Carolina Unit 1 includes the Roanoke River main stem from the Roanoke Rapids Dam downstream to rkm 0;

Carolina Unit 2 includes the Tar-Pamlico River main stem from the Rocky Mount Millpond Dam downstream to rkm 0;

Carolina Unit 3 includes the Neuse River main stem from the Milburnie Dam downstream to rkm 0;

Carolina Unit 4 includes the Cape Fear River main stem from Lock and

Dam #2 downstream to rkm 0 and the Northeast Cape Fear River from the upstream side of Rones Chapel Road Bridge downstream to the confluence with the Cape Fear River;

Carolina Unit 5 includes the Pee Dee River main stem from Blewett Falls Dam downstream to rkm 0, the Waccamaw River from Bull Creek downstream to rkm 0, and Bull Creek from the Pee Dee River to the confluence with the Waccamaw River;

Carolina Unit 6 includes the Black River main stem from Interstate Highway 95 downstream to rkm 0;

Carolina Unit 7 includes the Santee River main stem from the Wilson Dam downstream to the fork of the North Santee River and South Santee River distributaries, the Rediversion Canal from the St. Stephen Powerhouse downstream to the confluence with the Santee River, the North Santee River from the fork of the Santee River and South Santee River downstream to rkm 0, the South Santee River from the fork of the Santee River and North Santee River downstream to rkm 0, the Tailrace Canal from Pinopolis Dam downstream to the West Branch Cooper River, the West Branch Cooper River from the Tailrace Canal downstream to the confluence with the East Branch Cooper River, and the Cooper River from the confluence of the West Branch Cooper River and East Branch Cooper River tributaries downstream to rkm 0;

South Atlantic Unit 1 includes the North Fork Edisto River from Cones Pond downstream to the confluence with the South Fork Edisto River, the South Fork Edisto River from Highway 121 downstream to the confluence with the North Fork Edisto River, the Edisto River main stem from the confluence of the North Fork Edisto River and South Fork Edisto River tributaries downstream to the fork at the North Edisto River and South Edisto River distributaries, the North Edisto River from the Edisto River downstream to rkm 0, and the South Edisto River from the Edisto River downstream to rkm 0;

South Atlantic Unit 2 includes the main stem Combahee—Salkehatchie River from the confluence of Buck and Rosemary Creeks with the Salkehatchie River downstream to the Combahee River, and the Combahee River from the Salkehatchie River downstream to rkm 0;

South Atlantic Unit 3 includes the main stem Savannah River from the New Savannah Bluff Lock and Dam downstream to rkm 0;

South Atlantic Unit 4 includes the main stem Ogeechee River from the Mayfield Mill Dam downstream to rkm 0;

South Atlantic Unit 5 includes the main stem Oconee River from Sinclair Dam downstream to the confluence with the Ocmulgee River, the main stem Ocmulgee River from Juliette Dam downstream to the confluence with the Oconee River, and the main stem Altamaha River from the confluence of the Oconee River and Ocmulgee River downstream to rkm 0;

South Atlantic Unit 6 includes the main stem Satilla River from the confluence of Satilla and Wiggins Creeks downstream to rkm 0; and

South Atlantic Unit 7 includes the main stem St. Marys River from the confluence of Middle Prong St. Marys and the St. Marys Rivers downstream to rkm 0.

Need for Special Management Considerations or Protection

We concluded that each of the PBFs defined above for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon may require special management considerations or protection. Barriers (*e.g.,* dams, tidal turbines) to generate power or control water flow in rivers used by Atlantic sturgeon can damage or destroy bottom habitat needed for spawning and rearing of juveniles, restrict movement of adults to and from spawning grounds, prevent juveniles from accessing the full range of salinity in the natal estuary, and alter water quality parameters, including water depth, temperature and DO, to the detriment of sturgeon reproduction, growth, and survival. Water withdrawals can similarly adversely impact water quality for Atlantic sturgeon spawning, recruitment, and development. Land development and commercial and recreational activities on a river can contribute to sediment deposition that affects water quality necessary for successful spawning and recruitment. A build-up of fine sediments may, for example, reduce the suitability of hard spawning substrate for Atlantic sturgeon egg adherence and reduce the interstitial spaces used by larvae for refuge from predators. Dredging to remove sediment build-up, to deepen harbors and facilitate vessel traffic, or to mine construction materials may remove or alter hard substrate that is necessary for egg adherence and that serves as refuge for larvae or soft substrate needed for juvenile foraging, and may change the water depth, resulting in shifts in the salt wedge within the estuary, or change other characteristics of the water quality (*e.g.,* temperature, DO) necessary for the developing eggs, larvae, and juveniles.

The PBFs essential for successful Atlantic sturgeon reproduction and recruitment may also require special management considerations or protection as a result of global climate change. Conditions in the rivers of the Southeast used by sturgeon already threaten the species' survival and recovery due to exceedances of temperature tolerances and the sensitivity of sturgeon to low DO levels; these impacts will worsen as a result of global climate change and predicted warming of the U.S. Atlantic Coast. Many communities and commercial facilities withdraw water from the rivers containing the PBFs essential to Atlantic sturgeon reproduction. Water withdrawals during drought events can affect flows, depths, and the position of the salt wedge, further impacting the water flow necessary for successful sturgeon reproduction, and they can also affect DO levels. Attempts to control water during floods (*e.g.,* spilling water from dams upriver of Atlantic sturgeon spawning and rearing habitat) can similarly alter flows to the point of dislodging fertilized eggs, washing early life stages downstream into more saline habitat before being developmentally ready, and creating barriers (*e.g.,* from debris) to upstream and downstream passage of adults and juveniles. We therefore conclude that the PBFs essential to the conservation of the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs may require special management considerations or protections.

Unoccupied Areas

ESA section 3(5)(A)(ii) defines critical habitat to include specific areas outside the geographical area occupied if the areas are determined by the Secretary to be essential for the conservation of the species. Our regulations at 50 CFR 424.12(g) also state: ''The Secretary will not designate critical habitat within foreign countries or in other areas outside of the jurisdiction of the United States.''

There are riverine areas outside of the geographical area occupied by the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs as a result of dams and natural falls. We considered whether these unoccupied areas were essential to the conservation of the respective DPSs and concluded that they were not essential because nearly all known historical habitat is accessible to the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs (ASSRT, 2007; 77 FR 5880; February 6, 2012) and, because additional unoccupied habitat is not necessary in light of any

anticipated impacts of climate change. Therefore, we are not designating critical habitat within any unoccupied areas for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs.

For the Carolina and South Atlantic DPS, we had proposed to designate areas of unoccupied critical habitat. However, based on input received during the public review process, we reconsidered those proposals. After discussion with USFWS and state resource managers, we are uncertain whether the Cape Fear River unoccupied unit (*i.e.,* the area between Lock and Dam #2 and Lock and Dam #3) contains spawning habitat that would make it essential for the conservation of species. In addition,, following the conclusion of our discretionary exclusion analysis we have elected to exercise our discretion under section 4(b)(2) of the ESA and exclude the Santee-Cooper river system and Savannah River unoccupied units of critical habitat. We determined the benefits of exclusion (that is, avoiding some or all of the impacts that would result from designation) outweigh the benefits of designation.

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Critical Habitat Unit Name	DPS Nomenclature	Water Body	State	Upper extent	Total River kilometers	Total River miles
Roanoke	Carolina Unit 1 (C1)	Roanoke River	North Carolina	Roanoke Rapids Dam	213	132
Tar - Pamlico	Carolina Unit 2 (C2)	Tar - Pamlico River	North Carolina	Rocky Mount Mill Pond Dam	199	124
Neuse	Carolina Unit 3 (C3)	Neuse River	North Carolina	Milburnie Dam	345	214
Cape Fear	Carolina Unit 4 (C4)	Cape Fear River	North Carolina	Lock and Dam #2	151	94
		Northeast Cape Fear River	North Carolina	Upstream side of Rones Chapel Road Bridge	218	136
Pee Dee	Carolina Unit 5 (C5)	Pee Dee River	North Carolina/South Carolina	Blewett Falls Dam	310	192
		Waccamaw River	South Carolina	Bull Creek (a.k.a. Big Bull Creek)	35	22
		Bull Creek (a.k.a. Big Bull Creek)	South Carolina	Pee Dee River	17	11
Black	Carolina Unit 6 (C6)	Black River	South Carolina	Interstate Highway 95	203	126
Santee - Cooper	Carolina Unit 7 (C7)	Santee River	South Carolina	Wilson Dam	114	71
		Rediversion Canal	South Carolina	St. Stephens Dam	8	5
		North Santee River	South Carolina	Confluence of Santee River	29	18
		South Santee River	South Carolina	Confluence of Santee River	27	17
		Tailrace Canal - West Branch Cooper River	South Carolina	Pinopolis Dam	29	18
		Cooper River	South Carolina	Confluence of the West Branch Cooper and East Branch Cooper Rivers	41	25
Edisto	South Atlantic Unit 1 (SA1)	North Fork Edisto River	South Carolina	Cones Pond just north of I-20 (Approximately 33.8035 N, 80.4702 W)	155	96
		South Fork Edisto River	South Carolina	State Hwy 121	175	109
		Edisto River	South Carolina	Confluence of the North Fork Edisto and South Fork Edisto Rivers	163	101
		North Edisto River	South Carolina	Edisto River	29	18
		South Edisto River	South Carolina	Edisto River	31	19
Combahee - Salkehatchie	South Atlantic Unit 2 (SA2)	Combahee - Salkehatchie River	South Carolina	Confluence of Buck and Rosemary Creeks with (Approximately 33.2906 N, 81.4326 W)	185	115
Savannah	South Atlantic Unit 3 (SA3)	Savannah River	South Carolina/Georgia	New Savannah Bluff Lock and Dam	338	210
Ogeechee	South Atlantic Unit 4 (SA4)	Ogeechee River	Georgia	Mayfield Mill Dam (Approximately 33.364799 N, 82.805872 W)	420	261
Altamaha	South Atlantic Unit 5 (SA5)	Oconee River	Georgia	Sinclair Dam	227	141
		Ocmulgee River	Georgia	Juliette Dam	363	226
		Altamaha River	Georgia	Confluence of Oconee and Ocmulgee Rivers	216	134
Satilla	South Atlantic Unit 6 (SA6)	Satilla River	Georgia	Confluence of Satilla and Wiggins Creeks (Approximately 31.5041 N, 83.0818 W)	378	235
St. Marys	South Atlantic Unit 7 (SA7)	St. Marys River	Georgia/Florida	Confluence of Middle Prong St. Marys and St. Marys Rivers (Approximately 30.4233 N, 82.2094 W)	203	126

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Application of ESA Section 4(a)(3)(B)(i) (Military Lands)

Section 4(a)(3)(B)(i) of the ESA prohibits designating as critical habitat any lands or other geographical areas owned or controlled by the DOD, or designated for its use, that are subject to an INRMP prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation. The legislative history to this provision explains:

> The conferees would expect the [Secretary] to assess an INRMP's potential contribution to species conservation, giving due regard to those habitat protection, maintenance, and improvement projects and other related activities specified in the plan that address the particular conservation and protection needs of the species for which critical habitat would otherwise be proposed. Consistent with current practice, the Secretary would establish criteria that would be used to determine if an INRMP benefits the listed species for which critical habitat would be proposed. (Conference Committee report, 149 Cong. Rec. H. 10563 (November 6, 2003)).

Our regulations at 50 CFR 424.12(h) provide that in determining whether an applicable benefit is provided, we must consider:

(1) The extent of the area and features present;

(2) The type and frequency of use of the area by the species;

(3) The relevant elements of the INRMP in terms of management objectives, activities covered, and best management practices, and the certainty that the relevant elements will be implemented; and

(4) The degree to which the relevant elements of the INRMP will protect the habitat from the types of effects that would be addressed through a destruction-or-adverse-modification analysis.

In accordance with section 4(a)(3)(B)(i) of the ESA, the particular areas of the U.S. Military Academy—West Point, New York, Joint Base Langley—Eustis, Virginia, Marine Corps Base Quantico, Virginia, Naval Support Facility Dahlgren, and Naval Weapons Station Yorktown, that overlap with a New York Bight DPS or Chesapeake Bay DPS critical habitat unit are not part of the designated critical habitat unit because the INRMP for each facility provides a benefit to the respective Atlantic sturgeon DPS and its habitat. A copy of the letter providing our determination for each facility is provided in Appendix C of the Impacts Analysis and Biological Source Document for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon. That Appendix also includes our analysis supporting the conclusion that the relevant INRMPs provide the types of benefits to Atlantic sturgeon described in our regulations (50 CFR 424.12(h)); therefore, that analysis is not repeated here.

Consideration of Whether the Joint Base Charleston INRMP Provides a Conservation Benefit to the Carolina DPS

Joint Base Charleston (JBC) in South Carolina is the only installation controlled by the DOD which coincides with any area under consideration for critical habitat for the Carolina DPS. Prior to development of the proposed rule, we asked JBC to determine if they owned or controlled any lands that should not be designated as critical habitat pursuant to section 4(a)(3)(B)(i) of the ESA. They responded stating they did not believe they owned or controlled any lands eligible for section 4(a)(3)(B)(i) non-inclusion. However, during the public comment period, the Navy requested in writing that the restricted area on the Cooper River, South Carolina (defined at 33 CFR 334.460), not be designated as critical habitat, citing that it is covered by the 2015 INRMP for JBC and should not be included pursuant to ESA section 4(a)(3)(B)(i).

The regulations at 33 CFR 334.460 identify 16 specific areas, including some far from JBC. We determined the areas described in those regulations fall into three categories: (1) Areas outside the boundaries of critical habitat and therefore ineligible for non-designation consideration under section 4(a)(3)(B)(i) and not included in critical habitat (no need to request that these areas not be included); (2) areas within the boundaries of critical habitat, but not subject to an INRMP, and thus ineligible for non-designation consideration; and (3) areas within critical habitat, subject to an INRMP, which are eligible for non-designation consideration.

Of the 16 areas identified in 33 CFR 334.460, we determined seven entire areas (33 CFR 334.460 (a)(2), (3), (7), (8)(i), (11)–(13)), and a portion of another (33 CFR 334.460 (a)(1)—Noisette Creek), did not meet the definition of critical habitat and were ineligible for non-designation consideration. We determined four additional areas (33 CFR 334.460 (a)(1), (4)–(6)) were in the second category and also ineligible for non-designation consideration.

However, we did conclude the five remaining areas (33 CFR 334.460 (a)(8)(ii)–(iv), (9), (10)) fell under the JBC INRMP and were eligible for non-designation consideration. The JBC INRMP covers the lands encompassed by JB CHS Air (formerly Joint Base Charleston Air Force Base) in Charleston County and lands encompassed by JB CHS Weapons (formerly Naval Weapons Station Charleston) in Charleston and Berkeley Counties. JB CHS Air also includes North Auxiliary Airfield in Orangeburg County. Within the area covered by the INRMP, three of the four PBF(s) could be present (all but the spawning substrate). Atlantic sturgeon are expected to use the features in this area in the same way that they would all other areas of designated critical habitat; in other words, there is nothing unique or limiting about the critical habitat in this area.

The INRMP for JBC acknowledges that the estuarine waters of the Cooper River in the vicinity of JBC Weapons provide foraging and migratory habitat for Atlantic sturgeon. The INRMP notes that water pollution at JBC Weapons is a concern due to the large amount of essential fish habitat on and around the installation. The INRMP discusses that there are 26 water quality monitoring stations in the vicinity of JBC that are on the Clean Water Act section 303(d) list of impaired waterbodies, that these stations are located in a designated TMDL watershed, and that 16 of the stations are located within the Cooper River drainage surrounding JBC Weapons. While none of the monitoring stations have a TMDL, in 2013 the State of South Carolina revised their TMDL for DO for Charleston Harbor, and the Cooper, Ashley and Wando Rivers (SCDHEC, 2013). In the revised TMDL, the South Carolina Department of Health and Environmental Control (SCDHEC) notes that a number of monitoring stations in the covered area, including the Cooper River, are designated as not supporting aquatic life use due to low DO. SCDHEC also notes that available data and modeling indicate that regulated and unregulated stormwater and nonpoint sources are not contributing to allowable DO depression on main stem segments in Charleston Harbor, or the Cooper, Ashley, and Wando Rivers. JBC Weapons has three NPDES permits—one industrial and two stormwater. JBC is implementing a Stormwater Management Plan that addresses water quality for the entire storm sewer collection system.

Section 7.4 of the INRMP addresses management of threatened and endangered species, species of concern, and their habitats. In the subsection for Atlantic sturgeon, the INRMP

appropriately acknowledges that the Atlantic sturgeon requires access to expansive areas of high quality freshwater habitats and that the waters of the Cooper River in the vicinity of JBC Weapons provide foraging and migratory habitat for the species. The INRMP describes a number of management activities that benefit Atlantic sturgeon and its habitat. The INRMP summarizes the benefits of this suite of activities as follows: ''Management activities would improve water quality by identifying, correcting, or preventing pollution or sediment discharges; limiting substrate disturbance; maintaining DO content by reducing nutrients entering the water that result in an increased biological oxygen demand from organisms processing the nutrients; and maintaining or improving water clarity by reducing erosion and limiting sediment in runoff.'' These objectives are directly relevant to protection of the transitional salinity, soft substrate, and water quality facets of the PBFs of Atlantic sturgeon critical habitat. We identified several management activities discussed in the INRMP that we believe can help accomplish these objectives, including:

(1) Repairing/revitalizing stormwater drainage systems;

(2) Updating the Stormwater Pollution Prevention Plan and the Stormwater Management Plan;

(3) Repairing forestry roads and culverts;

(4) Including performance-based goals in grounds maintenance to help minimize erosion and sediment transport to the Cooper River;

(5) Implementing BMPs to improve water quality discharged to the Cooper River, including training, identifying and correcting illicit discharges, enforcing erosion and sedimentation controls;

(6) Limiting dredge operations in the Nuclear Power Training Unit ship channel and other shipping/receiving facilities to the minimum extent required;

(7) Maintaining and/or developing protective buffer strips where feasible around wetlands along streams; and

(8) Practicing ecologically-sound forest management.

These activities provide a benefit to the PBFs identified in the critical habitat designations, particularly the transitional salinity zone/soft substrate and water quality PBFs, by reducing sediment and nutrient discharges into nearshore waters, which addresses some of the conservation and protection needs that critical habitat would afford. These activities are similar to those that we describe below as project modifications for avoiding or reducing adverse effects to the critical habitat. Therefore, were we to consult with the DOD on the activities in the INRMP that may affect the critical habitat, we would likely not require any project modifications based on the best management practices in the INRMP. Further, the INRMP includes provisions for monitoring and evaluating conservation effectiveness, which will ensure continued benefits to the species. The INRMP must be reviewed by participating Federal and state resource management agencies on a regular basis, but not less often than every five years. JB CHS will also provide us an opportunity to review the INRMP, as protected species under our jurisdiction (*i.e.,* Atlantic and shortnose sturgeon) may be affected by measures in the INRMP. We believe the JBC INRMP provides the types of benefits to Atlantic sturgeon described in our regulations (50 CFR 424.12(h)) and, thus, the restricted areas in the Cooper River covered by the INRMP should not be included in designated critical habitat.

Application of ESA Section 4(b)(2)

Section 4(b)(2) of the ESA requires that we consider the economic impact, impact on national security, and any other relevant impact, of designating any particular area as critical habitat. Additionally, the Secretary has the discretion to consider excluding any area from critical habitat if [s]he determines, based upon the best scientific and commercial data available, the benefits of exclusion (that is, avoiding some or all of the impacts that would result from designation) outweigh the benefits of designation. The regulations at 50 CFR 424.19(h) provide the framework for how we intend to implement section 4(b)(2) of the ESA. These regulations were revised in 2016 (81 FR 7413; February 11, 2016). In particular, Congress has authorized the Secretary to ''exclude any area from critical habitat if [s]he determines that the benefits of exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless [s]he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned'' (ESA section 4(b)(2)). Because the authority to exclude is discretionary, exclusion is not required for any particular area, under any circumstances; however, under the final policy (81 FR 7226; February 11, 2016), if NMFS determines it is appropriate to conduct an exclusion analysis on some or all areas of a designation, it is our general practice to exclude an area when the benefits of exclusion outweigh the benefits of inclusion.

The ESA provides the Services with broad discretion in how to consider impacts. See, H.R. Rep. No. 95–1625, at 17, reprinted in 1978 U.S.C.C.A.N. 9453, 9467 (1978) (''Economics and any other relevant impact shall be considered by the Secretary in setting the limits of critical habitat for such a species. The Secretary is not required to give economics or any other 'relevant impact' predominant consideration in his specification of critical habitat . . . The consideration and weight given to any particular impact is completely within the Secretary's discretion.''). Courts have noted the ESA does not contain requirements for any particular methods or approaches. See, *e.g., Bldg. Indus. Ass'n of the Bay Area et al..* v. *U.S. Dep't. of Commerce et al..,* No. 13–15132, 9th Cir., July 7, 2015 (upholding district court's ruling that the ESA does not require the agency to follow a specific methodology when designating critical habitat under section 4(b)(2)). For this final rule, we followed the same approach to describing and evaluating impacts as we have for other recent critical habitat rulemakings.

The following discussion of impacts summarizes the analysis contained in our final Impacts Analysis and Biological Source Document for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon. The administrative cost of conducting ESA section 7 consultations was determined to be the primary source of economic impacts as a result of designating critical habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs. The number of incremental consultations over the next 10 years will likely be relatively small, because Atlantic sturgeon of a given life stage are likely to be either directly or indirectly affected by the Federal activities projected to occur within the proposed critical habitat. Since nearly all, if not all, the ESA section 7 consultations we anticipate to occur over the next 10 years will need to evaluate potential effects to both the Atlantic sturgeon DPS(s) present in the area and the critical habitat, the impacts will be coextensive. Therefore, the low administrative cost estimates are the most realistic cost estimates. The projected low administrative costs of designating all of the Gulf of Maine DPS critical habitat units total $816,574.20 over the next 10 years. The projected low administrative costs for the New York Bight DPS critical habitat units total $1,418,299.30 over the next 10

years. The projected low administrative costs of designating all of the Chesapeake Bay DPS critical habitat units total $501,774.20 over the next 10 years. Currently, there is no information indicating that any of the ESA section 7 consultations expected to result from the critical habitat designations will result in project modifications. However, because we cannot predict every Federal action that will be proposed in the future or what the impacts of those actions will be on critical habitat, we recognize that there may be some future costs associated with project modifications. The timing of the ESA section 7 consultation process, which is designed to occur as early as possible in the action planning process and before there have been any irreversible or irretrievable commitment of resources, minimizes the potential for the outcome of a consultation to be costly project modifications.

We considered information provided by the Navy for impacts to national security the Navy expects to result from critical habitat designation for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs. We determined that any resulting ESA section 7 consultations for Navy activities within the critical habitat areas will likely be coextensive and that based on this, as well as the types of activities the Navy will undertake in the critical habitat, there will be no impacts to national security resulting from the designation of critical habitat for the Gulf of Maine, New York Bight or Chesapeake Bay DPS.

There are a number of potential beneficial impacts of designating critical habitat that extend beyond the conservation benefits to Atlantic sturgeon. Because it is often difficult to quantify the benefits of designating critical habitat, Executive Order (EO) 12866, Regulatory Planning and Review, provides guidance on assessing costs and benefits. The EO directs Federal agencies to assess all costs and benefits of available regulatory alternatives, and to select those approaches that maximize net benefits.

The designation of critical habitat will provide conservation benefits such as improved education and outreach by informing the public about areas and features important to the conservation of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs. Specifying the geographical location of critical habitat facilitates implementation of section 7(a)(1) of the ESA by identifying areas where Federal agencies can focus their conservation programs and use their authorities to further the purposes of the ESA. Designating critical habitat can also help focus the efforts of other conservation partners (*e.g.,* State and local governments, individuals and nongovernmental organizations), and could be beneficial to the ecosystem by protecting features that are also necessary for the conservation of other species.

Based on our consideration of impacts, we are not excluding any areas from the critical habitat designations for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon based on economic, national security, or other relevant impacts. The designation of critical habitat will provide conservation benefits such as improved education and outreach by informing the public about areas and features important to the conservation of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs. There are also a number of potential beneficial impacts of designating critical habitat that extend beyond the conservation benefits to Atlantic sturgeon. For example, protecting essential PBFs of sturgeon habitat, including preserving water quality and natural flow regimes, will benefit other organisms that are co-located in these areas. While we cannot quantify nor monetize the benefits, we believe they are not negligible and would be an incremental benefit of this designation. Therefore, we have declined to exercise our discretion to exclude any particular area from the proposed critical habitat units for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon.

The Impacts Analysis and Biological Source Document for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs provides specific information on the Economic, National Security and Other Relevant Impacts considered for the critical habitat designations for these DPSs and therefore is not repeated here. Specific information for these impacts as well as the determination for Discretionary Exclusions under section 4(b)(2) for the critical habitat designations for the Carolina and South Atlantic DPSs is provided below.

The following discussion of impacts summarizes the analysis contained in our final ''Impacts Analysis of Critical Habitat Designation for the Carolina and South Atlantic Distinct Population Segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)'' (IA), which identifies the economic, national security, and other relevant impacts that we projected would result from including each of the 14 occupied and 2 unoccupied specific areas in the critical habitat designation. We considered these impacts when deciding whether to exercise our discretion to propose excluding particular areas from the designation. Both positive and negative impacts were identified and considered (these terms are used interchangeably with benefits and costs, respectively). Impacts were evaluated in quantitative terms where feasible, but qualitative appraisals were used where that is more appropriate to particular impacts. The final Impacts Analysis is available on our Web site at *http://sero.nmfs.noaa.gov/protected_resources/sturgeon/index.html.*

The primary impacts of a critical habitat designation result from the ESA section 7(a)(2) requirement that Federal agencies ensure their actions are not likely to result in the destruction or adverse modification of critical habitat, and that they consult with us in fulfilling this requirement. Determining these impacts is complicated by the fact that section 7(a)(2) also requires that Federal agencies ensure their actions are not likely to jeopardize the species' continued existence. One incremental impact of designation is the extent to which Federal agencies modify their proposed actions to ensure they are not likely to destroy or adversely modify the critical habitat beyond any modifications they would make because of listing and the results of a jeopardy analysis. When the same modification would be required due to impacts to both the species and critical habitat, the impact of the designation is coextensive with the ESA listing of the species (*i.e.,* attributable to both the listing of the species and the designation critical habitat). Relevant, existing regulatory protections are referred to as the ''baseline'' and are also discussed in the Impacts Analysis. In this case, notable baseline protections include the ESA listings of not only Atlantic sturgeon, but the co-occurring endangered shortnose sturgeon.

The Impacts Analysis describes the projected future Federal activities that would trigger section 7 consultation requirements because they may affect the PBF(s), and consequently may result in economic costs or negative impacts. The report also identifies the potential national security and other relevant impacts that may arise due to the critical habitat designation, such as positive impacts that may arise from conservation of the species and its habitat, state and local protections that may be triggered as a result of designation, and education of the public to the importance of an area for species conservation.

Economic Impacts of Designating Critical Habitat for the Carolina and South Atlantic DPSs

Economic impacts of the critical habitat designation result through implementation of section 7 of the ESA in consultations with Federal agencies to ensure their proposed actions are not likely to destroy or adversely modify critical habitat. These economic impacts may include both administrative and project modification costs; economic impacts that may be associated with the conservation benefits of the designation are described later.

When identifying costs, we examined the ESA section 7 consultation record over the last 10 years, as compiled in our PCTS database, to identify the types of Federal activities that may adversely affect Atlantic sturgeon critical habitat. We also requested that Federal action agencies provide us with information on future consultations if we omitted any future actions likely to affect the proposed critical habitat. No new categories of activities were identified through this process. Of the types of past consultations that ''may affect'' some or all of the PBF(s) in any unit of critical habitat, we determined that no activities would solely affect the PBFs essential for conservation. That is, all categories of the activities we identified that could impact the PBFs also had the potential of ''take'' resulting from the listing of the species.

In the proposed rule we identified 15 categories of activities implemented by 10 different Federal entities as likely to recur in the future and have the potential to affect the PBF(s). Based on comments from EPA, we added a category for EPA for the triennial approval of state water quality standards. Listed below is the agency, description of the activity, and total number of projected consultations anticipated over the next 10 years indicated in parentheses:

1. USACE—Navigation maintenance dredging, harbor expansion (14);
2. USACE—Water Resources Development Act (WRDA) flood control, ecosystem restoration studies (6);
3. USACE—WRDA dam operations, repair, fishway construction (3);
4. USACE—Clean Water Act (CWA) section 404/Rivers and Harbors Act (RHA) section 10 permitting—dredge, fill, construction (20);
5. Federal Highway Administration (FHWA)—Bridge repair, replacement (67);
6. U.S. Coast Guard (USCG)—Bridge repair, replacement permitting (3);
7. FERC—Hydropower licensing (5);
8. FERC—Liquefied Natural Gas (LNG) facilities, pipelines authorization (5);
9. Nuclear Regulatory Commission (NRC)—Nuclear power plant construction/operation licensing (8);
10. NMFS—ESA research and incidental take permitting (section 10) (46);
11. USFWS—Fishery management grants (11);
12. EPA—Nationwide pesticide authorizations (9);
13. EPA—State water quality standard reviews (12);
14. Federal Emergency Management Agency (FEMA)—Disaster assistance/preparation grants (5); and
15. Department of Energy (DOE)—Nuclear fuel management (3).

In total, we estimated that 217 activities would require section 7 consultation over the next 10 years to consider impacts to Atlantic sturgeon critical habitat for the Carolina and South Atlantic DPSs. As discussed in more detail in our final IA, all the activities identified as having the potential to adversely affect one or more of the PBF(s) also have the potential to take Atlantic sturgeon. For most, if not all, of the projected future activities, if the effects to critical habitat will be adverse and require formal consultation, those effects would also constitute adverse effects to the species, either directly when they are in the project area, or indirectly due to the effects on their critical habitat. This is due to the ecological functions of these PBFs. For example, water quality is being identified as an essential PBF to facilitate successful spawning, annual and inter-annual adult, larval, and juvenile survival, and larval, juvenile and subadult growth, development, and recruitment. Effects to the water quality PBF that impede that conservation objective could injure or kill individual Atlantic sturgeon, for example, by preventing adult reproduction, or rendering reproduction ineffective or resulting in reduced growth or mortality of larvae, juveniles or subadults. In these circumstances, the same project modifications would be required to address effects to both the species and effects to the critical habitat. Thus, projects that adversely affect the PBF(s) are likely to always also take the species and the project impacts would not be incremental.

For some of the projected activities, it may be feasible to conduct the action when sturgeon are out of the action area. If effects to critical habitat are temporary such that the PBF(s) return to their pre-project condition by the time the sturgeon return and rely on the PBFs, there might not be any adverse effects to either the species or the critical habitat. In these circumstances, consultations would be fully incremental consultations only on critical habitat, and the consultations would be informal (*i.e.,* impacts to critical habitat would not be permanent and would not be significant). This would likely only apply to actions that affect spawning habitat in the upper parts of the rivers, as sturgeon of various ages are present year-round in the lower reaches of the rivers and the estuaries. The costs of fully incremental, informal consultations are higher than the marginal costs of adding critical habitat analyses to coextensive, formal consultations. Thus, to be conservative and avoid underestimating incremental impacts of this designation, and based on the activities we identified, we assumed that two categories of activities could result in incremental, informal consultations. Those activities, both implemented by the USACE, are CWA section 404/Rivers and Harbors Act permitting and WRDA dam operations/repair. Administrative costs include the cost of time spent in meetings, preparing letters, and in some cases, developing a biological assessment and biological opinion, identifying and designing reasonable and prudent measures (RPMs), and so forth. For this impacts report, we estimated per-project administrative costs based on critical habitat economic analyses by Industrial Economics, Inc. (IEc) (2014). This impacts report estimates administrative costs for different categories of consultations as follows: (1) New consultations resulting entirely from critical habitat designation; (2) new consultations considering only adverse modification (unoccupied habitat); (3) reinitiation of consultation to address adverse modification; and (4) additional consultation effort to address adverse modification in a new consultation. Most of the projected future consultations we project to result from this final rulemaking will be coextensive formal consultations on new actions that would be evaluating impacts to sturgeon as well as impacts to critical habitat, and the administrative costs for these 194 consultations would be in category 4 above. The remaining 23 actions are projected to involve incremental informal consultation due to impacts to critical habitat alone. Based on the IEc reports (2014), we project that each formal consultation will result in the following additional costs to address critical habitat impacts: $1,400 in costs to us; $1,600 in action agency costs; $880 in third party (*e.g.,* permittee) costs, if applicable; and $1,200 in costs to the action agency or third party to prepare a biological assessment. Costs for the incremental informal consultations would be as follows: $1,900 in costs to us; $2,300 in action agency costs; $1,500 in third party (*e.g.,*

permittee) costs, if applicable; and $1,500 in costs to the action agency or third party to prepare a BA.

Costs of the nine EPA nationwide pesticide consultations were treated differently. These consultations will involve all listed species and all designated critical habitat under our jurisdiction, and thus costs attributable solely to this final rule designating critical habitat for Atlantic sturgeon are expected to be only a very small part of that cost. To be conservative, we added nine consultations to each critical habitat unit for all five DPSs. We spread the costs of these 9 consultations ($5,080 each) evenly across all 31 critical habitat units. This resulted in a total cost of $1,474.84 per unit over 10 years.

The 12 consultations on EPA approval of state water quality standards were also treated differently. EPA expects to conduct three statewide consultations regarding their approval of state water quality standards in each of the four states covered by the designation of critical habitat for the Carolina and South Atlantic DPSs. For these two DPSs, we have split the incremental administrative costs of 3 statewide consultations ($15,240) equally across all the units within each state, added these costs to the 10-year totals, and derived the annual totals from these figures, because these are not annual actions. We added the costs projected across two states to units that occur in two states. Total costs for these consultations are $3,048 per unit in North Carolina, $2,540 per unit in Georgia, and $2,177.14 in South Carolina. Costs for units bordering 2 states are $5,225.14 in the Pee Dee River unit, $4,717.14 in the Savannah River unit, and $17,780 in the St. Marys unit (the costs of the 3 statewide water quality standards (WQS) consultations in Florida are attributed wholly to this single unit in the state, added to the costs of Georgia WQS consultations). We have added three consultations to the number expected in each unit, but the total number of consultations for each DPS consists of three consultations per each state with units in that DPS. This approach avoids underestimating the costs in any unit but would overestimate the total costs expected.

In our impacts analysis, we concluded that none of the projected future activities are likely to require project modifications to avoid adverse effects to critical habitat PBFs that would be different from modifications required to avoid adverse effects to sturgeon. In other words, we projected no incremental costs for actions in a critical habitat unit other than the administrative costs of section 7 consultations. While there may be serious adverse impacts to critical habitat from projected future projects that require project modifications to avoid destroying or adversely modifying critical habitat, impacts of these magnitudes to the PBF(s) as defined would also result in adverse effects to Atlantic sturgeon, either directly when they are in the project area, or indirectly as harm, resulting from impacts to their habitat that result in injury or death. The same project modifications would be required to avoid destroying or adversely modifying critical habitat and avoiding jeopardy, or minimizing take of Atlantic sturgeon caused by impacts to its habitat.

Based on our final Impacts Analysis for the Carolina and South Atlantic DPSs, we project that the costs that will result from the designation of critical habitat will total $1,154,475 over the next 10 years. The total incremental cost resulting from the designation for the Carolina DPS is $526,447, and the total incremental cost resulting from the designation for the South Atlantic DPS is $628,027, over 10 years. The annual cost per-unit ranges widely from $873 (Carolina Unit 6—Black River, Carolina DPS) to $23,523 (South Atlantic Unit 3—Occupied Savannah River, South Atlantic DPS).

National Security Impacts of Designating Critical Habitat for the Carolina and South Atlantic DPSs

Previous critical habitat designations have recognized that impacts to national security result if a designation would trigger future ESA section 7 consultations because a proposed military activity ''may affect'' the PBFs essential to the listed species' conservation. Anticipated interference with mission-essential training or testing or unit readiness, through the additional commitment of resources to an adverse modification analysis and expected requirements to modify the action to prevent adverse modification of critical habitat, has been identified as a negative impact of critical habitat designations. (See, *e.g.,* Proposed Designation of Critical Habitat for Southern Resident Killer Whales; 69 FR 75608, Dec. 17, 2004, at 75633.)

On February 14, 2014, and again in October 7, 2015, we sent letters to the DOD and the Department of Homeland Security requesting information on national security impacts of the proposed critical habitat designations, and we received responses from the Navy, Air Force, Army, and USCG. We discuss the information contained within the responses thoroughly in the Impacts Analysis, and we summarize the information below.

The Navy's first submission provided information on its facilities and operations. However, the Navy was not able to make a full assessment of whether there would be any national security impacts. The Navy indicated that as we define our PBF(s) and areas more precisely, they would be able to provide a more detailed response to our requests and would update their INRMPs as necessary for the protection of Atlantic sturgeon and its critical habitat. The Navy's second submission noted that Naval Submarine Base Kings Bay was adjacent to the South Atlantic DPS critical habitat unit in the St. Marys River. The Navy stated it did not own or control any land or waters within the St. Marys channel, but that the TRIDENT-class submarines used 4.9 km of the waterway transiting to and from the Atlantic Ocean. The Navy stated that any operational or dredging restrictions that would impede maintenance of the channel from the Intracoastal Waterway and St. Marys channel intersection, downstream, could pose a national security risk. Typically we consult with the USACE for dredging actions, and in this case the Navy would be the permit applicant. We determined that dredging has the potential to affect critical habitat, but we also concluded that consultations for effects of dredging on critical habitat will be fully-coextensive with consultations to address impacts to sturgeon (both shortnose and Atlantic). The effects of dredging on PBF(s) would also result in injury or death to individual sturgeon, and thus constitute take. Removal or covering of spawning substrate could prevent effective spawning or result in death of eggs or larvae that are spawned. Changing the salinity regime by deepening harbors and parts of rivers could result in permanent decreases of available foraging and developmental habitat for juveniles. These types of adverse effects are not likely to be temporary and limited to periods of sturgeon absence. Thus, adverse effects of dredging activities identified by the Navy would be likely to be coextensive in formal consultations to address impacts to both the species and the PBF(s), and thus no new requirements or project modifications are anticipated as a result of the critical habitat designation. Therefore, after considering the action identified by the Navy at Kings Bay, we find there will be no impact on national security as a consequence of the critical habitat designation for these actions.

Both the Navy and Air Force expressed concern that designating the Cooper River, including the riverine

area on the west bank adjacent to the Joint Base Charleston Naval Weapons Station, could have significant impacts on the Navy's ability to adequately support mission-essential military operations, thereby impacting national security. The Navy and Air Force were concerned that designation of critical habitat could affect training facilities and the maintenance of their facilities. Additional concerns were expressed regarding shipping and receiving operations from two waterfront facilities. Because no specifics were given on how designation of critical habitat could affect these activities, and because we determined there are no routes of effects to PBF(s) from these activities based on the information provided, we concluded that designation of critical habitat will have no impact on these activities and thus will not result in impacts to national security. Upon further discussion with the Navy, we determined the area was covered by the 2015 INRMP and should not be included as critical habitat pursuant to ESA section 4(a)(3)(B)(i) (see *Consideration of Whether the Joint Base Charleston INRMP Provides a Conservation Benefit to the Carolina DPS* above).

The Army noted that Military Ocean Terminal-Sunny Point was located on the Cape Fear River, North Carolina, and Fort Stewart was located on the Ogeechee River, Georgia. The Army was not able to make a full assessment whether there would be any national security impacts and concluded that technical assessments to occur between the installations and NMFS at the regional level would identify any specific impacts.

The USCG provided information on its facilities and operations. The USCG was not able to make a full assessment whether there would be any national security impacts. The USCG indicated that as we develop our PBF(s) and areas more precisely in the final rule, they would be able to provide a more detailed response to our requests. Our PCTS database indicated the USCG consulted with us three times on authorizations for bridge repairs or replacements. In developing this final rule we determined if those actions were conducted in the future, the activities may affect critical habitat PBFs, but the effects would be fully coextensive with effects to the listed sturgeons. Based on this information regarding potential future USCG action in Atlantic sturgeon critical habitat, we do not expect any national security impacts as a consequence of the critical habitat designation.

Based on a review of our PCTS database, and the information provided by the Navy, Air Force, Army, and USCG on their activities conducted within the specific areas being designated as Atlantic sturgeon critical habitat, we determined that only one military action identified as a potential area of national security impact has routes of potential adverse effects to PBF(s)—river channel dredging. As discussed, this activity will require consultation due to potential impacts to listed Atlantic and shortnose sturgeon, and any project modifications needed to address impacts to these species would also address impacts to critical habitat. Thus, no incremental project modification impacts are expected due to this designation. On this basis, we conclude there will be no national security impacts associated with the critical habitat designation for the Carolina and South Atlantic DPSs of Atlantic sturgeon.

Other Relevant Impacts

Other relevant impacts of critical habitat designations can include conservation benefits to the species and to society, and impacts to governmental and private entities. The Impacts Analysis for the designation of critical habitat for the Carolina and South Atlantic DPSs discusses conservation benefits of designating the 14 occupied and 2 unoccupied areas, and the benefits of conserving the Carolina and South Atlantic sturgeon DPSs to society, in both ecological and economic metrics.

As discussed in the Impacts Analysis for the Carolina and South Atlantic DPSs and summarized here, Atlantic sturgeon currently provide a range of benefits to society. Given the positive benefits of protecting the PBFs essential to the conservation of these DPSs, this protection will in turn contribute to an increase in the benefits of this species to society in the future as the species recovers. While we cannot quantify nor monetize these benefits, we believe they are not negligible and would be an incremental benefit of this designation. However, although the PBFs are essential to the conservation of Atlantic sturgeon DPSs, critical habitat designation alone will not bring about the recovery of the species. The benefits of conserving Atlantic sturgeon are, and will continue to be, the result of several laws and regulations.

The Impacts Analysis identifies both consumptive (*e.g.,* commercial and recreational fishing) and non-consumptive (*e.g.,* wildlife viewing) activities that occur in the areas being designated as critical habitat. Commercial and recreational fishing are components of the economy related to the ecosystem services provided by the resources within Atlantic sturgeon critical habitat areas. The PBF(s) contribute to fish species diversity.

Education and awareness benefits stem from the critical habitat designation when non-Federal government entities or members of the general public responsible for, or interested in, Atlantic sturgeon conservation change their behavior or activities when they become aware of the designation and the importance of the critical habitat areas and features. Designation of critical habitat raises the public's awareness that there are special considerations that may need to be taken within the area. Similarly, state and local governments may be prompted to carry out programs to complement the critical habitat designation and benefit the Carolina and South Atlantic DPSs of Atlantic sturgeon. Those programs would likely result in additional impacts of the designation. However, it is impossible to quantify the beneficial effects of the awareness gained or the secondary impacts from state and local programs resulting from the critical habitat designation.

Discretionary Exclusions Under Section 4(b)(2) for the Carolina and South Atlantic DPSs

In our proposed rule, we described our preliminary determination that we would not perform a discretionary exclusion analysis. Input received during the public comment period resulted in our determination that an exclusion analysis for the unoccupied Santee-Cooper and Savannah River units was warranted. On the other hand, given that occupied units are currently used by Atlantic sturgeon for reproduction and recruitment, and due to the severely depressed levels of all river populations, occupied units are far too valuable to both the conservation and the continuing survival of Atlantic sturgeon to be considered for exclusion.

Based on the analysis included in our IA, the likely benefits of excluding the unoccupied Santee-Cooper and Savannah river units include avoiding consultation costs of $23,972 and $11,272 over ten years, respectively. In addition, there may be ancillary benefits of exclusion to Federal agencies that would conduct activities in these areas, and to their project applicants.

Our qualitative analysis of the benefits derived from designation include benefits associated with section 7 consultations (*e.g.,* proactive coordination with other federal agencies

to avoid impacts to critical habitat); increased likelihood of specifically protecting habitat necessary for Atlantic sturgeon recovery; and opportunities for federal agency conservation programs under section 7(a)(1) of the ESA. These benefits would be limited in the unoccupied Santee-Cooper and Savannah River units, given the low number of unique federal agency actions projected to require consultation over the next ten years (4 and 1 action, respectively). Other benefits of designation include ancillary benefits to other commercially-important aquatic species associated with Atlantic sturgeon habitat; non-use values for sturgeon and their habitats; and increased state, local and public awareness of the importance of these areas, that could generate non-federal conservation efforts and benefits. As we discuss in the IA, given the particular facts and circumstances for these DPSs and this critical habitat designation, it is likely that many or most of these benefits will result from baseline protections for sturgeon and their habitats, even if the unoccupied areas are excluded from the designation. As such, we do not conclude that conservation and recovery of the Carolina and South Atlantic DPSs would be impaired by excluding these areas from the designation.

We determined the potential economic impacts of the designation of unoccupied critical habitat are relatively small. We determined there are significant conservation benefits associated with designation of unoccupied critical habitat, but we could not conclude that these benefits are incremental impacts of including the unoccupied units in the designation. Therefore, it is our judgment that the benefits of excluding the unoccupied Santee-Cooper and Savannah River units outweigh the benefits of including these units in the designation.

Exclusion of these unoccupied units will not result in the extinction of the Carolina or South Atlantic DPS of Atlantic sturgeon. Atlantic sturgeon will need the additional spawning habitat in these units to increase their reproductive success and population growth in order to recover, and thus if these habitats were lost to sturgeon they would not recover. However, based on the Federal actions expected to occur in these areas over the next ten years, and because the areas are protected through a number of baseline requirements including the listing of shortnose sturgeon, we do not expect impacts to these areas would prevent them from supporting Atlantic sturgeon conservation once fish passage to these areas is established in the near future.

We also note that FERC and USACE submitted some significant new information late during the interagency review process on the final rule, outside of the public comment period. One agency suggested exclusion of unoccupied critical habitat was needed to prevent third party litigation seeking fish passage or removal of dams the agency owns and operates on the Cape Fear River to allow migration of sturgeon. That agency estimated the average cost to provide fish passage would range from $8 million and $15 million. The other agency submitted hypothetical costs that might result if consultation were required solely to protect unoccupied critical habitat from the effects of numerous facilities they regulate in the watersheds extending hundreds of miles above the proposed unoccupied units. Cost estimates provided by that agency ranged from $0 to over $1.7 million annually for the range of facilities identified. Those estimates were projected based on past environmental compliance costs for similar facilities. We decided to remove the unoccupied Cape Fear unit because it is not essential to sturgeon conservation. Because we decided to exclude the unoccupied Santee-Cooper and Savannah River units based on the impacts identified in our proposed impacts assessment, and because the public was not afforded an opportunity to review and comment on the new cost information and assumptions, consideration of this late input was not necessary and did not play a role in our determinations. If the types of impacts identified by these agencies would be potential impacts of including the unoccupied units in the designation, it would bolster our conclusion that the benefits of exclusion outweigh the benefits of inclusion.

Final Determinations and Critical Habitat Designation

We conclude that specific areas meet the definition of critical habitat for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon, that a critical habitat designation is prudent, and that critical habitat is determinable.

We found approximately 244 km (152 miles) of aquatic habitat within the Penobscot, Kennebec, Androscoggin, Piscataqua, Cocheco, Salmon Falls, and Merrimack Rivers are critical habitat for the Gulf of Maine DPS of Atlantic sturgeon. We found approximately 547 km (340 miles) of aquatic habitat within the Connecticut, Housatonic, Hudson, and Delaware Rivers are critical habitat for the New York Bight DPS of Atlantic sturgeon. We found approximately 773 km (480 miles) of aquatic habitat within the Potomac, Rappahannock, York, Pamunkey, Mattaponi, James, Nanticoke Rivers and Marshyhope Creek are critical habitat for the Chesapeake Bay DPS of Atlantic sturgeon.

We found approximately 1,939 km (1,205 miles) of aquatic habitat within the Roanoke, Tar-Pamlico, Neuse, Cape Fear, Northeast Cape Fear, Waccamaw, Pee Dee, Black, Santee, North Santee, South Santee, and Cooper Rivers and Bull Creek are critical habitat for the Carolina DPS of Atlantic sturgeon.

Likewise, we found approximately 2,883 km (1,791 miles) of aquatic habitat within the Edisto, Combahee-Salkehatchie, Savannah, Ogeechee, Altamaha, Ocmulgee, Oconee, Satilla, and St. Marys Rivers are critical habitat for the South Atlantic DPS of Atlantic sturgeon.

Activities That May Be Affected

Section 4(b)(8) of the ESA requires that to the maximum extent practicable, we describe briefly and evaluate, in any proposed or final regulation to designate critical habitat, those activities that may destroy or adversely modify such habitat or that may be affected by such designation. As described in our Impacts Analysis and Biological Source Document for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon, and in our final Impacts Analysis for the Carolina and South Atlantic DPSs of Atlantic sturgeon, a wide variety of activities may affect critical habitat and, when carried out, funded, or authorized by a Federal agency, will require an ESA section 7 consultation because they may affect one or more of the PBFs of critical habitat. Such activities include in-water construction for a variety of Federal actions, dredging for navigation, harbor expansion or sand and gravel mining, flood control projects, bridge repair and replacement, hydropower licensing, natural gas facility and pipeline construction, ESA research and incidental take permits or fishery research grants, and CWA TMDL program management. Private entities may also be affected by these critical habitat designations if they are a proponent of a project that requires a Federal permit, Federal funding is received, or the entity is involved in or receives benefits from a Federal project. Future activities will need to be evaluated with respect to their potential to destroy or adversely modify critical habitat. For example, activities may adversely modify the substrate essential PBF by removing or altering the

substrate. The open passage PBF may be adversely modified by the placement of structures such as dams and tidal turbines, research nets, or altering the water depth so that fish cannot swim. The salinity PBF may be adversely modified by activities that impact fresh water input such as operation of water control structures and water withdrawals, and impacts to water depth such as dredging. The water quality PBF may be adversely modified by land development as well as commercial and recreational activities on rivers that contribute to nutrient loading that could result in decreased DO levels and increased water temperature, and increased sediment deposition that reduces Atlantic sturgeon egg adherence on hard spawning substrate and reduces the interstitial spaces used by larvae for refuge from predators. Dredging to remove sediment build-up or to facilitate vessel traffic may remove or alter hard substrate that is necessary for egg adherence and as refuge for larvae, and may change the water depth resulting in shifts in the salt wedge within the estuary or change other characteristics of the water quality (*e.g.,* temperature, DO) necessary for the developing eggs, larvae, and juveniles. These activities would require ESA section 7 consultation when they are implemented, funded, or carried out by a Federal agency.

We believe this critical habitat designation provides Federal agencies, private entities, and the public with clear notification of critical habitat for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon, the PBF(s), and the boundaries of those habitats. These designations allow Federal agencies and others to evaluate the potential effects of their activities on critical habitat to determine if ESA section 7 consultation with us is needed, given the specific definition of each PBF.

Information Quality Act and Peer Review

On December 16, 2004, the Office of Management and Budget (OMB) issued its Final Information Quality Bulletin for Peer Review (Bulletin), 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 scientific information or highly influential scientific assessments disseminated on or after June 16, 2005. The biological information describing the Atlantic sturgeon DPSs, and the information in the draft economic impacts analyses supporting the critical habitat designation for the five DPSs is considered influential scientific information and subject to peer review. To satisfy our requirements under the OMB Bulletin, we obtained independent peer review of the biological information and the information used to draft the impacts analyses. We incorporated the peer review comments into the proposed rules prior to dissemination. Comments received from peer reviewers were summarized and are available on the web at: *http://www.cio.noaa.gov/services_programs/prplans/ID294.html* and *http://www.cio.noaa.gov/services_programs/prplans/ID336.html.*

Classification

National Environmental Policy Act

We have determined that an environmental analysis as provided for under the National Environmental Policy Act of 1969 for critical habitat designations made pursuant to the ESA is not required. See *Markle Interests, L.L.C.* v. *U.S. Fish and Wildlife Serv.,* 827 F.3d 452 (5th Cir. 2016); *Bldg. Indus. Ass'n of the Bay Area* v. *U.S. Dept. of Commerce,* 792 F.3d 1027 (9th Cir. 201); *Douglas County* v. *Babbitt,* 48 F.3d 1495 (9th Cir. 1995), cert. denied, 116 S.Ct. 698 (1996).

Regulatory Flexibility Act Determinations

The ESA does not require use of any particular methodology in the consideration of impacts pursuant to section 4(b)(2) (see, *e.g., Building Industry Association of the Bay Area* v. *U.S. Department of Commerce,* 792 F.3d 1027 (9th Cir. 2015)). In preparing the rules proposing critical habitat for the Atlantic sturgeon DPSs, we used different methodologies to conduct the respective impacts analyses. While those differences in analyses are reflected below, we note the conclusions are the same, *i.e.,* that designation of critical habitat for the five DPSs of Atlantic sturgeon will not have significant economic impacts on small entities. The Final Regulatory Flexibility Analyses (FRFA) were prepared pursuant to section 604 of the Regulatory Flexibility Act (5 U.S.C. 601, *et seq.*). A FRFA includes: A statement of the need for, and objectives of, the rule; a statement of the significant issues raised by the public comments in response to the initial regulatory flexibility analysis (IRFA), a statement of the assessment by the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments; the response of the agency to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration (SBA) in response to the proposed rule, and a detailed statement of any change made to the proposed rule in the final rule as a result of the comments; a description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available; a description of the projected reporting, recordkeeping and other compliance requirements of the rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and, a description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected. We received no comments specifically on the IRFAs from the public or from the Chief Counsel for Advocacy of the SBA. The FRFA for the Regulatory Flexibility Act determinations for the Gulf of Maine, New York Bight and Chesapeake Bay DPSs and the FRFA for the Regulatory Flexibility Act determinations for the Carolina and South Atlantic DPSs of Atlantic sturgeon analyze the impacts of this rule on small entities, are included as Appendix A of the respective Impacts Analysis, and are available upon request (see **ADDRESSES**). A summary of each analysis follows.

Regulatory Flexibility Act Determinations for the Gulf of Maine, New York Bight and Chesapeake Bay DPSs (5 U.S.C. 601 et seq.)

As explained in the FRFA for the Gulf of Maine, New York Bight and Chesapeake Bay DPSs, the economic analysis described and estimated the number of small entities to which this rule may apply. These estimates are based on the best available information and take into account uncertainty. Using the number of employees as the criteria for determining whether or not an establishment is a small business, on average, 99 percent of businesses in the counties and cities in which the

proposed Atlantic sturgeon critical habitat units occur are considered small businesses. For purposes of projecting the impacts of administrative ESA section 7 costs on small businesses in each critical habitat unit, it was assumed that the percentage of private entities that are involved in those consultations that are small businesses is the same as the percentage of businesses that are small businesses in counties that include critical habitat units.

To address uncertainty, costs were estimated as low, medium, and high. However, this approach likely overestimates the costs because the majority of consultations have been informal and, thus, have lower costs than formal consultations. In addition, this analysis was based on the critical habitat areas as defined by hydrographic unit codes. We subsequently revised and narrowed how we define the boundaries of the critical habitat units. As a result, fewer small businesses are likely to be affected by the critical habitat designations than were projected based on the information available to the economist at that time. Finally, because Atlantic sturgeon are present in the areas that we are designating as critical habitat, consultation is likely to have occurred even if critical habitat was not designated. Therefore, the section 7 consultation costs attributed to the designation of critical habitat, alone, are likely to be very small.

We considered the effect to small businesses throughout our analysis and, as stated above, there will be no significant economic impact to small businesses; therefore, it was unnecessary to make any changes from the proposed rule with the goal of minimizing any significant economic impacts on small entities. It is unlikely that the rule will significantly reduce profits or revenue for small businesses. The administrative costs of ESA section 7 consultation are likely to be small given, in the absence of critical habitat designation, nearly the same number and type of consultations would have occurred to consider the effects of Federal actions on the Atlantic sturgeon DPSs.

In the IRFA, we considered the alternative of not proposing critical habitat for the Gulf of Maine, New York Bight, or Chesapeake Bay DPS. We rejected this alternative because we determined the PBFs forming the basis for the critical habitat designations are essential to the conservation of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs. The lack of protection of the critical habitat PBFs from adverse modification and/or destruction could result in continued declines in abundance of these Atlantic sturgeon DPSs, would not provide for the conservation of the DPSs, and would not meet the legal requirements of the ESA.

We also analyzed designating a subset of the identified critical habitat areas. We rejected this alternative because designating only some of the areas containing the PBFs that are essential to the conservation of each DPS would not provide for the conservation of the DPSs and, thus, this alternative does not meet the legal requirements of the ESA.

Finally, we analyzed designating all critical habitat areas identified for the DPS. We analyzed the economic, national security, and other relevant impacts of designating critical habitat. Our conservative identification of potential, incremental, economic impacts indicates that any such impacts, if they were to occur, would be very small. Any incremental economic impacts will consist solely of the administrative costs of consultation; no project modifications are projected to be required to address impacts solely to the proposed critical habitat. There are conservation benefits of the critical habitat designations, both to the species and to society. While we cannot quantify nor monetize these benefits, we believe they are not negligible and are an incremental effect of the designations.

This final rule does not introduce any new reporting, record-keeping requirements, or other compliance requirements.

Regulatory Flexibility Act Determinations for the Carolina and Southeast DPSs

As explained in the FRFA for the Carolina and Southeast DPSs, this final rule is needed to comply with the ESA's requirement to designate critical habitat to the maximum extent prudent and determinable when species are listed as threatened or endangered. The objective of this rule is to identify Atlantic sturgeon habitat areas and features, the protection of which will support the conservation of these endangered DPSs.

The FRFA estimates the number of small entities to which the rule may apply, based on the information in the Impacts Report. The SBA has established size standards for all for-profit economic activities or industries in the North American Industry Classification System (13 CFR 121.201; 78 FR 37398; June 20, 2013; 78 FR 77343, December 23, 2013; 79 FR 33467, June 12, 2014) (*https://www.sba.gov/sites/default/files/files/Size_Standards_Table.pdf*).

Businesses in North American Industry Classification System (NAICS) Subsector 325320, Pesticide and Other Agricultural Chemical Manufacturing, could be involved in 5 projected nationwide pesticide authorization consultations. A small business in this subsector is defined by the SBA as having 1,000 employees. Businesses in NAICS Sector 22 (Utilities) could be involved in 14 consultations projected to occur for hydropower licensing, LNG facility or pipelines authorization, or nuclear power plant construction/operation licensing. For hydropower generation and natural gas distribution enterprises, a small business is defined by the SBA as one having a total of 500 employees. For nuclear power generation, a small business is defined by the SBA as one having a total of 750 employees. Businesses in NAICS Sector 54 could be involved as contractors assisting with ESA section 7 consultation in any of the 155 projected future Federal actions that could involve third parties. Relevant subsectors could include 541370, Surveying and Mapping, 541620, Environmental Consulting Services, or 541690, Other Scientific and Technical Consulting Services. A small business in any of these subsectors is defined by the SBA as one having average annual receipts of $15 million.

Businesses in NAICS Sector 23, Construction, could be involved in a number of categories of projected future actions, where they could incur administrative costs of construction. These could include businesses from the subsector 237120, Oil and Gas Pipeline and Related Structures Construction, or subsector 237310, Highway, Street, and Bridge Construction. A small business in subsector 237120 has average annual receipts of $36.5 million, and a small business in subsector 237310 has average annual receipts of $36.5 million. Businesses in subsector 238, Other Specialty Trade Contractors, could be involved as construction contractors in 20 future USACE section 404/RHA permitting actions and 5 FEMA disaster assistance actions. Small businesses in this subsector have average annual receipts of $15 million.

Cities could be involved in many of the 70 projected bridge repair or replacement projects, and some proportion of the 20 projected section 404/RHA permitting actions. The SBA defines a small governmental jurisdiction as cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000.

Our consultation database does not track the identity of past third parties involved in consultations, or whether the third parties were small entities; therefore we have no basis to determine the percentage of the 155 third parties that may potentially be involved in future consultations due to impacts to critical habitat that may be small businesses, small nonprofits or small government jurisdictions.

There is no indication in the data evaluated in the Impacts Analysis Report, which serves as the basis for this FRFA, that the designation would place small entities at a competitive disadvantage compared to large entities. Incremental economic impacts due to the designation for the Carolina and South Atlantic DPSs will be minimal overall. These costs will result from participation in the Section 7 consultation process, and will be spread over 14 critical habitat units totaling over 2,996 river miles (4,822 rkm) in 4 states. Federal agencies will bear the majority of the costs (59 percent to 83 percent), which will be limited to administrative costs of consultation for all parties involved. There are no apparent concentrations of costs. For most if not all of the Federal activities predicted to occur in the next 10 years, if the effects to critical habitat will be adverse and require formal consultation, those effects would also constitute adverse effects to Atlantic sturgeon or shortnose sturgeon, either directly when they are in the project area, or indirectly due to the effects on their habitat, and these consultations would be coextensive formal consultations. Assuming a third party would be involved and incur costs for each of the 179 projects in all of the categories of Federal activity that involved third parties in the past, the costs to third parties that could be involved in the projected future consultations other than those with EPA would be between $880 and $2,080 for each action for coextensive formal consultations, and between $1,500 and $3,000 for each of the 23 fully incremental informal consultations we conservatively estimated could be required due to the rule. The total costs over the next 10 years to all third parties for these 2 classes of actions would be between $30,000 and $60,000 for the incremental informal consultations and between $136,400 and $322,400 for the coextensive formal consultations. The total costs over the next 10 years to third parties involved in the EPA pesticides consultations are conservatively estimated to be $25,072 across all units.

There are no record-keeping or reporting requirements associated with the rule. Third parties would only be required to keep records or submit reports pursuant to ESA section 7 consultations on future proposed projects that may affect critical habitat. Similarly, there are no other compliance requirements in the rule. There are no professional skills necessary for preparation of any report or record.

We considered the effect to small businesses throughout our analysis and, as stated above, there will be no significant economic impact to small businesses. Changes from the proposed rule that would minimize significant economic impacts on small entities were therefore unnecessary.

In the IRFA, we considered the alternative of not proposing new critical habitat for the Carolina and South Atlantic DPSs of Atlantic sturgeon. We rejected this alternative because we determined designating critical habitat for Atlantic sturgeon is prudent and determinable, and the ESA requires critical habitat designation in that circumstance. In the IRFA, we also analyzed the alternative of including all large coastal rivers from the North Carolina/Virginia border southward to the St Johns River, Florida, in the designation, instead of just documented spawning rivers. This alternative would likely have involved many more consultations on Federal actions each year, potentially impacting many more small entities. Several large coastal rivers within the geographical area occupied by the Carolina and South Atlantic DPSs of Atlantic sturgeon do not appear to support spawning and juvenile recruitment or to contain suitable habitat features to support spawning and we determined it would not promote Atlantic sturgeon conservation by including those rivers in the rule.

Consultation and Coordination With Indian Tribal Governments (Executive Order 13175)

The longstanding and distinctive relationship between the Federal and tribal governments is defined by treaties, statutes, executive orders, judicial decisions, and agreements, which differentiate tribal governments from the other entities that deal with, or are affected by, the Federal Government. This relationship has given rise to a special Federal trust responsibility involving the legal responsibilities and obligations of the United States toward Indian Tribes and the application of fiduciary standards of due care with respect to Indian lands, tribal trust resources, and the exercise of tribal rights.

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, outlines the responsibilities of the Federal Government in matters affecting tribal interests. If NMFS issues a regulation with tribal implications (defined as having a substantial direct effect on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes), we must consult with those governments or the Federal Government must provide funds necessary to pay direct compliance costs incurred by tribal governments. The critical habitat designations for Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs do not have tribal implications because designated critical habitat will not have a substantial direct effect on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes.

Takings (Executive Order 12630)

Under E.O. 12630, Federal agencies must consider the effects of their actions on constitutionally protected private property rights and avoid unnecessary takings of property. A taking of property includes actions that result in physical invasion or occupancy of private property, and regulations imposed on private property that substantially affect its value or use. In accordance with E.O. 12630, this rule would not have significant takings implications. The designation of critical habitat for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon will not impose additional burdens on land use or affect property values. Therefore, a takings implication assessment is not required.

Environmental Justice (Executive Order 12898)

The designation of critical habitat is not expected to have a disproportionately high effect on minority populations or low-income populations.

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

This final rule will not produce a Federal mandate. The designation of critical habitat does not impose a legally-binding duty on non-Federal government entities or private parties. The only regulatory effect is that Federal agencies must ensure that their actions

do not destroy or adversely modify critical habitat under section 7 of the ESA. Non-Federal entities which receive Federal funding, assistance, permits or otherwise require approval or authorization from a Federal agency for an action may be indirectly impacted by the designation of critical habitat, but the Federal agency has the legally binding duty to avoid destruction or adverse modification of critical habitat.

This rule will not significantly or uniquely affect small governments. Therefore, a Small Government Action Plan is not required.

Regulatory Planning and Review (Executive Orders 12866 and 13771)

The OMB determined that this final rule is significant under Executive Order 12866 because it may create a serious inconsistency or otherwise interfere with an action taken or planned by another agency. Final Economic and Regulatory Impact Review Analyses and 4(b)(2) analyses as set forth and referenced herein have been prepared to support the exclusion process under section 4(b)(2) of the ESA. To review these documents see **ADDRESSES** section above.

In addition, as explained above, OMB classified this rule as significant under E.O. 12866. Therefore, this final rule is considered an E.O. 13771 regulatory action. This rule is not subject to the requirements of E.O. 13771 because this rule results in no more than *de minimis* costs.

Federalism (Executive Order 13132)

Pursuant to the Executive Order on Federalism, E.O. 13132, we determined that this final rule does not have significant federalism effects and that a federalism assessment is not required. However, in keeping with Department of Commerce policies and consistent with ESA regulations at 50 CFR 424.16(c)(1)(ii), we requested information from, and coordinated this critical habitat designation with, appropriate state resource agencies in Maine, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Delaware, Maryland, Virginia, the District of Columbia, North Carolina, South Carolina, Georgia, and Florida.

Coastal Zone Management Act

Under section 307(c)(1)(A) of the Coastal Zone Management Act (CZMA) (16 U.S.C. 1456(c)(1)(A)) and its implementing regulations, each Federal activity within or outside the coastal zone that has reasonably foreseeable effects on any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State coastal management programs. We have determined that any effects of this designation of critical habitat on coastal uses and resources in Maine, New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, North Carolina, South Carolina, Georgia and Florida are not reasonably foreseeable at this time. However, the State of North Carolina suggested SERO's consistency determination regarding designating critical habitat was incomplete and did not meet the requirements of the CZMA and its implementing regulations. The State maintained SERO submitted an incomplete negative determination, because it had not provided an evaluation of the North Carolina coastal program's enforceable policies; SERO disagrees. While SERO recognizes the State's goals of coastal resource protection and economic development, it determined that any effects of the proposed action on North Carolina's coastal uses and resources are not reasonably foreseeable at this time. As indicated in SERO's negative determination, this designation of critical habitat will not restrict any coastal uses, affect land ownership, or establish a refuge or other conservation area; rather, the designation affects only the ESA section 7 consultation process for Federal actions. These consultations will consider effects of Federal actions on coastal uses and resources to the extent they overlap with critical habitat. We considered the range of Federal actions that this designation may affect (*e.g.,* dredging, bridge construction/repair, water withdrawals) and which may affect coastal uses and resources in the affected States. However, we do not have sufficient information on the specifics of any future activities (*e.g.,* when, where and how they will be carried out) to characterize any of these as reasonably foreseeable. Therefore, because the effects are not reasonably foreseeable, we cannot make a determination as to whether the Federal activities will be consistent with any enforceable policies of approved State coastal management programs. Through the consultation process, we will receive information on proposed Federal actions and their effects on listed species and the designated critical habitat. Any related biological opinions will analyze this information. It will then be up to the Federal action agencies to decide how to comply with the ESA in light of our biological opinion, as well as to ensure that their actions comply with the CZMA's Federal consistency requirement. At this time, we do not anticipate that this designation is likely to result in any additional management measures by other Federal agencies.

Energy Supply, Distribution, and Use (Executive Order 13211)

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking an action expected to lead to the promulgation of a final rule or regulation that is a significant regulatory action under E.O. 12866 and is likely to have a significant adverse effect on the supply, distribution, or use of energy. OMB Guidance on Implementing E.O. 13211 (July 13, 2001) states that significant adverse effects could include any of the following outcomes compared to a world without the regulatory action under consideration: (1) Reductions in crude oil supply in excess of 10,000 barrels per day; (2) reductions in fuel production in excess of 4,000 barrels per day; (3) reductions in coal production in excess of 5 million tons per year; (4) reductions in natural gas production in excess of 25 million cubic feet per year; (5) reductions in electricity production in excess of 1 billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity; (6) increases in energy use required by the regulatory action that exceed any of the thresholds above; (7) increases in the cost of energy production in excess of one percent; (8) increases in the cost of energy distribution in excess of one percent; or (9) other similarly adverse outcomes. A regulatory action could also have significant adverse effects if it: (1) Adversely affects in a material way the productivity, competition, or prices in the energy sector; (2) adversely affects in a material way productivity, competition or prices within a region; (3) creates a serious inconsistency or otherwise interferes with an action taken or planned by another agency regarding energy; or (4) raises novel legal or policy issues adversely affecting the supply, distribution or use of energy arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866 and 13211. We do not believe this rule will have a significant adverse effect on the supply, distribution, or use of energy. The only Federal actions we may consult on that may have material effects on energy are FERC hydropower licensing and Nuclear Regulatory Commission actions. These actions have the potential to adversely affect sturgeon as well as its

critical habitat, and thus most of the impacts of these consultations will not be incremental impacts of this rule. Moreover, the FPA, which FERC implements in issuing hydropower licenses, has independent requirements to avoid adverse effects on fisheries resources and habitats, and thus modifications to hydropower facilities to avoid impacts to critical habitat may also be coextensive with the FPA, and not incremental impacts of the designation. Therefore, we have not prepared a Statement of Energy Effects.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This final rule does not contain any new or revised collection of information. This rule, if adopted, would not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations.

References Cited

A complete list of all references cited in this rulemaking can be found on our Web sites at *http://sero.nmfs.noaa.gov/protected_resources/sturgeon/index.html* and *https://www.greateratlantic.fisheries.noaa.gov/protected/atlsturgeon/* and is available upon request from the NMFS SERO and GARFO offices (see **ADDRESSES**).

List of Subjects in 50 CFR Part 226

Endangered and threatened species.

Dated: August 10, 2017.

Samuel D Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For the reasons set out in the preamble, we amend 50 CFR part 226 as follows:

PART 226—DESIGNATED CRITICAL HABITAT

■ 1. The authority citation for part 226 continues to read as follows:

Authority: 16 U.S.C. 1533.

■ 2. Add § 226.225 to read as follows:

§ 226.225 Critical habitat for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic distinct population segments (DPSs) of Atlantic Sturgeon.

Critical habitat is designated for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon as described in paragraphs (a) through (h) of this section. The maps, clarified by the textual descriptions in paragraphs (d) through (h) of this section, are the definitive source for determining the critical habitat boundaries.

(a) *Critical habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon.* The physical features essential for the conservation of Atlantic sturgeon belonging to the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs are those habitat components that support successful reproduction and recruitment. These are:

(1) Hard bottom substrate (*e.g.,* rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (*i.e.,* 0.0–0.5 parts per thousand range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;

(2) Aquatic habitat with a gradual downstream salinity gradient of 0.5 up to as high as 30 parts per thousand and soft substrate (*e.g.,* sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development;

(3) Water of appropriate depth and absent physical barriers to passage (*e.g.,* locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support:

(i) Unimpeded movement of adults to and from spawning sites;

(ii) Seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and

(iii) Staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (*e.g.,* at least 1.2 meters) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river;

(4) Water, between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support:

(i) Spawning;

(ii) Annual and interannual adult, subadult, larval, and juvenile survival; and

(iii) Larval, juvenile, and subadult growth, development, and recruitment (*e.g.,* 13 to 26 °C for spawning habitat and no more than 30 °C for juvenile rearing habitat, and 6 milligrams per liter (mg/L) or greater dissolved oxygen for juvenile rearing habitat).

(5) Pursuant to ESA section 4(a)(3)(B)(i), critical habitat for the New York Bight and Chesapeake Bay DPSs of Atlantic sturgeon does not include the following areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resource management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), and for which we have determined that such plan provides a conservation benefit to the species, and its habitat, for which critical habitat is designated.

(i) The Department of the Army, U.S. Military Academy—West Point, NY;

(ii) The Department of the Air Force, Joint Base Langley—Eustis, VA;

(iii) The Department of the Navy, Marine Corps Base Quantico, VA;

(iv) The Department of the Navy, Naval Weapons Station Yorktown, VA; and,

(v) The Department of the Navy, Naval Support Facility Dahlgren, VA.

(6) Pursuant to ESA section 3(5)(A)(i), critical habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs of Atlantic sturgeon does not include existing (already constructed), as of September 18, 2017, manmade structures that do not provide the physical features such as aids-to-navigation (ATONs), artificial reefs, boat ramps, docks, or pilings within the legal boundaries of designated critical habitat.

(b) *Critical habitat for the Carolina and South Atlantic DPSs of Atlantic sturgeon.* The physical features essential for the conservation of Atlantic sturgeon belonging to the Carolina and South Atlantic DPSs are those habitat components that support successful reproduction and recruitment. These are:

(1) Hard bottom substrate (*e.g.,* rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (*i.e.,* 0.0–0.5 parts per thousand range) for settlement of fertilized eggs and refuge, growth, and development of early life stages;

(2) Aquatic habitat inclusive of waters with a gradual downstream gradient of 0.5 up to as high as 30 parts per thousand and soft substrate (*e.g.,* sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development;

(3) Water of appropriate depth and absent physical barriers to passage (*e.g.,* locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support:

(i) Unimpeded movement of adults to and from spawning sites;

(ii) Seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and

(iii) Staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (at least 1.2 meters) to ensure continuous flow in the

main channel at all times when any sturgeon life stage would be in the river;

(4) Water quality conditions, especially in the bottom meter of the water column, with temperature and oxygen values that support:

(i) Spawning;

(ii) Annual and inter-annual adult, subadult, larval, and juvenile survival; and

(iii) Larval, juvenile, and subadult growth, development, and recruitment. Appropriate temperature and oxygen values will vary interdependently, and depending on salinity in a particular habitat. For example, 6.0 mg/L dissolved oxygen or greater likely supports juvenile rearing habitat, whereas dissolved oxygen less than 5.0 mg/L for longer than 30 days is less likely to support rearing when water temperature is greater than 25 °C. In temperatures greater than 26 °C, dissolved oxygen greater than 4.3 mg/L is needed to protect survival and growth. Temperatures of 13 to 26 °C likely support spawning habitat.

(5) Pursuant to ESA section 4(a)(3)(B)(i), critical habitat for the Carolina DPS of Atlantic sturgeon does not include certain waters of the Cooper River, South Carolina, adjacent to Joint Base Charleston. These areas are described in 33 CFR 334.460(a)(8)(ii)–(iv), 33 CFR 334.460(a)(9), and 33 CFR 334.460(a)(10).

(6) Pursuant to ESA section 3(5)(A)(i), critical habitat for the Carolina and the South Atlantic DPSs of Atlantic sturgeon does not include existing (already constructed), as of September 18, 2017, manmade structures that do not provide the physical features such as aids-to-navigation (ATONs), artificial reefs, boat ramps, docks, or pilings within the legal boundaries of designated critical habitat.

(c) *States and counties affected by this critical habitat designation.* Critical habitat is designated for the following DPSs in the following states and counties:

DPS	State—Counties
Gulf of Maine	ME—Androscoggin, Cumberland, Kennebec, Lincoln, Penobscot, Sagadahoc, Somerset, Waldo, and York.
	NH—Rockingham and Stafford.
	MA—Essex.
New York Bight	CT—Fairfield, Hartford, Litchfield, Middlesex, New Haven, New London, and Tolland.
	NJ—Bergen, Burlington, Camden, Cape May, Cumberland, Gloucester, Hudson, Mercer, Monmouth, and Salem.
	NY—Albany, Bronx, Columbia, Dutchess, Greene, Kings, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Ulster, and Westchester.
	DE—Kent, New Castle, and Sussex.
	PA—Bucks, Delaware, and Philadelphia.
Chesapeake Bay	DC—District of Columbia.
	MD—Charles, Dorchester, Montgomery, Prince George's, St. Mary's, and Wicomico.
	VA—Arlington, Caroline, Charles City, Chesterfield, Dinwiddie, Essex, Fairfax, Gloucester, Hanover, Henrico, Isle of Wight, King George, James City, King and Queen, King William, Lancaster, Loudoun, Middlesex, New Kent, Northumberland, Prince George, Prince William, Richmond, Spotsylvania, Stafford, Surry, Westmoreland, and York.
Carolina	NC—Anson, Bertie, Beaufort, Brunswick, Carteret, Columbus, Craven, Duplin, Edgecombe, Halifax, Hyde, Johnston, Lenoir, Martin, Nash, New Hanover, Northampton, Pamlico, Pender, Pitt, Richmond, Wake, Washington, and Wayne.
	SC—Berkeley, Charleston, Chesterfield, Clarendon, Darlington, Dillon, Florence, Georgetown, Horry, Marion, Marlboro, and Williamsburg.
South Atlantic	SC—Aiken, Allendale, Bamberg, Barnwell, Beaufort, Charleston, Colleton, Dorchester, Edgefield, Hampton, and Jasper.
	GA—Appling, Atkinson, Baldwin, Ben Hill, Bibb, Bleckley, Brantley, Bryan, Bulloch, Burke, Camden, Charlton, Chatham, Coffee, Dodge, Effingham, Emanuel, Glascock, Glynn, Hancock, Houston, Jeff Davis, Jefferson, Jenkins, Johnson, Jones, Laurens, Long, McIntosh, Monroe, Montgomery, Pierce, Pulaski, Richmond, Screven, Tattnall, Telfair, Toombs, Treutlen, Twiggs, Ware, Warren, Washington, Wayne, Wheeler, Wilcox, and Wilkinson.
	FL—Baker and Nassau.

(d) *Critical habitat boundaries for the Gulf of Maine DPS.* Critical habitat for the Gulf of Maine DPS of Atlantic sturgeon is the waters of:

(1) Penobscot River main stem from the Milford Dam downstream to where the main stem river drainage discharges at its mouth into Penobscot Bay;

(2) Kennebec River main stem from the Ticonic Falls/Lockwood Dam downstream to where the main stem river discharges at its mouth into the Atlantic Ocean;

(3) Androscoggin River main stem from the Brunswick Dam downstream to where the main stem river drainage discharges into Merrymeeting Bay;

(4) Piscataqua River from its confluence with the Salmon Falls and Cocheco rivers downstream to where the main stem river discharges at its mouth into the Atlantic Ocean as well as the waters of the Cocheco River from its confluence with the Piscataqua River and upstream to the Cocheco Falls Dam, and waters of the Salmon Falls River from its confluence with the Piscataqua River and upstream to the Route 4 Dam; and

(5) Merrimack River from the Essex Dam (also known as the Lawrence Dam) downstream to where the main stem river discharges at its mouth into the Atlantic Ocean.

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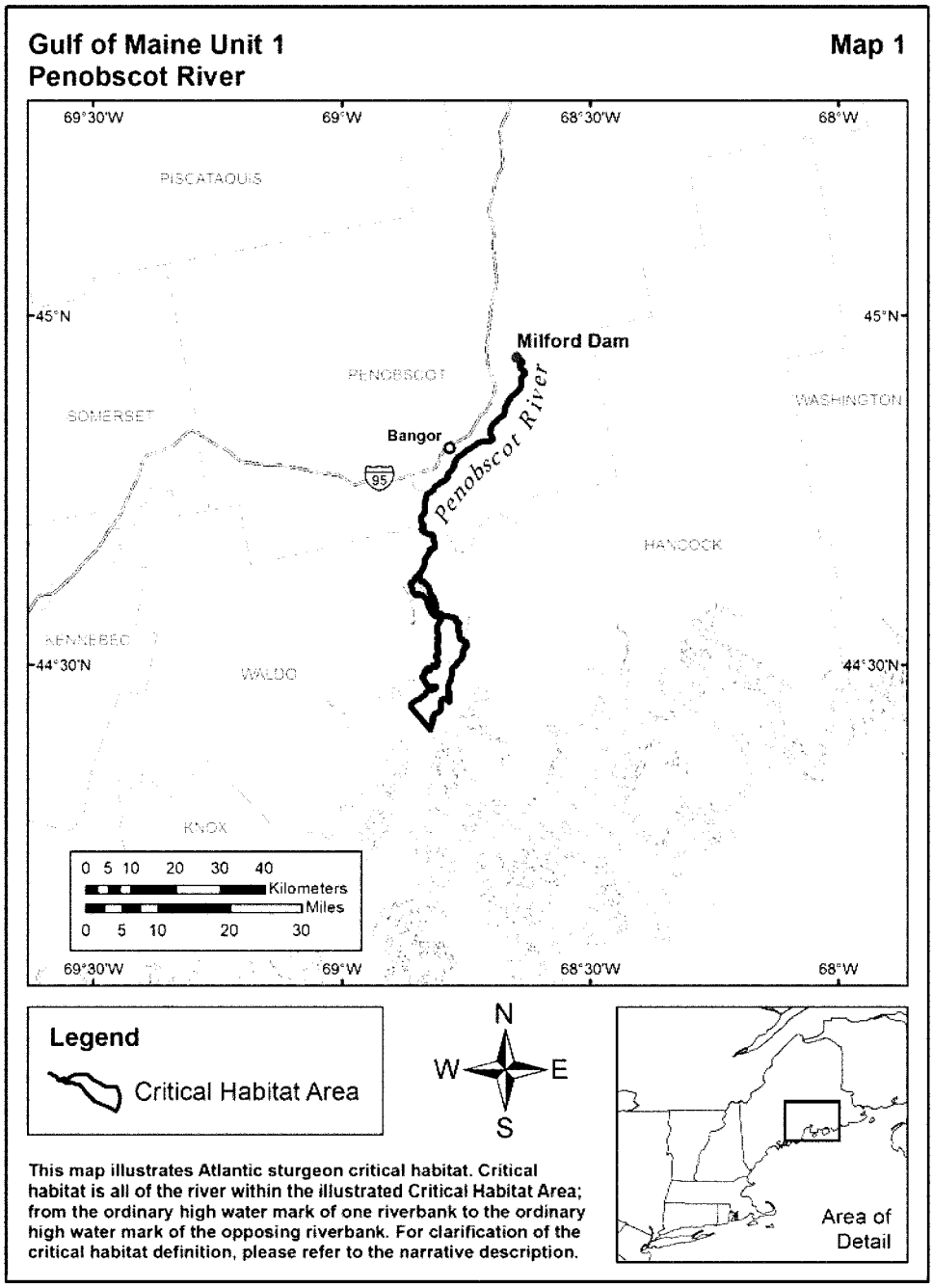
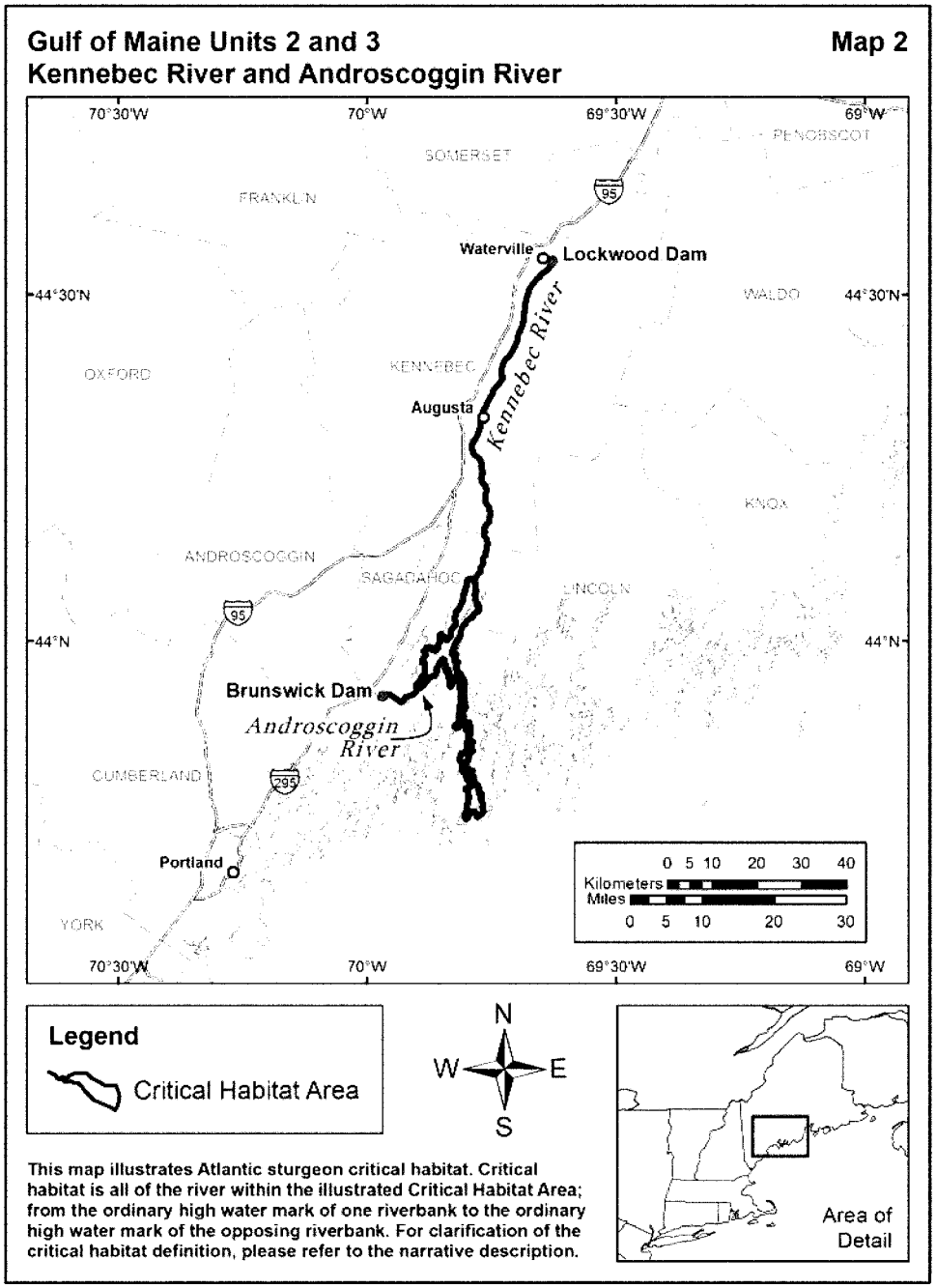
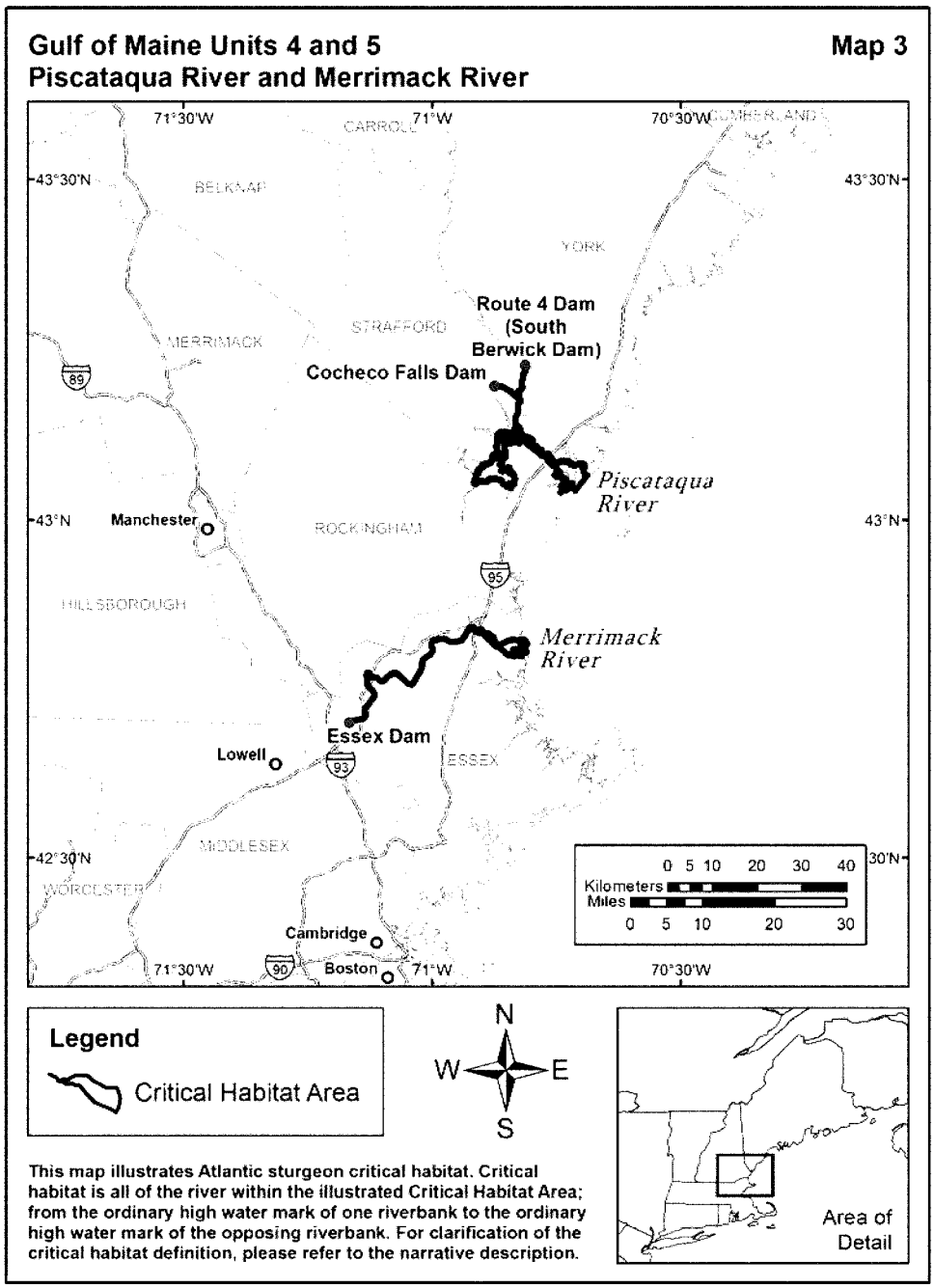
(6) Maps of the Gulf of Maine DPS follow:





This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area; from the ordinary high water mark of one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.



(e) *Critical habitat boundaries of the New York Bight DPS.* Critical habitat for the New York Bight DPS of Atlantic sturgeon is the waters of:

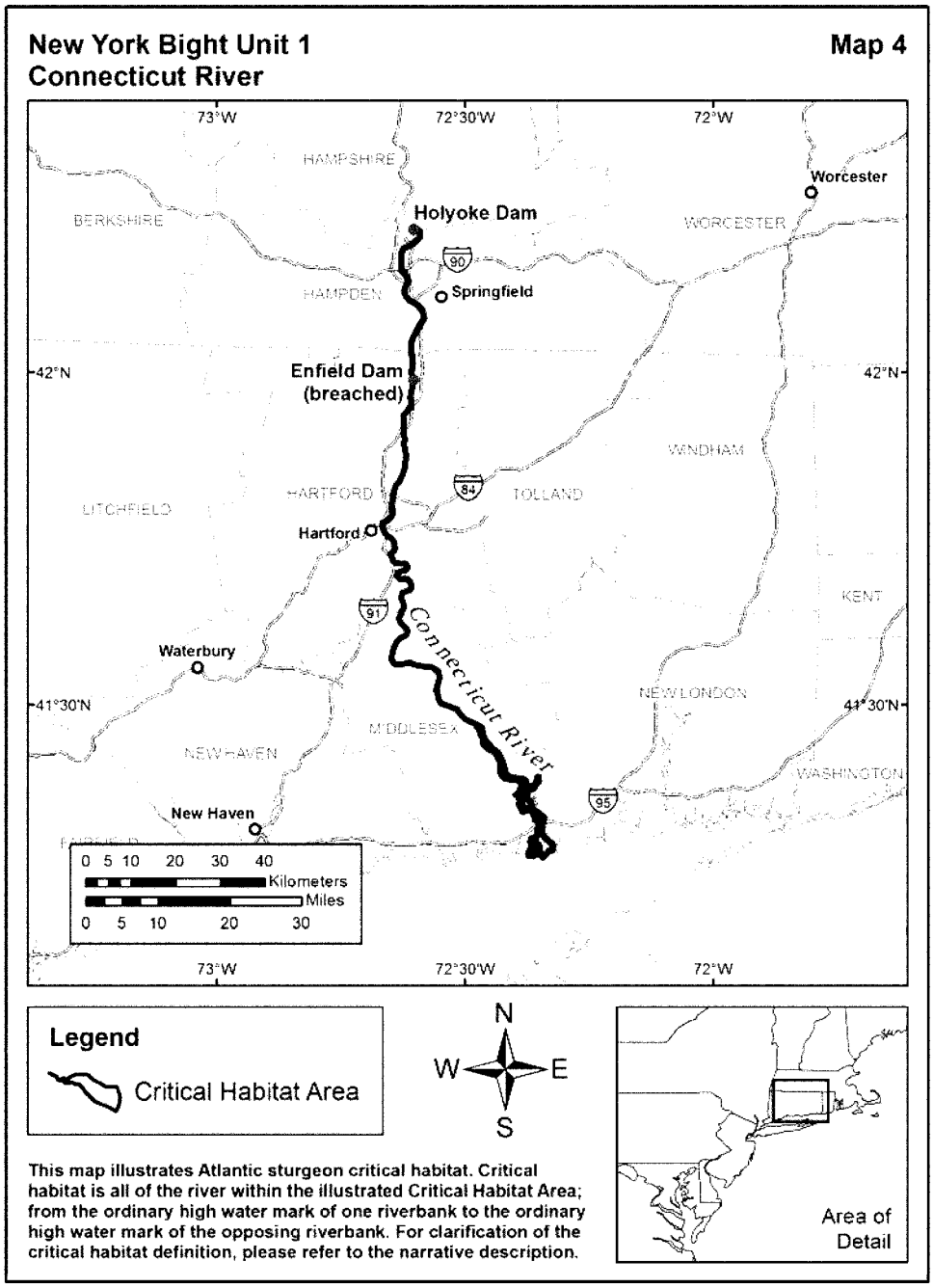
(1) Connecticut River from the Holyoke Dam downstream to where the main stem river discharges at its mouth into Long Island Sound;

(2) Housatonic River from the Derby Dam downstream to where the main stem discharges at its mouth into Long Island Sound;

(3) Hudson River from the Troy Lock and Dam (also known as the Federal Dam) downstream to where the main stem river discharges at its mouth into New York City Harbor; and

(4) Delaware River at the crossing of the Trenton-Morrisville Route 1 Toll Bridge, downstream to where the main stem river discharges at its mouth into Delaware Bay.

(5) Maps of the New York Bight DPS follow:



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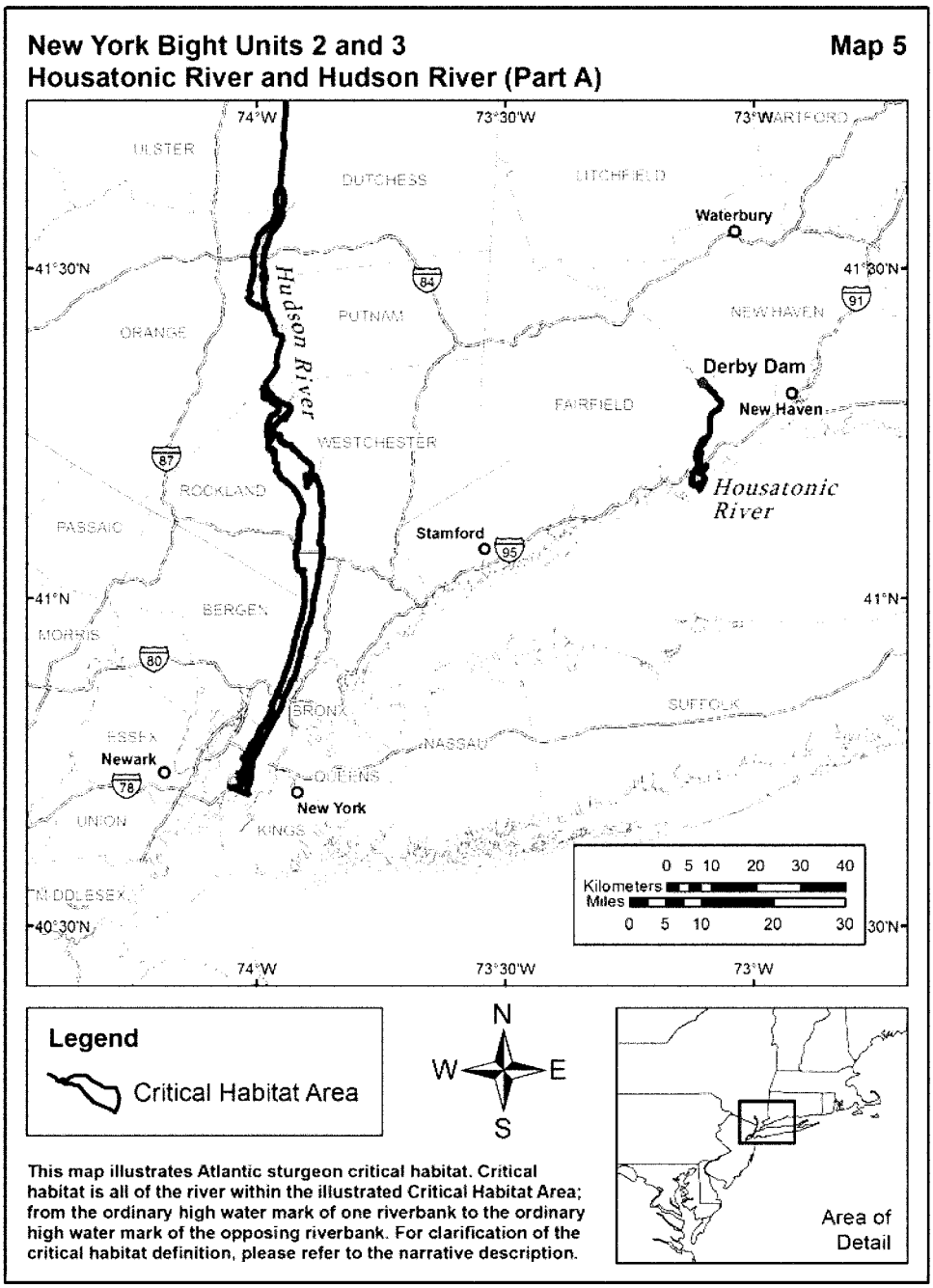

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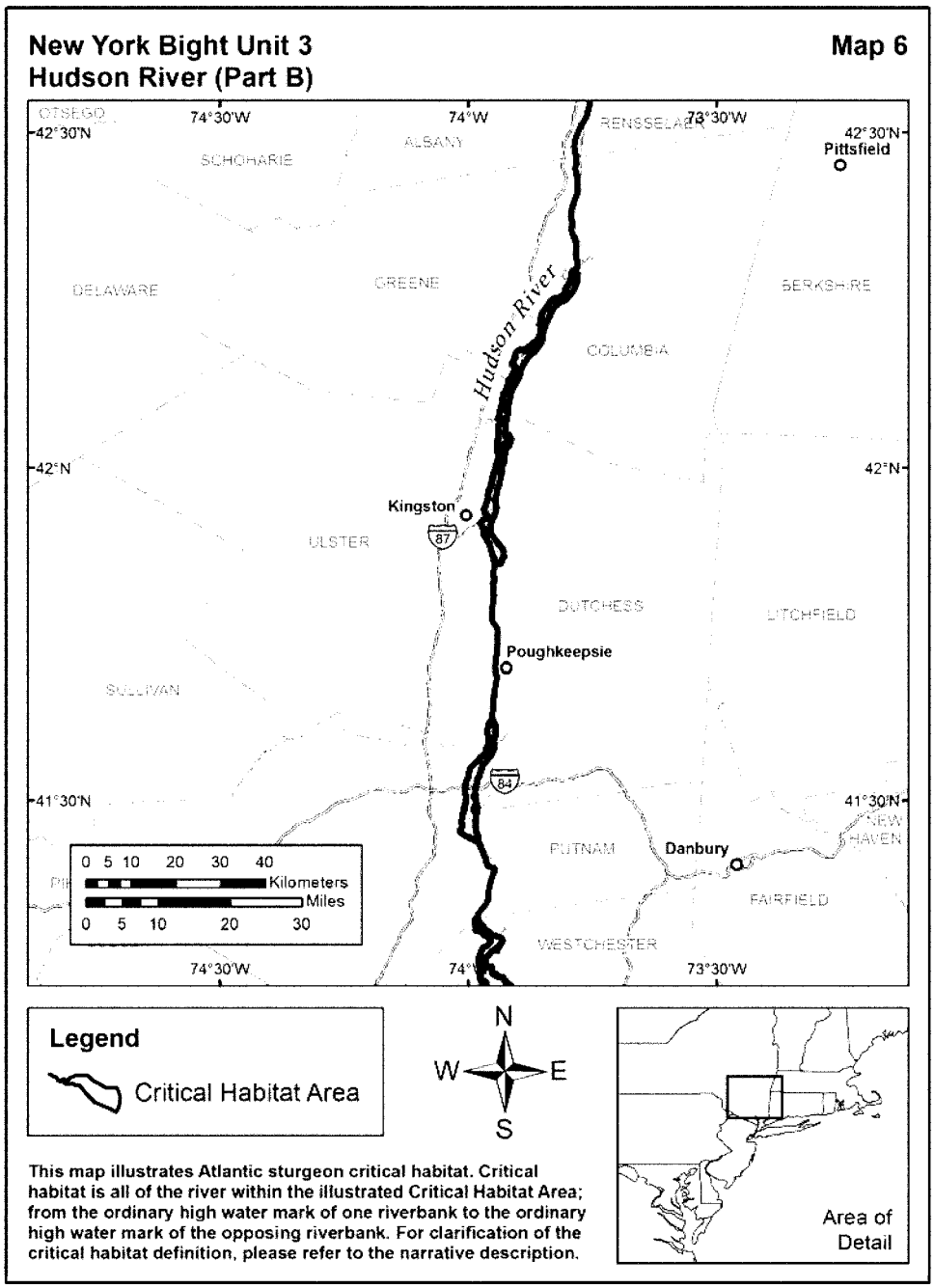

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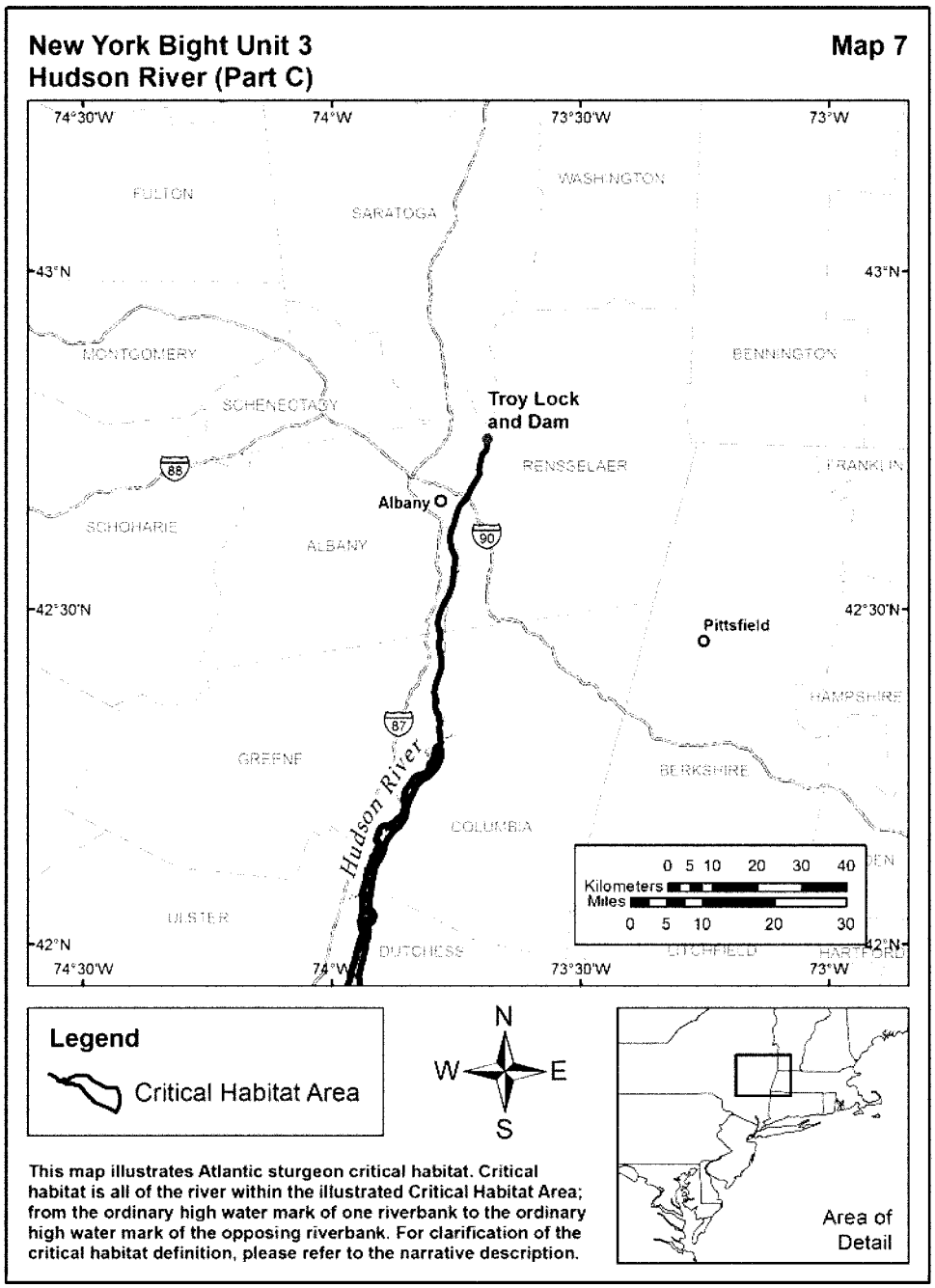

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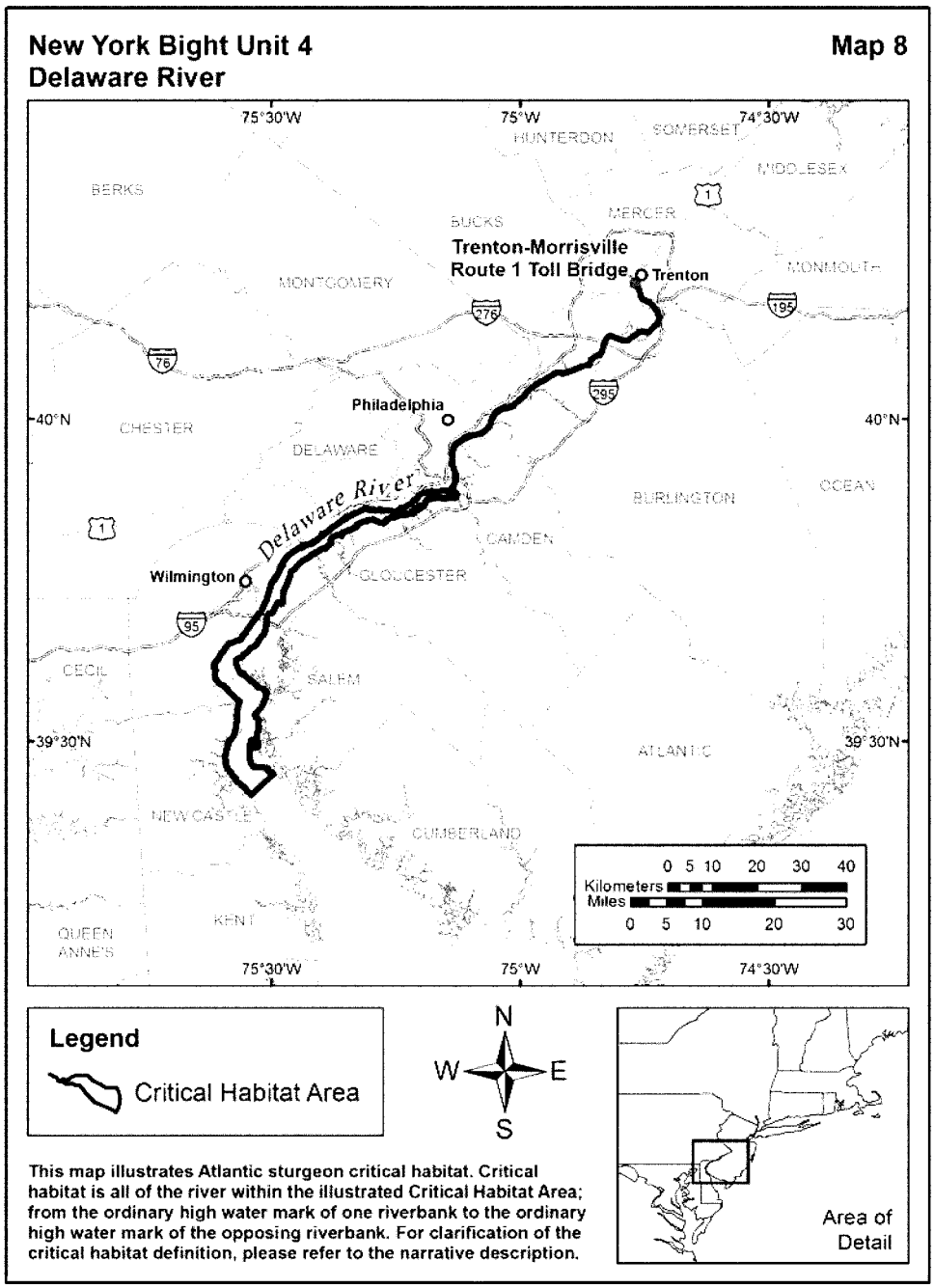


(f) *Critical habitat boundaries of the Chesapeake Bay DPS.* Critical habitat for the Chesapeake Bay DPS of Atlantic sturgeon is the waters of:

(1) Potomac River from the Little Falls Dam downstream to where the main stem river discharges at its mouth into the Chesapeake Bay;

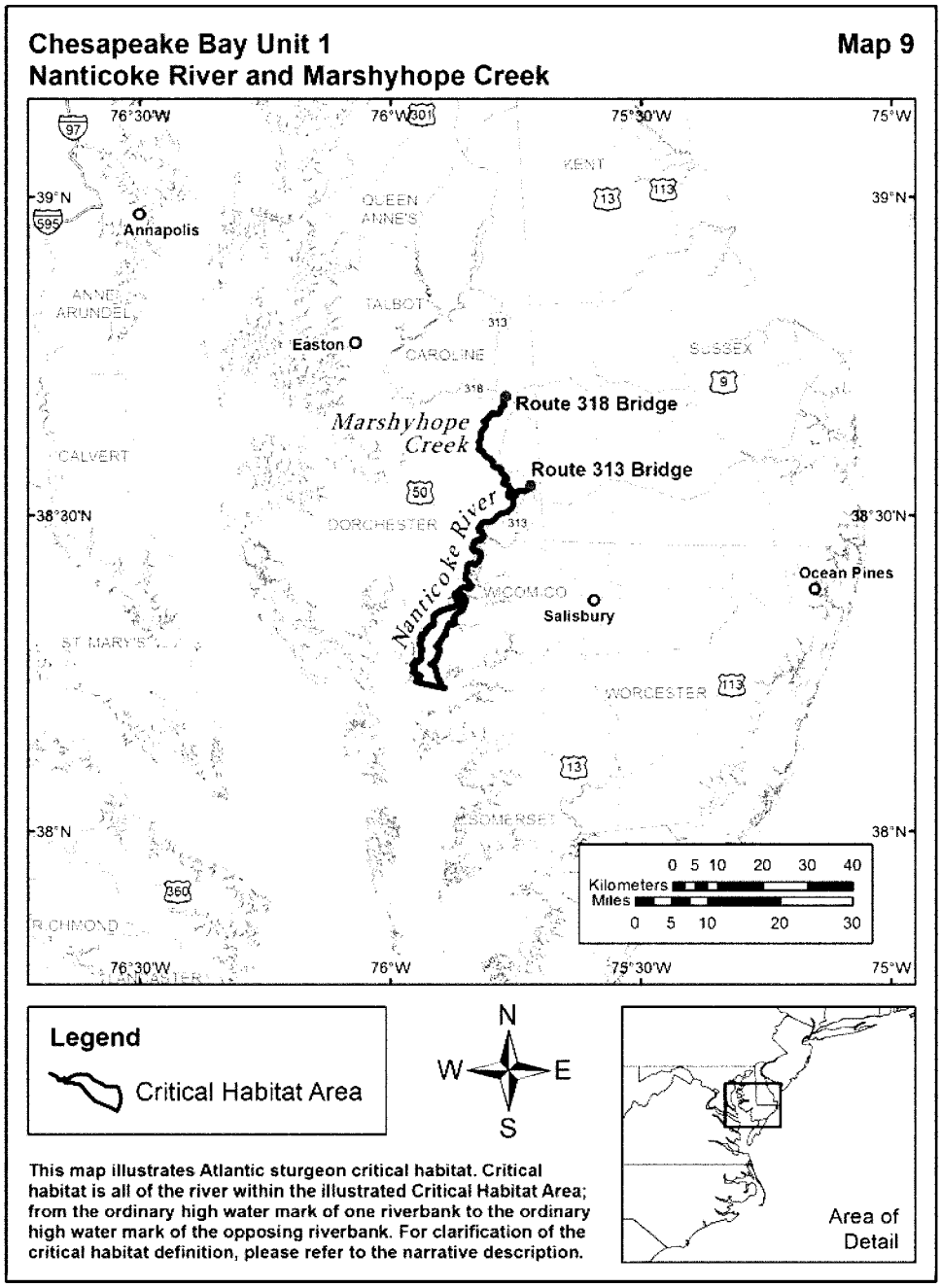
(2) Rappahannock River from the U.S. Highway 1 Bridge, downstream to where the river discharges at its mouth into the Chesapeake Bay;

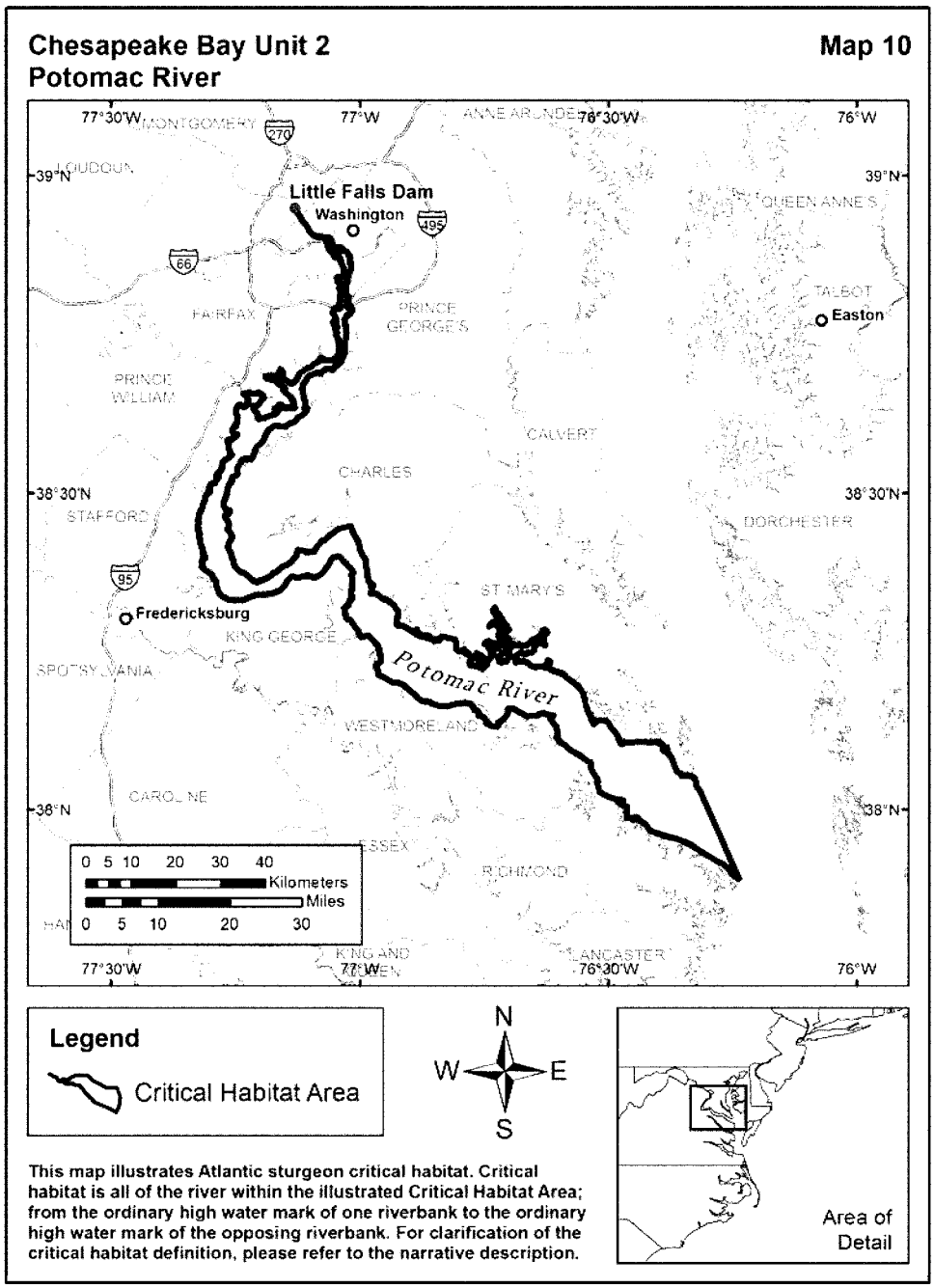
(3) York River from its confluence with the Mattaponi and Pamunkey rivers downstream to where the main stem river discharges at its mouth into the Chesapeake Bay as well as the waters of the Mattaponi River from its confluence with the York River and upstream to the Virginia State Route 360 Bridge of the Mattaponi River, and waters of the Pamunkey River from its confluence with the York River and upstream to the Nelson's Bridge Road Route 615 crossing of the Pamunkey River;

(4) James River from Boshers Dam downstream to where the main stem river discharges at its mouth into the Chesapeake Bay at Hampton Roads; and

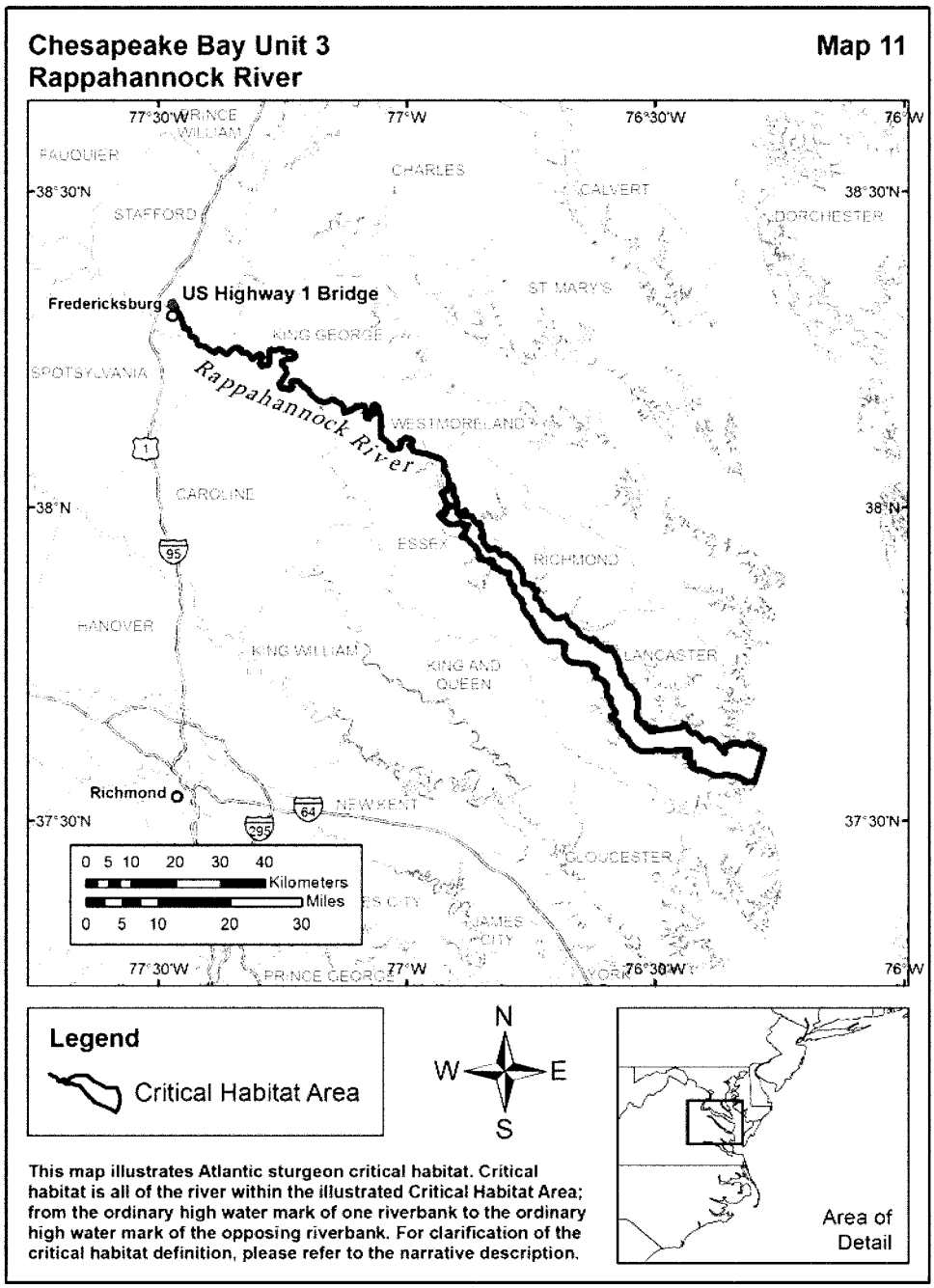
(5) Nanticoke River from the Maryland State Route 313 Bridge crossing near Sharptown, MD to where the main stem discharges at its mouth into the Chesapeake Bay as well as Marshyhope Creek from its confluence with the Nanticoke River and upriver to the Maryland State Route 318 Bridge crossing near Federalsburg, MD.

(6) Maps of the Chesapeake Bay DPS follow:





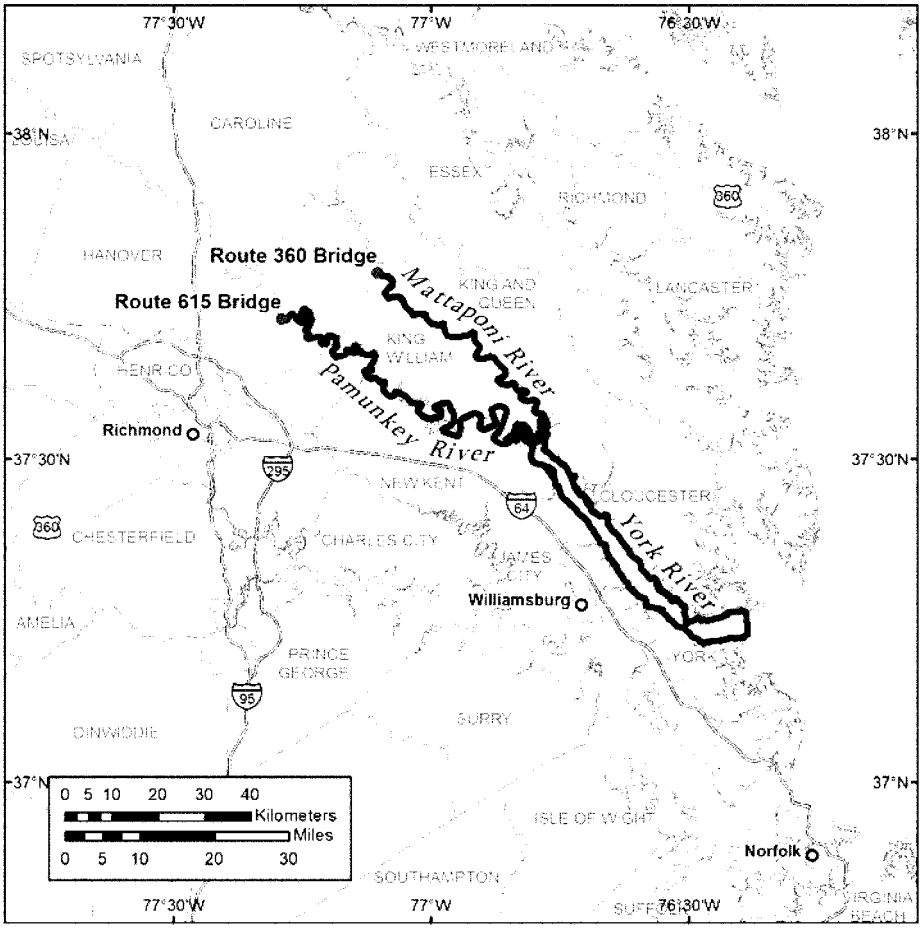
This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area; from the ordinary high water mark of one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.



This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area; from the ordinary high water mark of one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.

Chesapeake Bay Unit 4 **Map 12**

York River, Mattaponi River, and Pamunkey River



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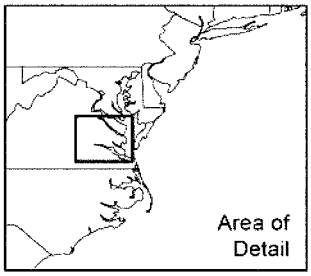
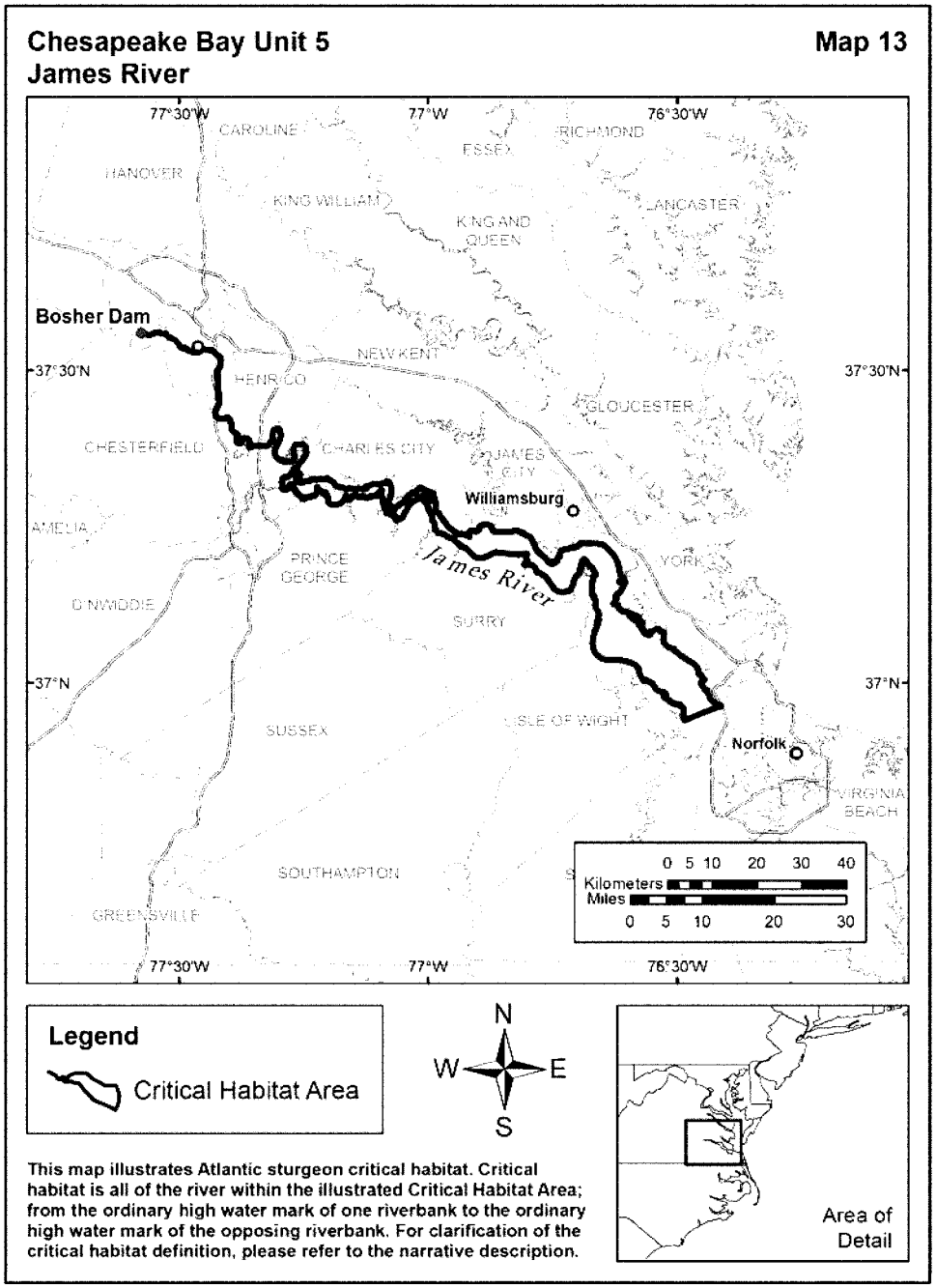
Critical Habitat Area



This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area; from the ordinary high water mark of one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.



(g) *Critical habitat boundaries of the Carolina DPS.* The lateral extent for all critical habitat units for the Carolina DPS of Atlantic sturgeon is the ordinary high water mark on each bank of the river and shorelines. Critical habitat for the Carolina DPS of Atlantic sturgeon is:

(1) Carolina Unit 1 includes the Roanoke River main stem from the Roanoke Rapids Dam downstream to rkm 0;

(2) Carolina Unit 2 includes the Tar-Pamlico River main stem from the Rocky Mount Millpond Dam downstream to rkm 0;

(3) Carolina Unit 3 includes the Neuse River main stem from the Milburnie Dam downstream to rkm 0;

(4) Carolina Unit 4 includes the Cape Fear River main stem from Lock and Dam #2 downstream to rkm 0 and the Northeast Cape Fear River from the upstream side of Rones Chapel Road Bridge downstream to the confluence with the Cape Fear River;

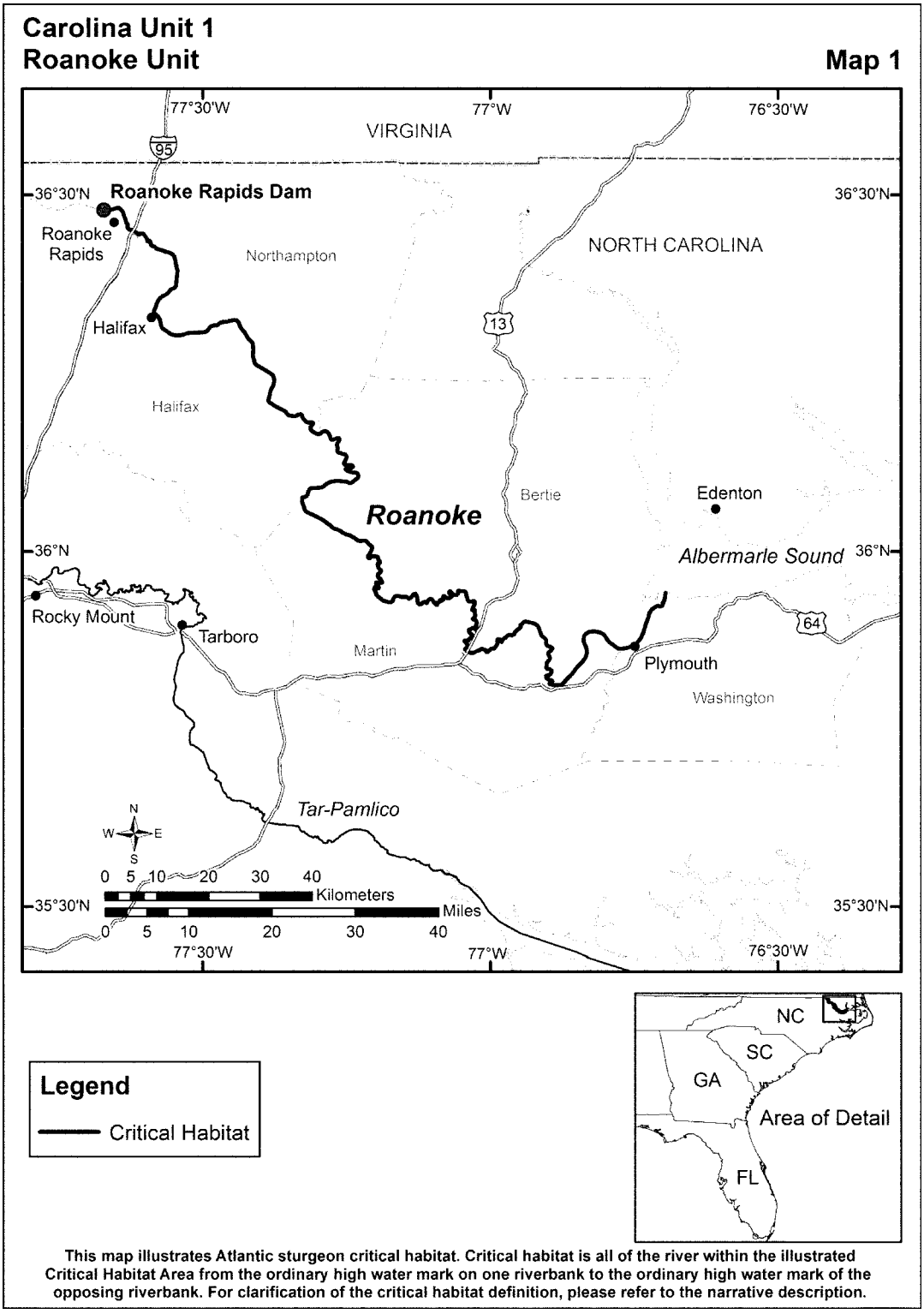
(5) Carolina Unit 5 includes the Pee Dee River main stem from Blewett Falls Dam downstream to rkm 0, the Waccamaw River from Bull Creek downstream to rkm 0, and Bull Creek from the Pee Dee River to the confluence with the Waccamaw River;

(6) Carolina Unit 6 includes the Black River main stem from Interstate Highway 95 downstream to rkm 0 (the confluence with the Pee Dee River); and

(7) Carolina Unit 7 includes the Santee River main stem from the Wilson Dam downstream to the fork of the North Santee River and South Santee River distributaries, the Rediversion Canal from the St. Stephen Powerhouse downstream to the confluence with the Santee River, the North Santee River from the fork of the Santee River and South Santee River downstream to rkm

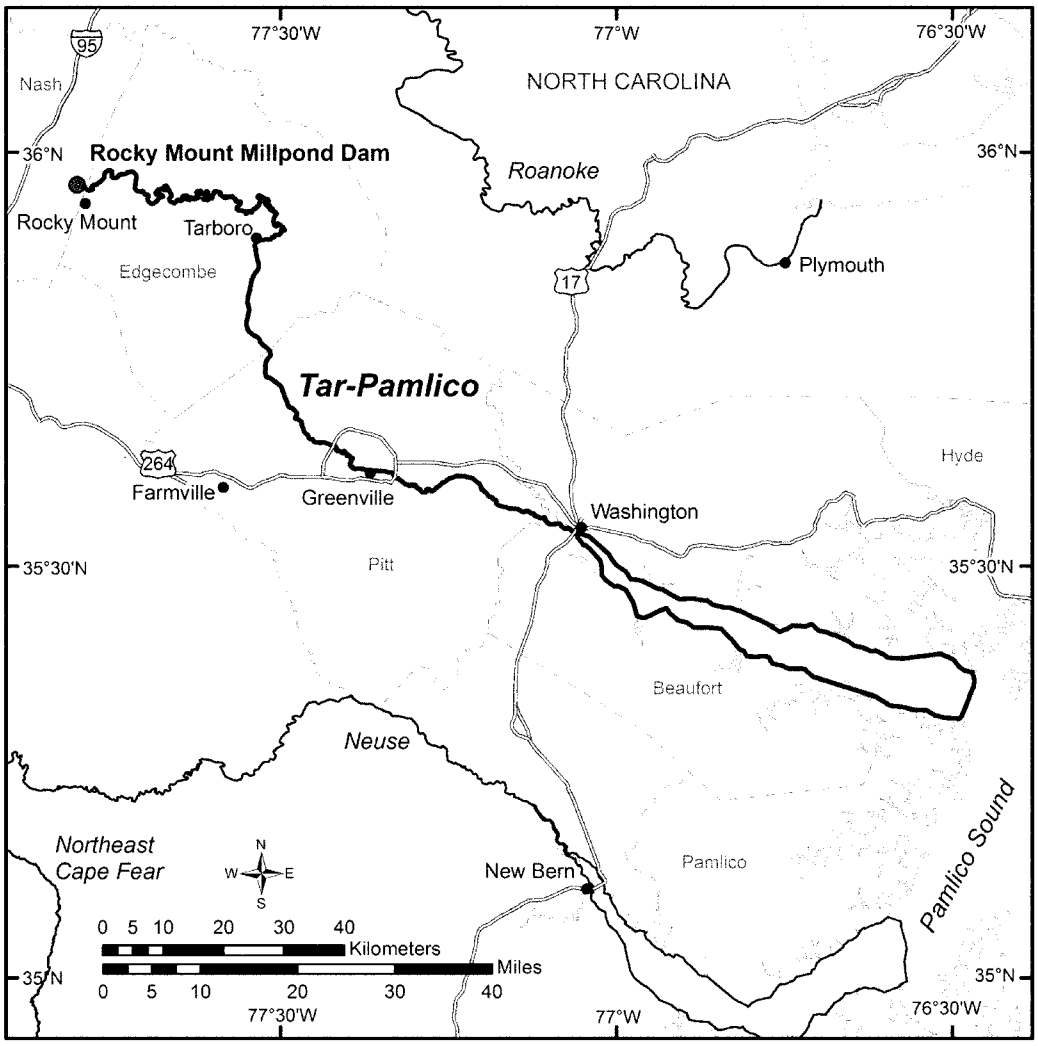
0, the South Santee River from the fork of the Santee River and North Santee River downstream to rkm 0, the Tailrace Canal from Pinopolis Dam downstream to the West Branch Cooper River, the West Branch Cooper River from the Tailrace Canal downstream to the confluence with the East Branch Cooper River, and the Cooper River from confluence of the West Branch Cooper River and East Branch Cooper River tributaries downstream to rkm 0, not including the area described in paragraph (b)(5) of this section.

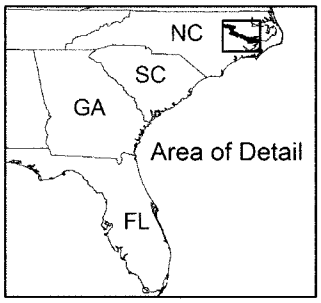
(8) Maps of the Carolina DPS follow:



Carolina Unit 2
Tar-Pamlico Unit

Map 2





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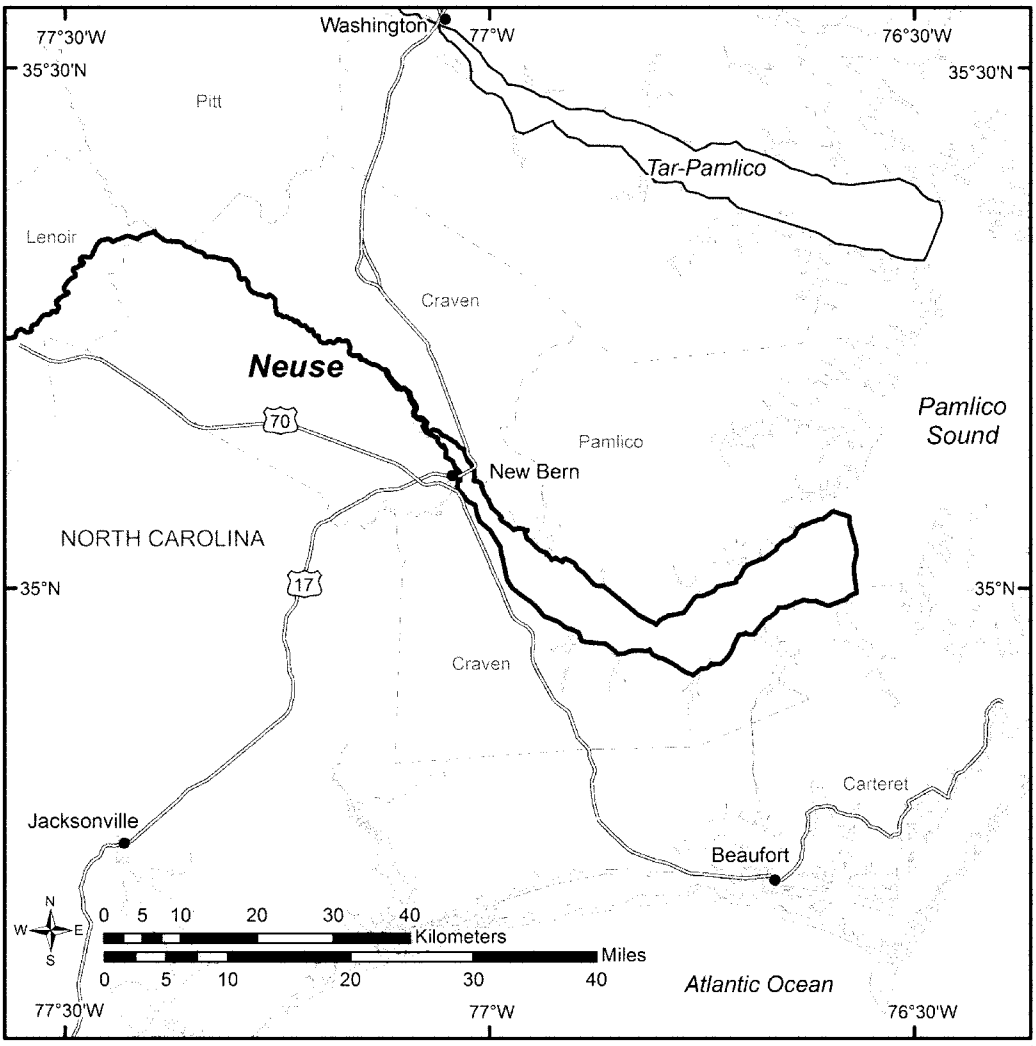
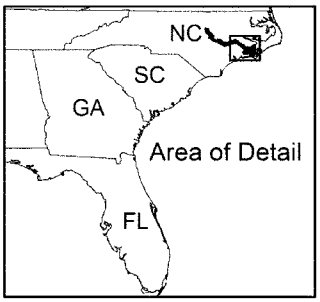
Critical Habitat Area

This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.

Carolina Unit 3
Neuse Unit

Map 3.1





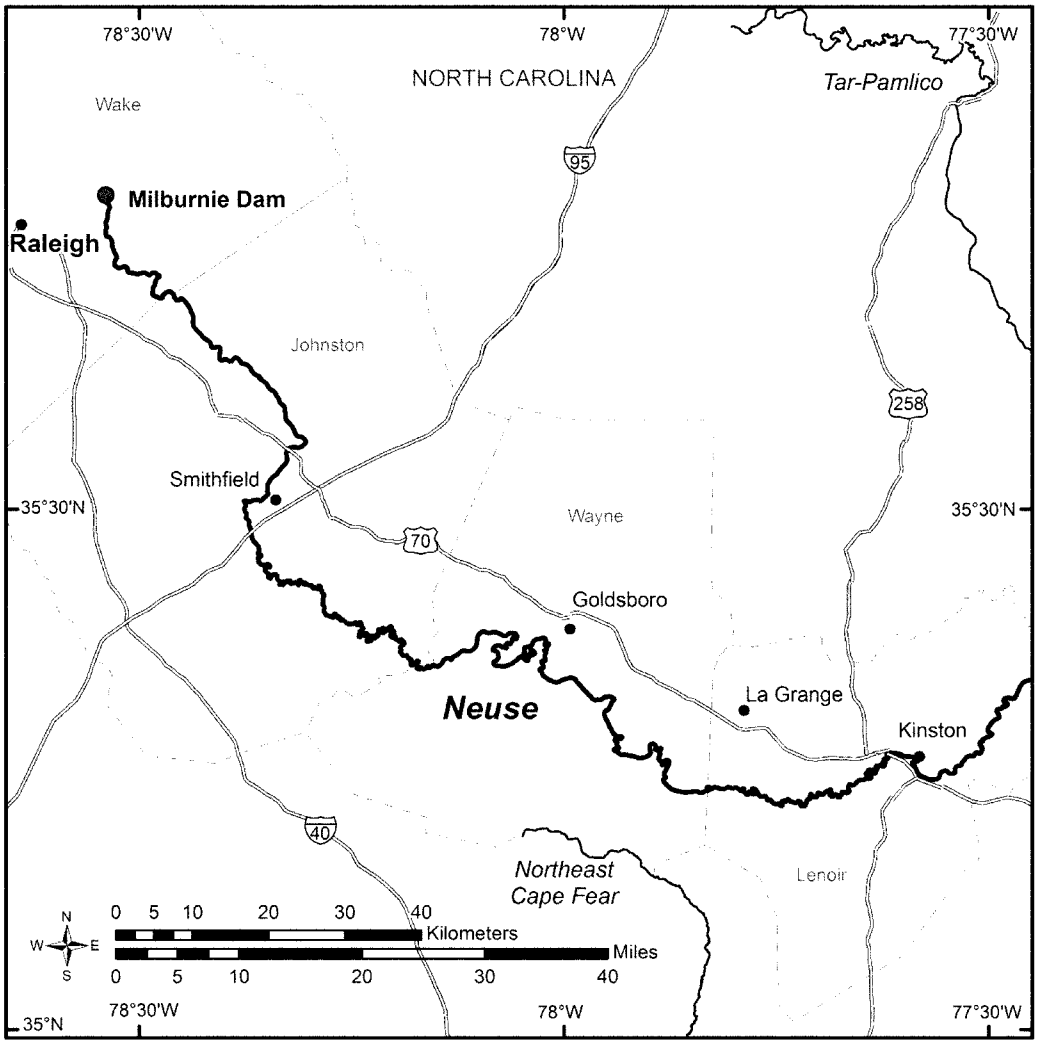
Legend

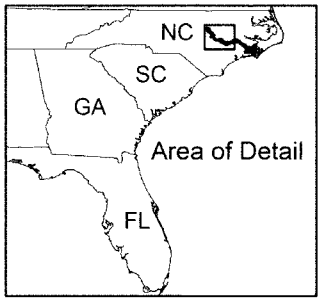
Critical Habitat Area

This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.

Carolina Unit 3
Neuse Unit

Map 3.2

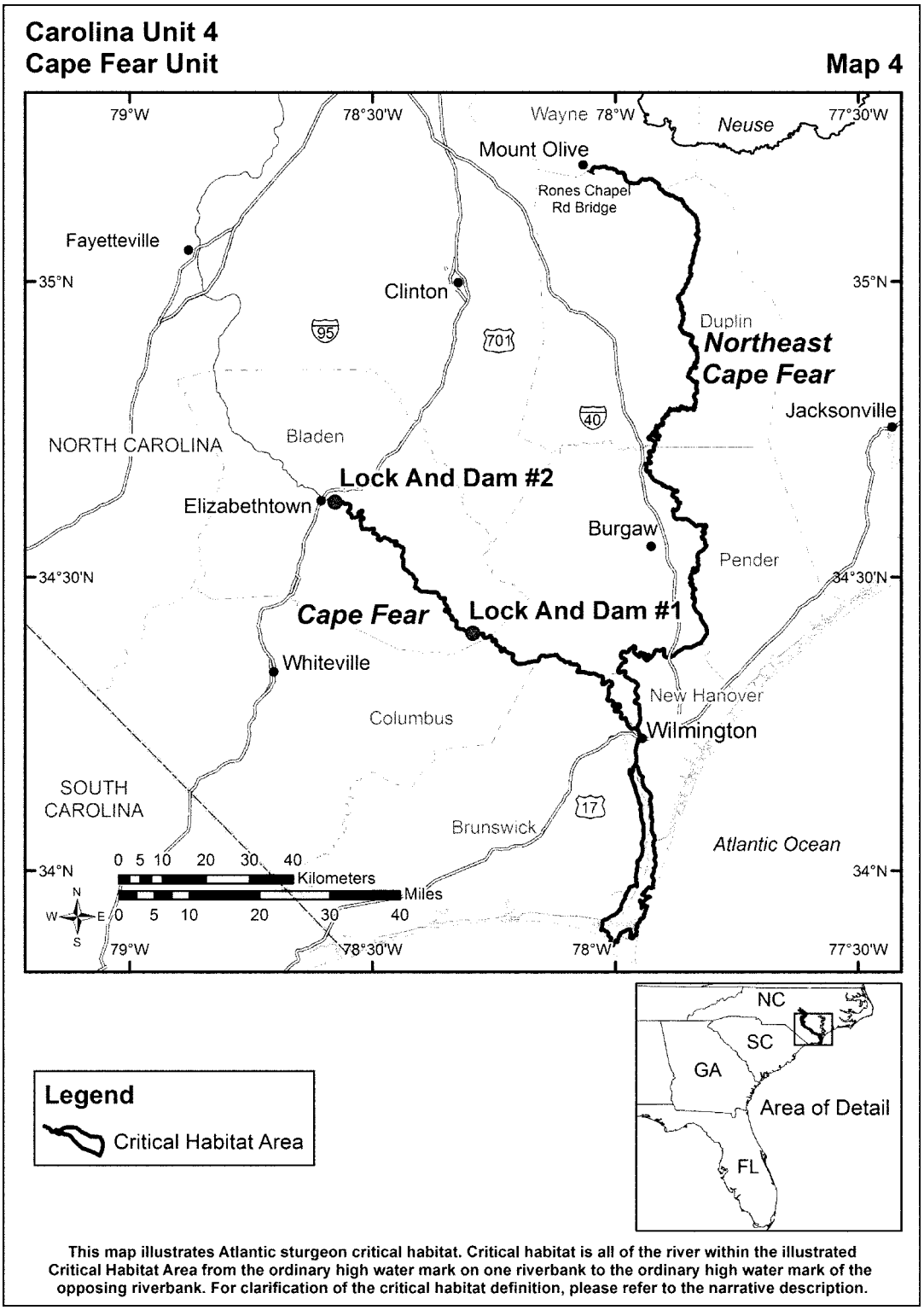




Legend

Critical Habitat

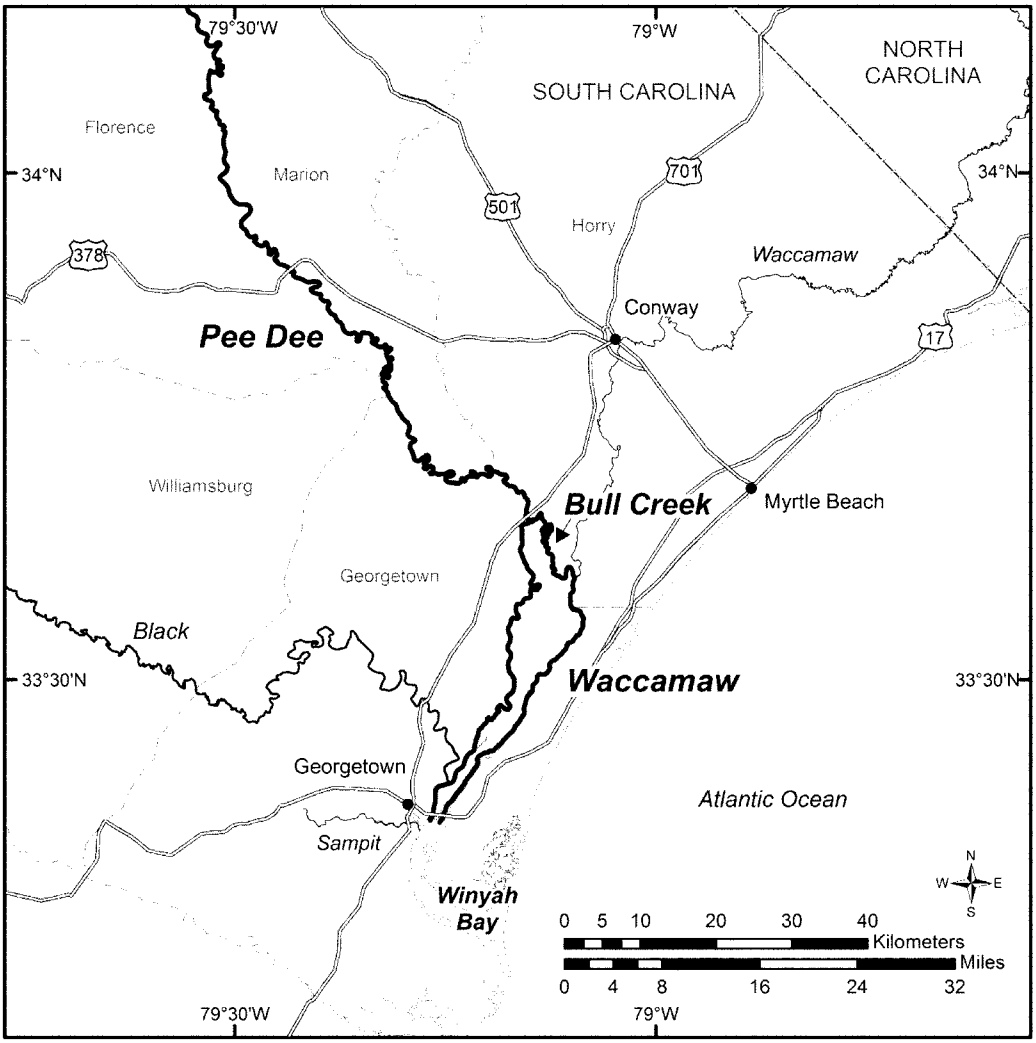
This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.

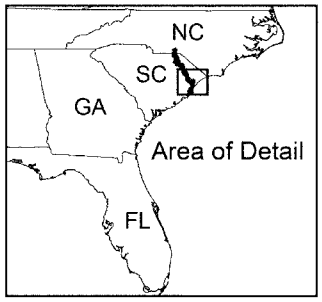


This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.

Carolina Unit 5
Pee Dee Unit

Map 5.1





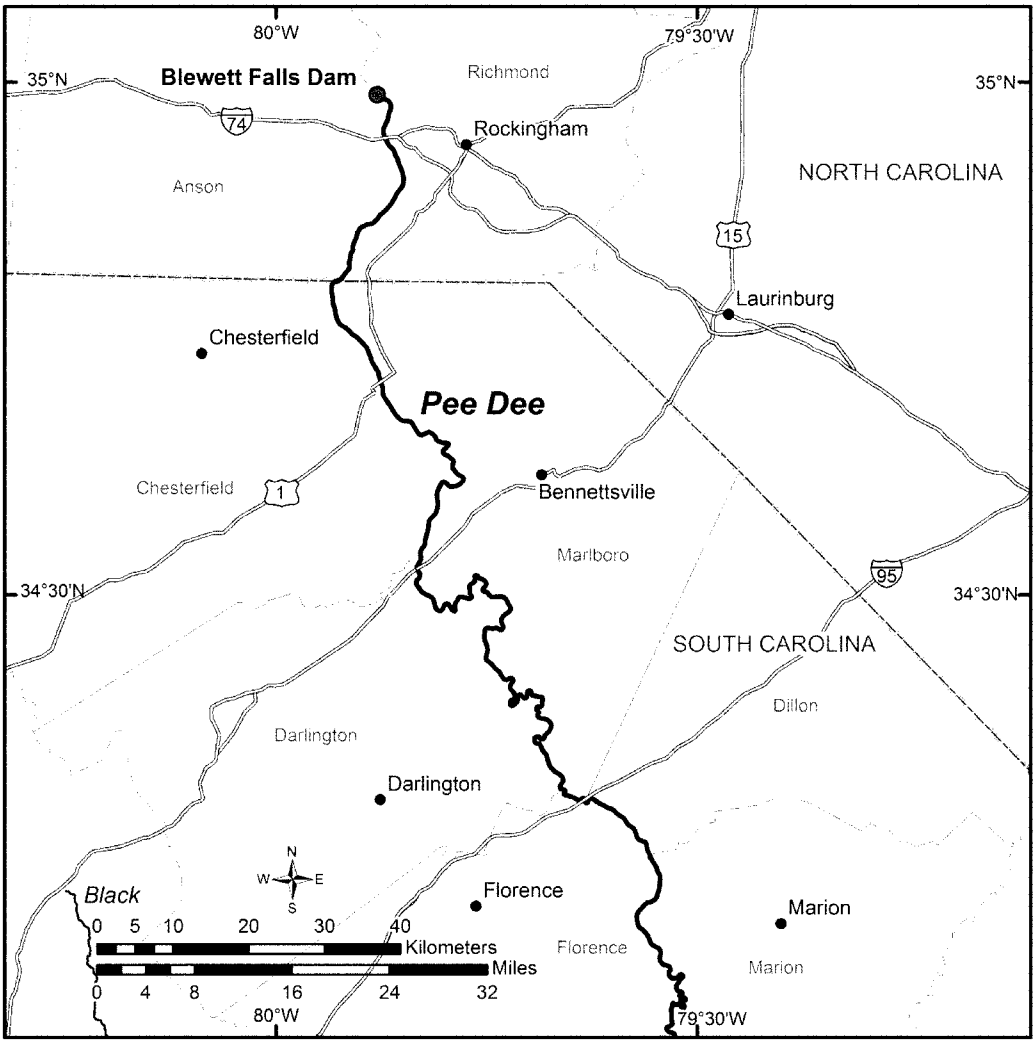
Legend

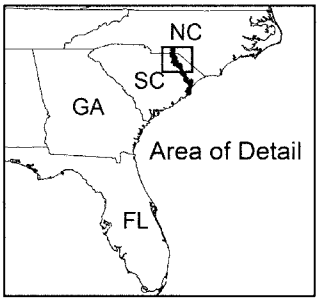
Critical Habitat

This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.

Carolina Unit 5
Pee Dee Unit

Map 5.2





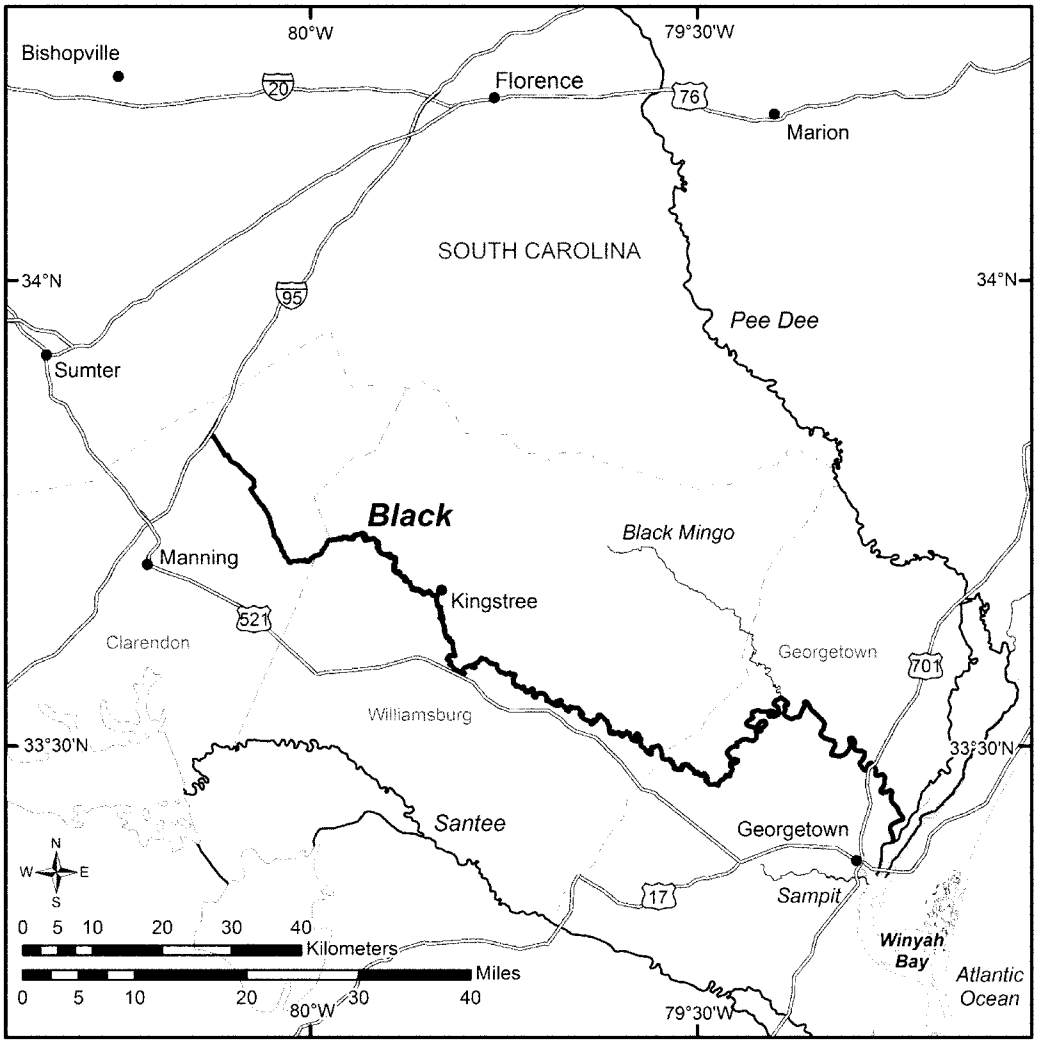
Legend

Critical Habitat

This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.

Carolina Unit 6
Black Unit

Map 6



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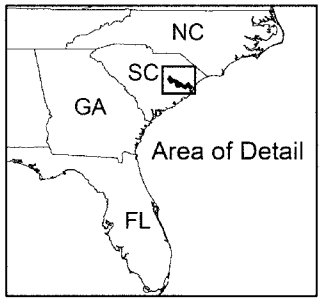
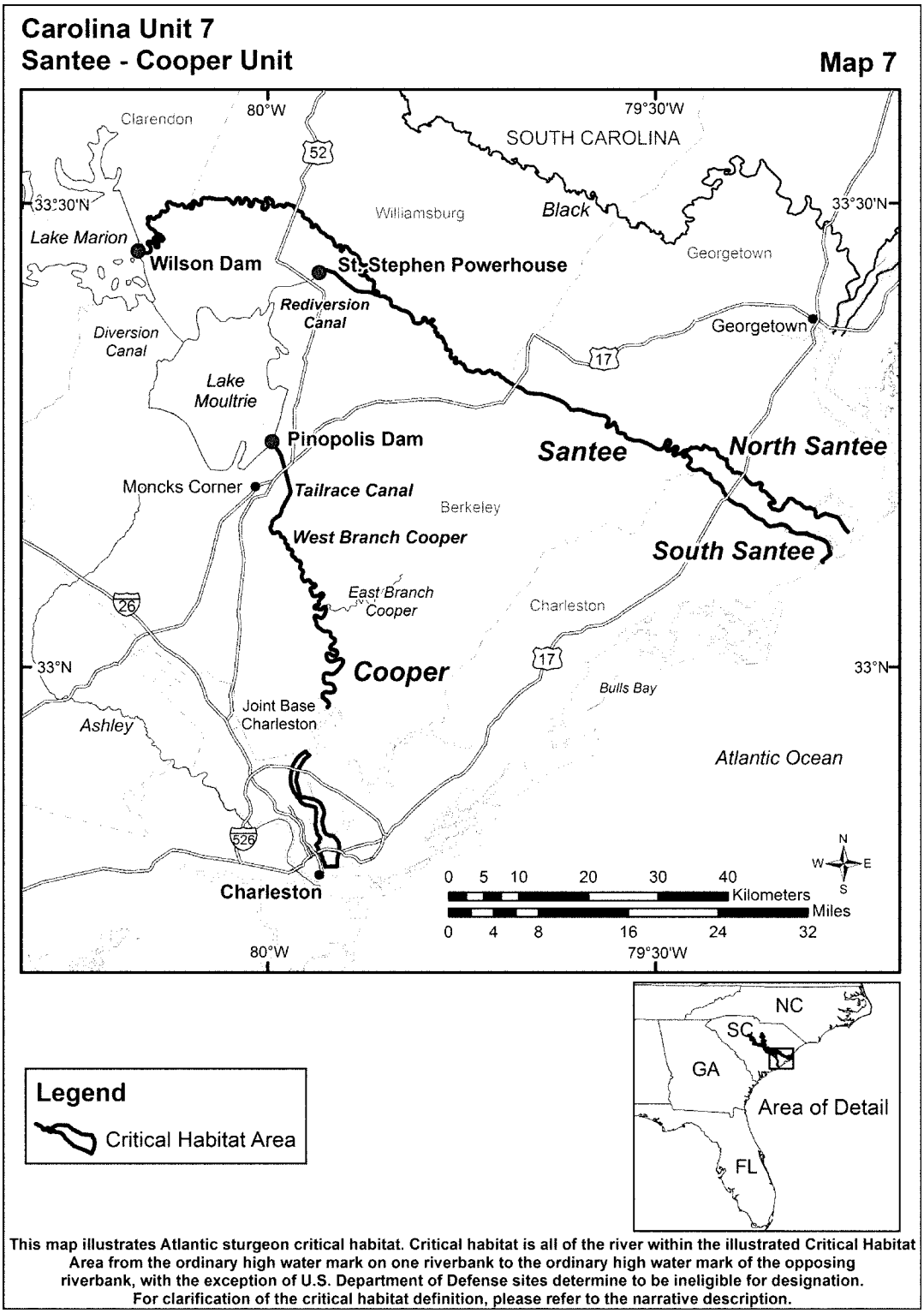
Critical Habitat



This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.



This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank, with the exception of U.S. Department of Defense sites determine to be ineligible for designation. For clarification of the critical habitat definition, please refer to the narrative description.

(h) *Critical habitat boundaries of the South Atlantic DPS.* The lateral extent for all critical habitat units for the South Atlantic DPS of Atlantic sturgeon is the ordinary high water mark on each bank of the river and shorelines. Critical habitat for the South Atlantic DPS of Atlantic sturgeon is:

(1) South Atlantic Unit 1 includes the North Fork Edisto River from Cones Pond downstream to the confluence with the South Fork Edisto River, the South Fork Edisto River from Highway 121 downstream to the confluence with the North Fork Edisto River, the Edisto River main stem from the confluence of the North Fork Edisto River and South Fork Edisto River tributaries downstream to the fork at the North Edisto River and South Edisto River distributaries, the North Edisto River from the Edisto River downstream to rkm 0, and the South Edisto River from the Edisto River downstream to rkm 0;

(2) South Atlantic Unit 2 includes the main stem Combahee–Salkehatchie River from the confluence of Buck and Rosemary Creeks with the Salkehatchie River downstream to the Combahee River, the Combahee River from the Salkehatchie River downstream to rkm 0;

(3) South Atlantic Unit 3 includes the main stem Savannah River (including the Back River, Middle River, Front River, Little Back River, South River, Steamboat River, and McCoy's Cut) from the New Savannah Bluff Lock and Dam downstream to rkm 0;

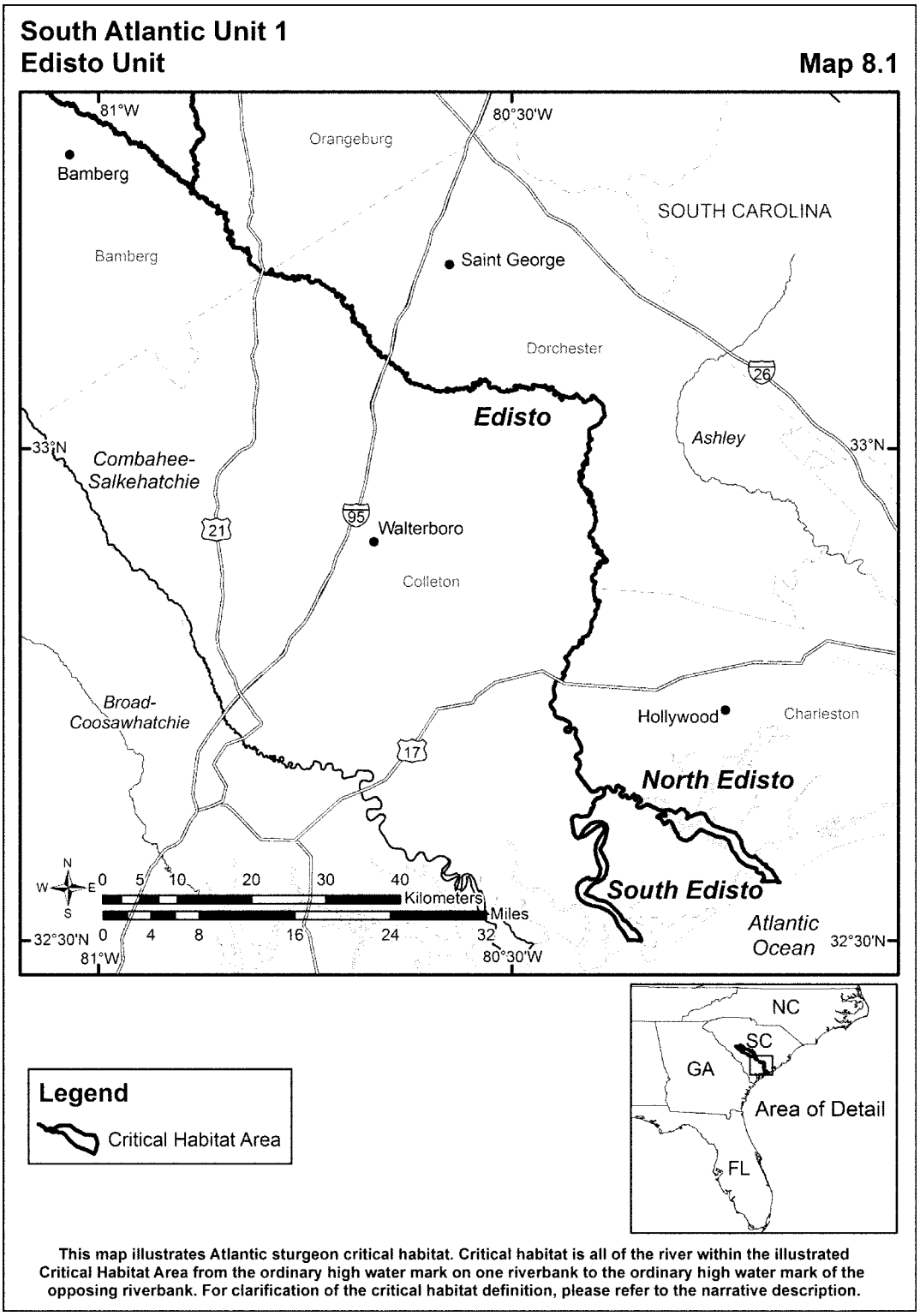
(4) South Atlantic Unit 4 includes the main stem Ogeechee River from the Mayfield Mill Dam downstream to rkm 0;

(5) South Atlantic Unit 5 includes the main stem Oconee River from Sinclair Dam downstream to the confluence with the Ocmulgee River, the main stem Ocmulgee River from Juliette Dam downstream to the confluence with the Oconee River, and the main stem Altamaha River from the confluence of the Oconee River and Ocmulgee River downstream to rkm 0;

(6) South Atlantic Unit 6 includes the main stem Satilla River from the confluence of Satilla and Wiggins Creeks downstream to rkm 0; and

(7) South Atlantic Unit 7 includes the main stem St. Marys River from the confluence of Middle Prong St. Marys and the St. Marys Rivers downstream to rkm 0.

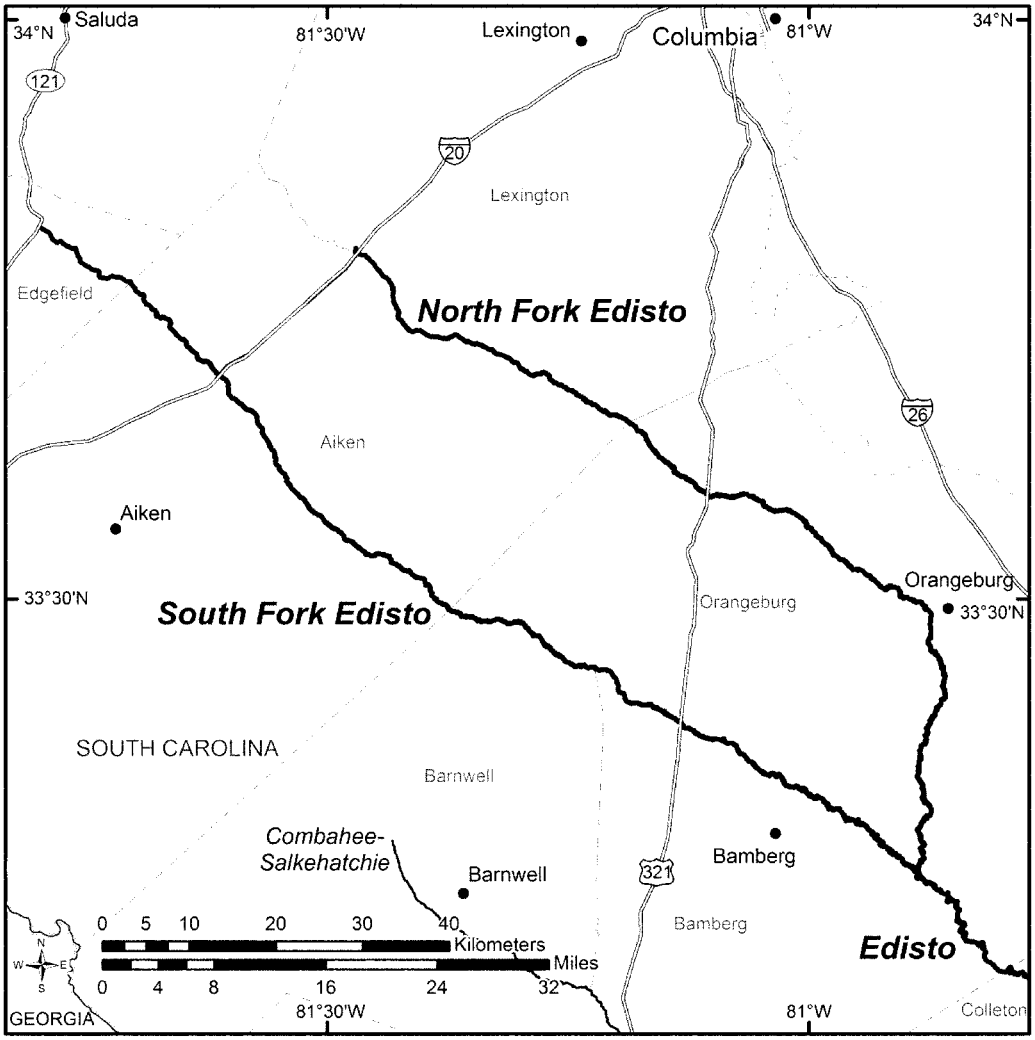
(8) Maps of the South Atlantic DPS follow:

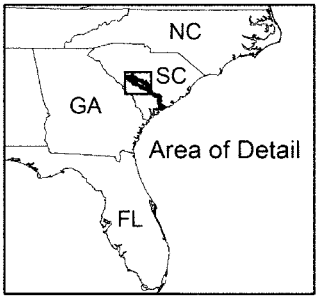


This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.

South Atlantic Unit 1
Edisto Unit

Map 8.2



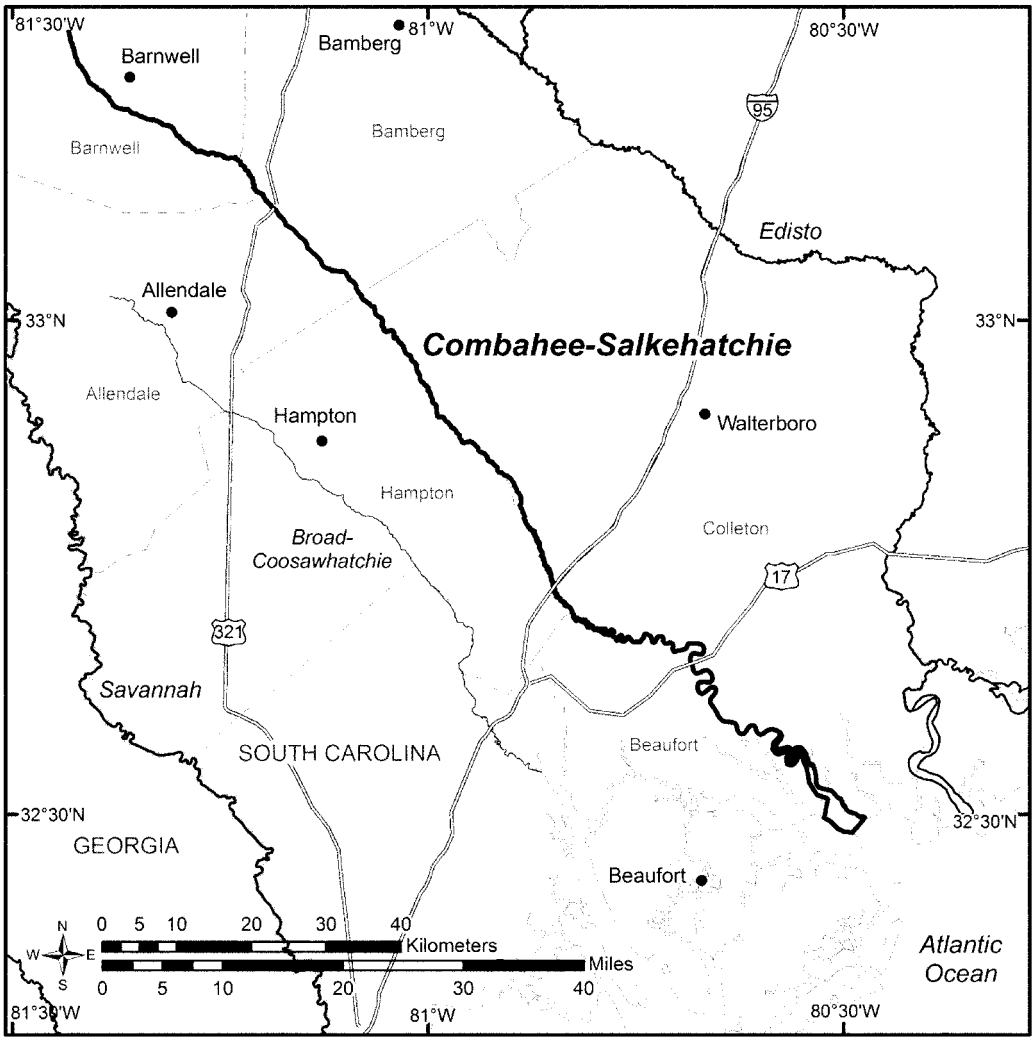


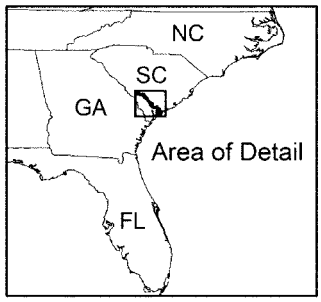
Legend

Critical Habitat

This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.

South Atlantic Unit 2
Combahee - Salkehatchie Unit **Map 9**

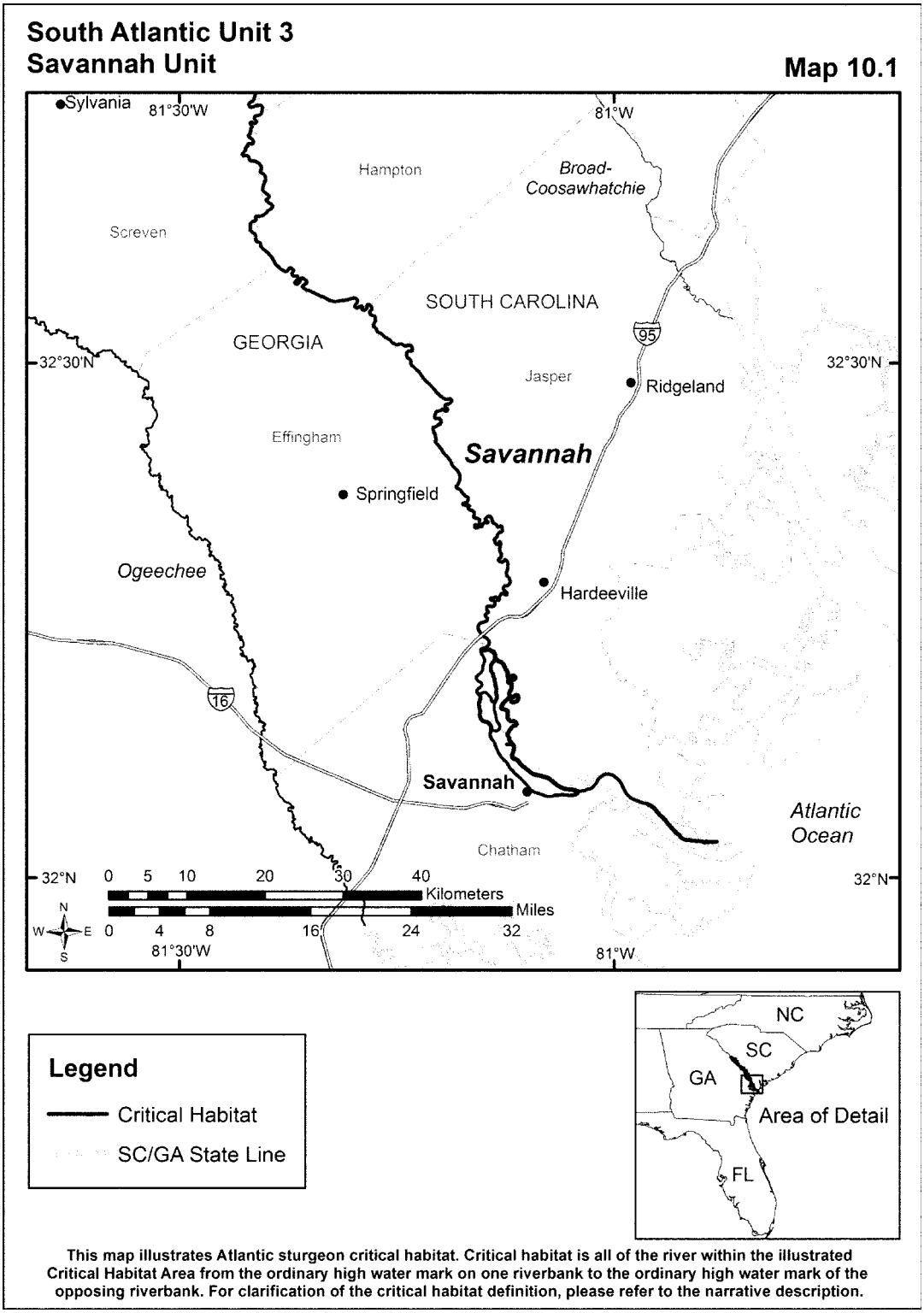




Legend

Critical Habitat Area

This map illustrates Atlantic sturgeon critical habitat. Critical habitat is all of the river within the illustrated Critical Habitat Area from the ordinary high water mark on one riverbank to the ordinary high water mark of the opposing riverbank. For clarification of the critical habitat definition, please refer to the narrative description.



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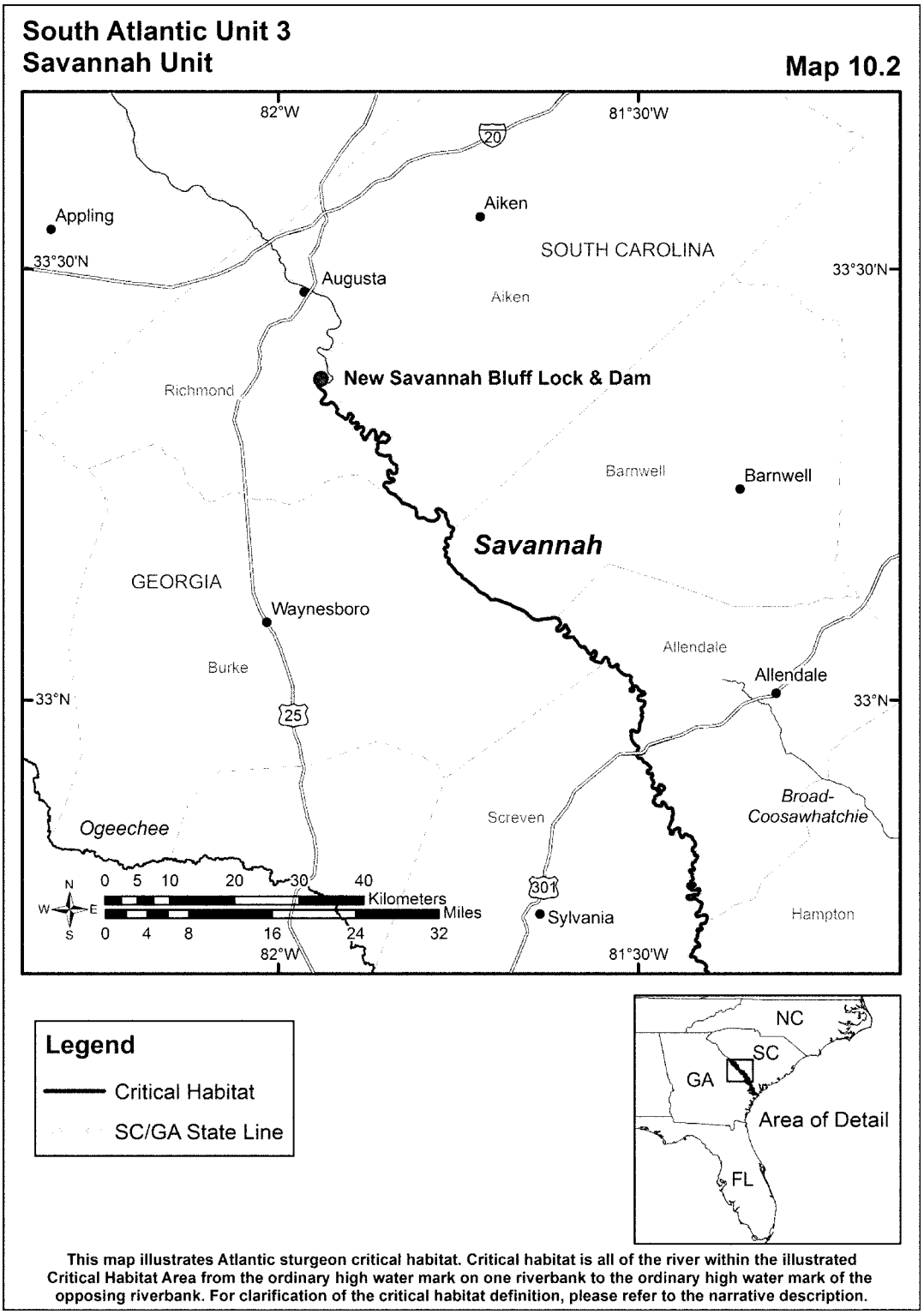

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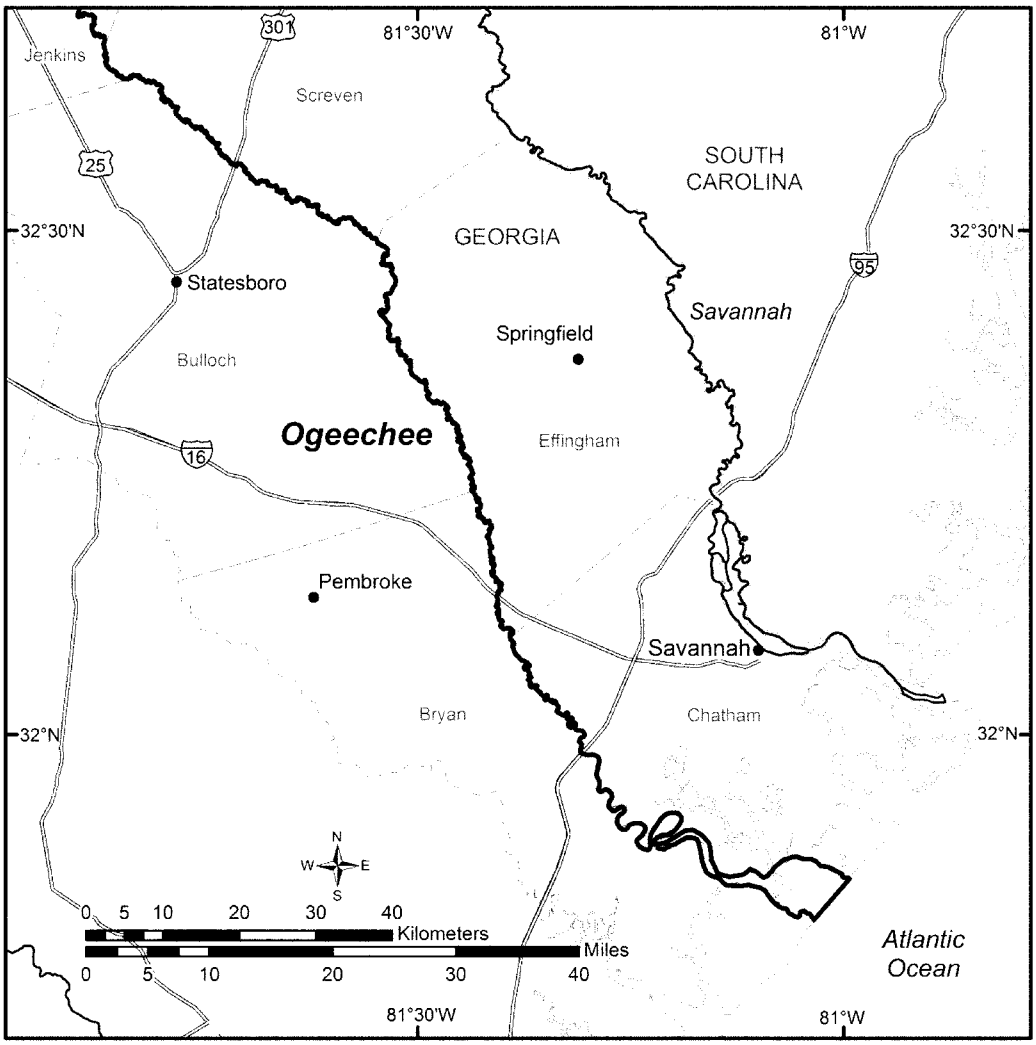
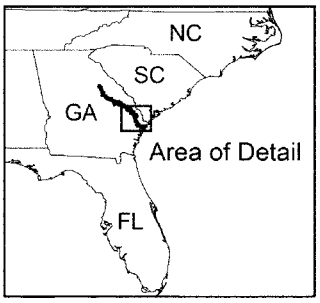
South Atlantic Unit 4
Ogeechee Unit

Map 11.1





Legend

Critical Habitat Area

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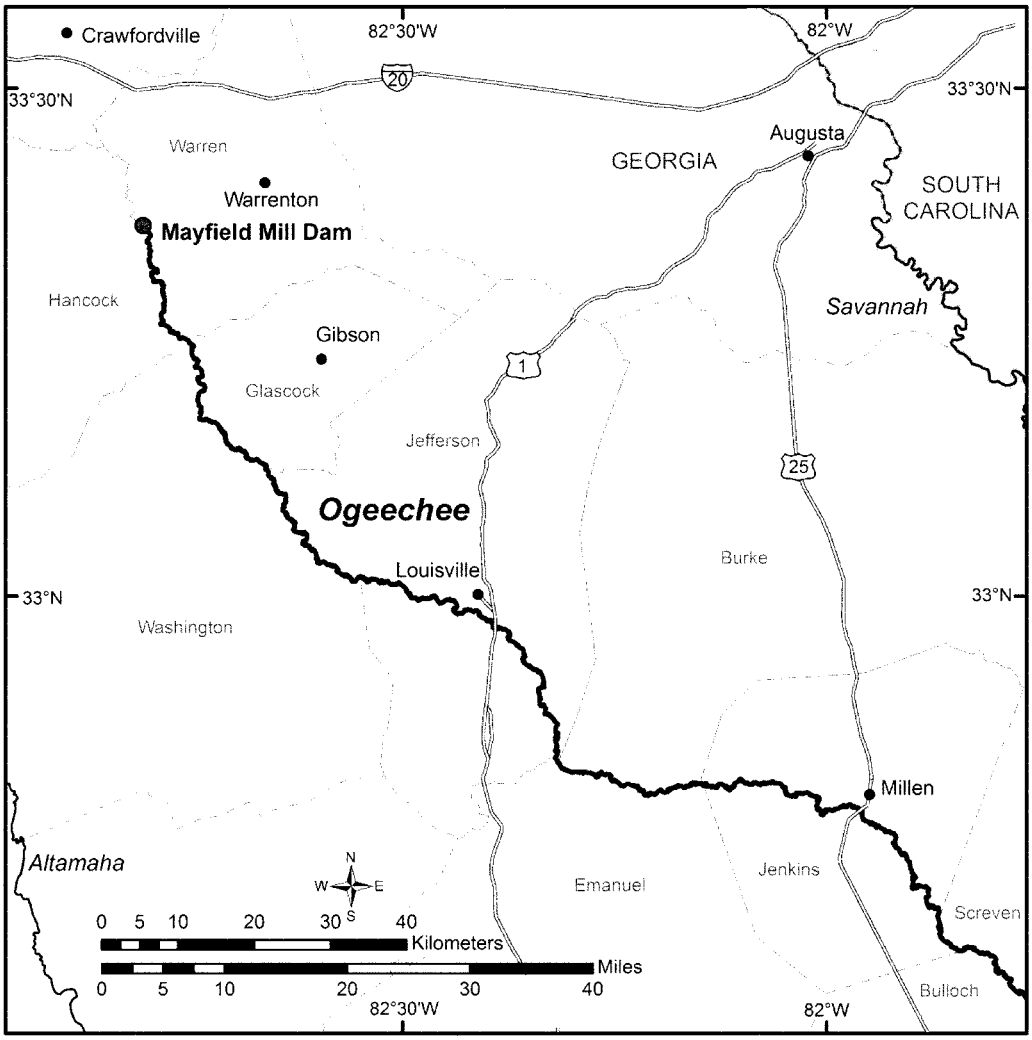
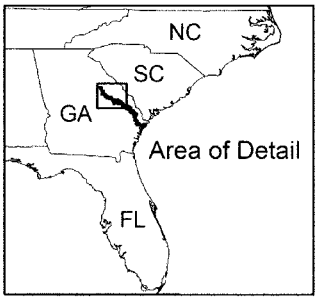
South Atlantic Unit 4
Ogeechee Unit

Map 11.2





Legend

Critical Habitat

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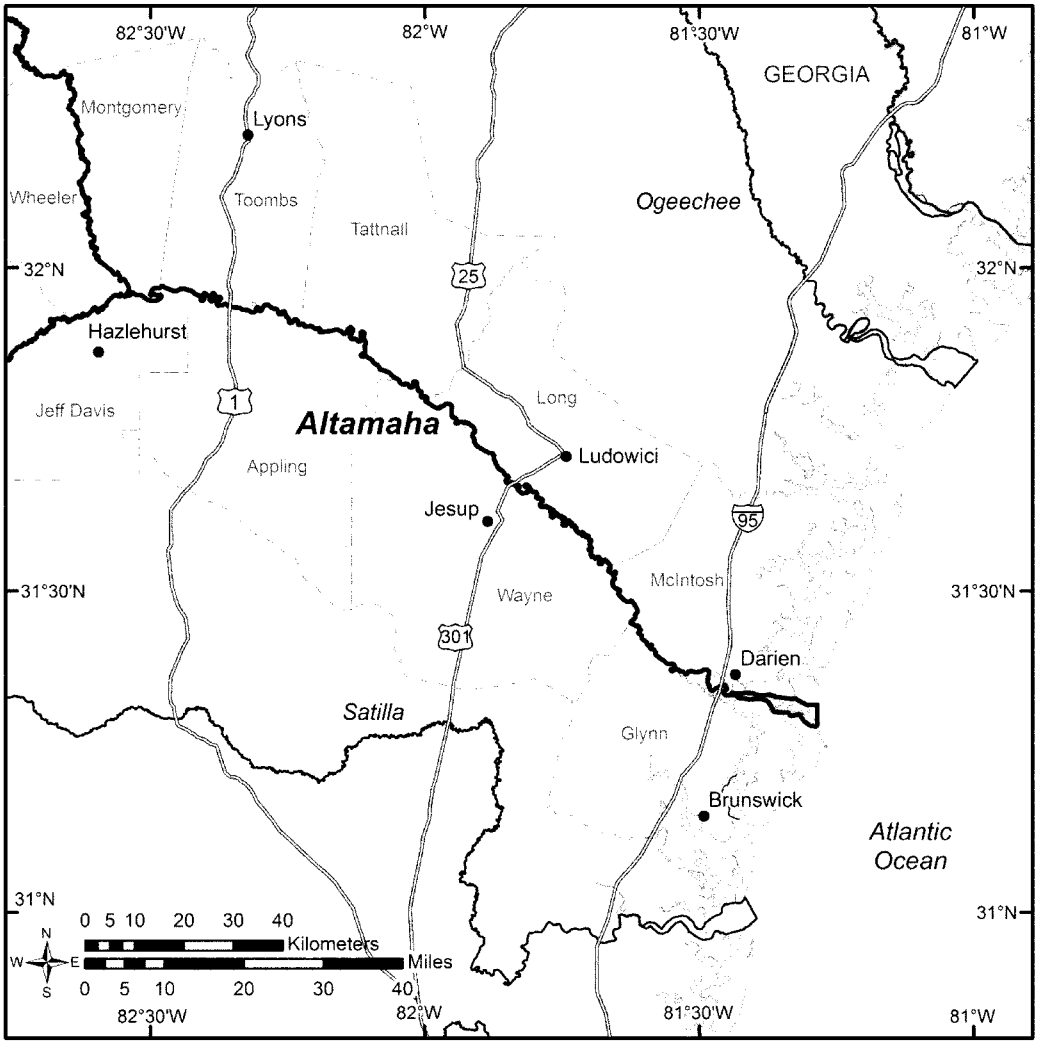
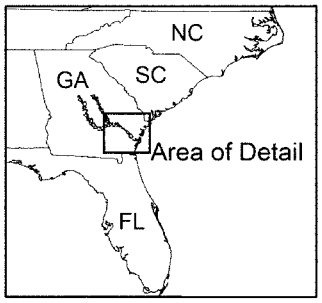
South Atlantic Unit 5
Altamaha Unit

Map 12.1





Legend

Critical Habitat Area

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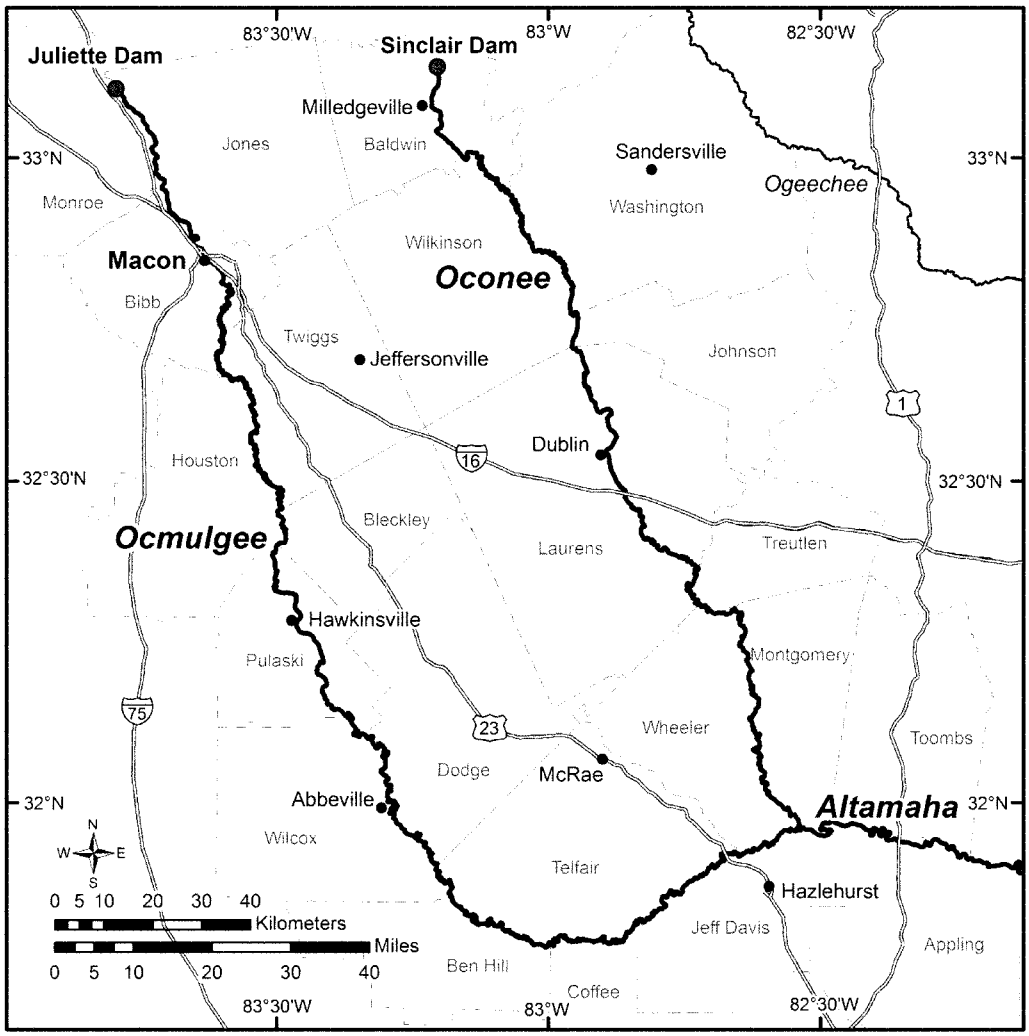
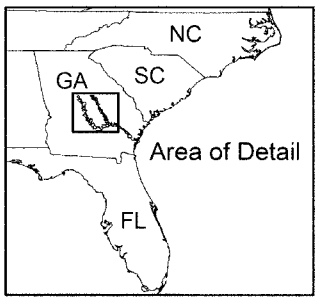
South Atlantic Unit 5
Altamaha Unit

Map 12.2



Legend

Critical Habitat



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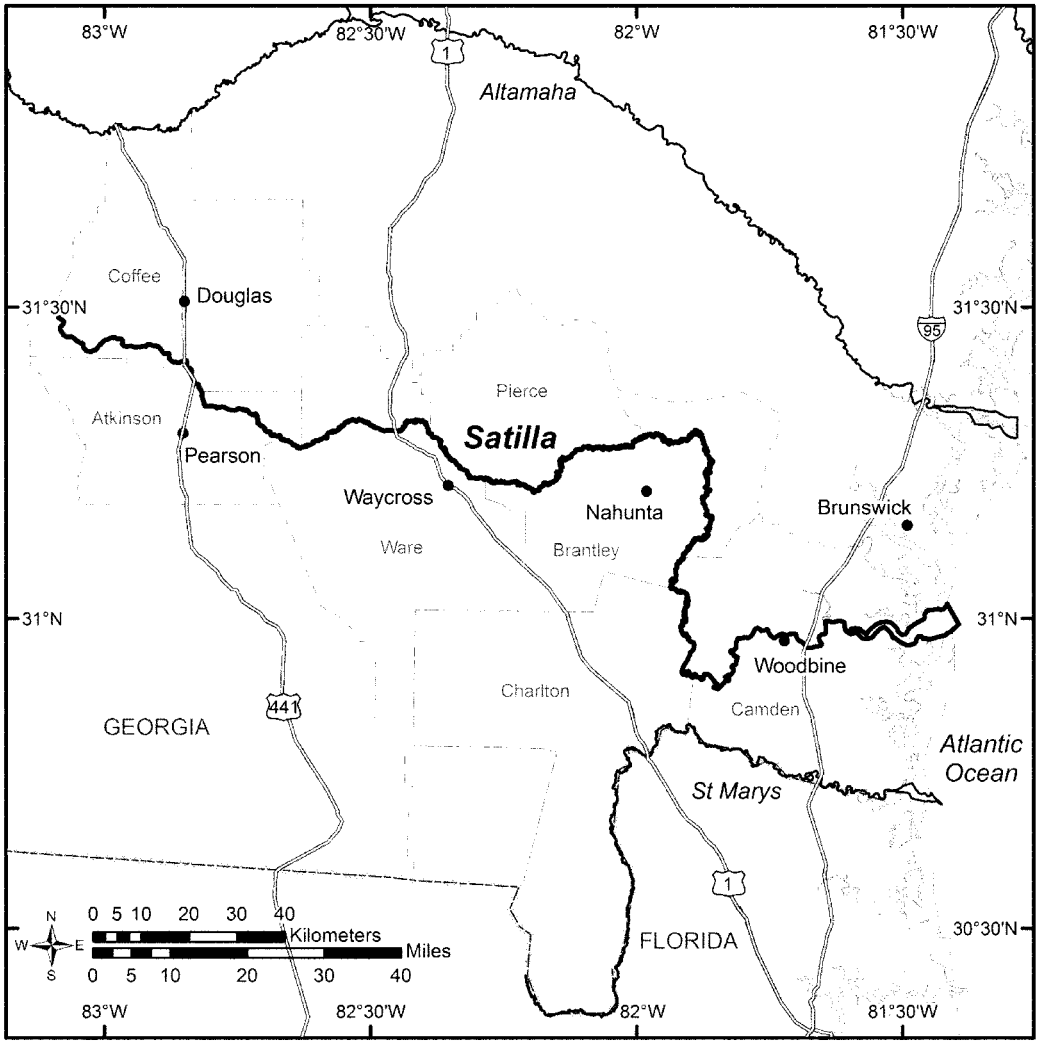
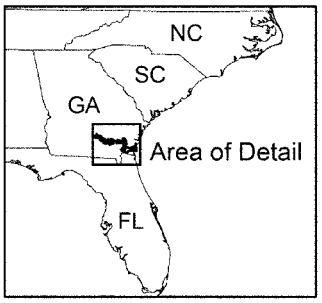
South Atlantic Unit 6
Satilla Unit

Map 13





Legend

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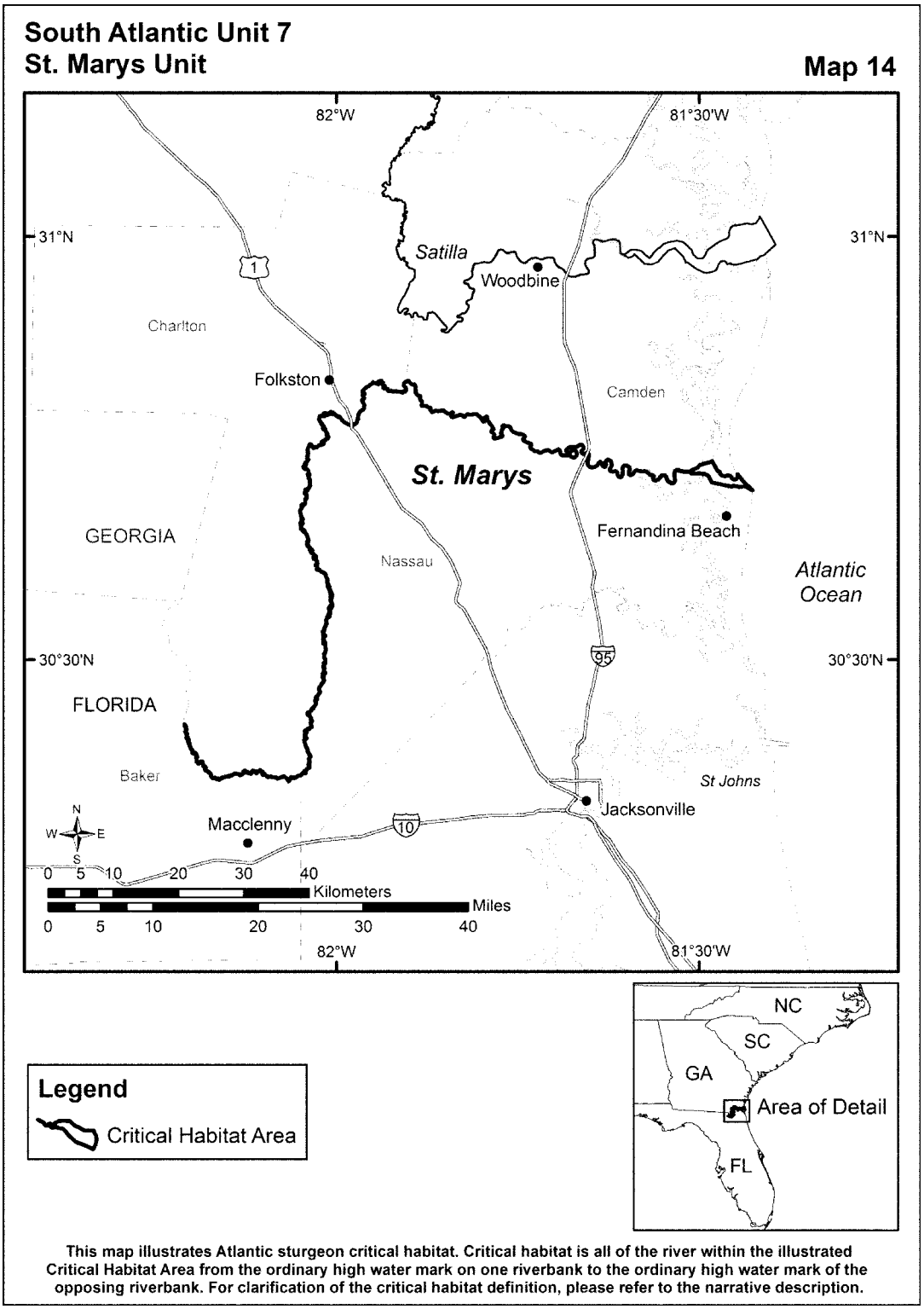

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