PROPOSED ACTION:	Authorizing Directed Take for the Translocation of Shortnose and Atlantic Sturgeon as a Permitted Research or Enhancement Activity in Endangered Species Act Section 10(a)(1)(A) Permits
TYPE OF STATEMENT:	Final Programmatic Environmental Assessment
LEAD AGENCY:	U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service
RESPONSIBLE OFFICIAL:	Kimberly Damon-Randall Director, Office of Protected Resources National Marine Fisheries Service
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LOCATION:	Atlantic Ocean and its riverine, estuarine, and coastal environment
ABSTRACT:	This Programmatic Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Office of Protected Resources' proposal to authorize directed take under the sturgeon ESA Section 10(a)(1)(A) permitting program for the translocation of shortnose and Atlantic sturgeon needed to achieve recovery objectives.
DATE:	September 20, 2024

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Chapter 1 Introduction and Purpose and Need

1.0 Introduction

The National Marine Fisheries Service (NMFS) Office of Protected Resources (OPR) Permits and Conservation Division (PR1) is proposing to issue permits pursuant to Section 10(a)(1)(A) of the Endangered Species Act (ESA; 16 U.S.C. 1531 *et seq*.) and its implementing regulations (50 CFR Parts 222-226) to authorize directed take for the translocation of shortnose (*Acipenser brevirostrum*) and Atlantic (*A. oxyrinchus oxyrinchus*) sturgeon concurrent with other research and enhancement activities conducted on these species. For the purposes of the sturgeon permitting program (hereafter "the Program"), translocation is the intentional capture, holding, handling, transport, and release of individuals within a river system (e.g., translocation of fish across a dam or fish passage) or between river systems within the U.S. historical range of Atlantic and shortnose sturgeon (i.e., Maine to Florida). Translocation may be necessary when sturgeon have been prevented access to previously attainable spawning, foraging, fish passage, or marine areas by natural or anthropogenic obstructions, or when a population in a river system has been extirpated. The proposed translocations exclude releasing captive Atlantic or shortnose sturgeon (individuals captured from the wild and currently held in captivity or captive-born) into the wild and would only be authorized when conducted concurrent with other research or enhancement activities. Translocation of shortnose and Atlantic sturgeon has not previously been authorized by the Program, and therefore, has not undergone prior NEPA analysis.

1.1 Background

The proposed action (i.e. issuance of permits to authorize translocation) was triggered by a modification request submitted to PR1 by the South Carolina Department of Natural Resources in response to the proposed re-licensing by the Federal Energy Regulatory Commission (FERC) of the South Carolina Public Service Authority Hydroelectric Project (Second Modified Prescription for Fishways for the Santee Cooper Hydroelectric Project; NMFS 2020b). The request to re-license required consultation under Section 7 of the ESA, which resulted in a Biological Opinion (BO) (SERO-2018-00325; NMFS 2020a). Translocation of Atlantic and shortnose sturgeon is a term and condition of the FERC BO, but an ESA Section 10(a)(1)(A) permit is needed for translocation to occur. As a result, a proposed permit modification was requested for which the *Federal Register* notice (86 FR 56692, October 12, 2021) included a summary of the permit application which includes a detailed description of the proposed action (i.e., translocation) and the potential effects of the project on Atlantic and shortnose sturgeon and their habitat.

The primary goal of translocating endangered sturgeon in the Santee-Cooper project in South Carolina, as indicated in the above referenced documents, is to provide previously inaccessible spawning habitat to sturgeon on the Santee River by moving the sturgeon blocked from spawning below the Pinopolis Dam on the Cooper River (an unsuccessful spawning location) to traditional spawning and recruitment areas below the St. Stephens Dam on the Santee River. The action would also include possible future translocation of sturgeon from the area below the St. Stephens Dam, to Lakes Marion and Moultrie, South Carolina, based on ongoing habitat suitability investigations. This translocation to Lakes Marion and Moultrie would occur once saturation of habitat is reached at sites below the St. Stephens Dam. NMFS SERO stated in the FERC BO and second modified prescription that translocation of shortnose and Atlantic sturgeon

is needed for enhancing their populations, and noted the need for follow-up monitoring of translocated individuals (NMFS 2020a and 2020b). Additionally, the FERC BO concluded that the action (i.e., FERC relicensing) was not likely to jeopardize the continued existence of the shortnose and Atlantic sturgeon (Carolina distinct population segment [DPS]) (NMFS 2020a).

As a result of the FERC BO (NMFS 2020a), a permit modification was submitted to PR1 to conduct translocations of shortnose sturgeon. However, the translocation component was not originally analyzed in the programmatic consultation for the Program. Therefore, NMFS reinitiated the 2017 programmatic biological opinion (PBO) (NMFS 2017a) to allow inclusion of translocation as an activity concurrent with other permitted research or enhancement activities. The Program requested reinitiation of the PBO on September 13, 2021, to add translocation as an activity concurrent with other research or enhancement activities throughout the historical range of Atlantic and shortnose sturgeon (i.e. Maine to Florida). Consultation of the reinitiated PBO concluded on February 7, 2023 (NMFS 2023). The 2023 PBO concluded that the actions, which included translocation, were not likely to jeopardize the continued existence of the shortnose and Atlantic sturgeon (all DPSs).

Section 4(f) of the ESA directs NMFS to develop and implement recovery plans for threatened and endangered species, unless such a plan would not promote conservation of the species. The proposed action is consistent with the Final Recovery Plan for shortnose sturgeon (NMFS 1998), which identifies the Recovery Objective and Criteria: "To recover populations to levels of abundance at which they no longer require protection under the [ESA]. For each population segment, the minimum population size will be large enough to maintain genetic diversity and avoid extinction, aiding the recovery of the species." The Recovery Plan lists the following relevant actions needed for recovery:

a. "Protect Shortnose Sturgeon and their Habitats" through:
- Ensuring agency compliance with the ESA
- Mitigating/eliminating impact of adverse anthropogenic actions on shortnose sturgeon population segments (human actions that adversely affect shortnose sturgeon include: 1) activities that modify or destroy important habitats and/or kill sturgeon, and 2) introduction of non-native species that disturb ecosystems upon which shortnose sturgeon depend)

b. "Rehabilitate Shortnose Sturgeon Populations and Habitats" through:
- Restoring access to habitats
- Restoring spawning habitat and conditions
- Restoring foraging habitat
- Reintroducing shortnose sturgeon into river ecosystems where they have been extirpated

This action is also in accordance with the Atlantic sturgeon recovery outline[1] (*https://media.fisheries.noaa.gov/dam-migration/ats_recovery_outline.pdf*) objectives focusing

[1] NMFS has not developed a recovery plan for Atlantic sturgeon. The Atlantic sturgeon recovery outline serves as interim guidance to direct recovery efforts, including recovery planning, until a full recovery plan is developed and approved.

on fish passage and improving access to historical habitats. Specific actions mentioned in the recovery outline include:

- Continue researching fish passage designs that allow Atlantic sturgeon access to historical spawning grounds currently blocked by dams
- Implementing regional initiatives to improve access to historical habitats and ensure water withdrawals have minimal impact on Atlantic sturgeon

This chapter presents the following sections: 1.2) environmental review process; 1.3) NMFS' proposed action and purpose and need; 1.4) application of the PEA; 1.5) other associated environmental laws or consultations; and 1.6) the scope of the document.

The remainder of this PEA is organized as follows:

- Chapter 2 describes current research and enhancement activities and the alternatives carried forward for analysis as well as alternatives not carried forward for analysis
- Chapter 3 describes the baseline conditions of the affected environment
- Chapter 4 describes the direct, indirect, and cumulative impacts to the affected environment, specifically impacts to shortnose and Atlantic sturgeon and their habitat associated with NMFS' proposed action and alternatives
- Chapter 5 lists document preparers and agencies consulted
- Chapter 6 lists references cited

1.2 Environmental Review Process

The National Environmental Policy Act (NEPA), the 2020 Council on Environmental Quality (CEQ) Regulations (40 CFR Parts 1500–1508[2]), and National Oceanic and Atmospheric and Administration (NOAA) policy and procedures[3] require all proposals for major federal actions be reviewed with respect to environmental consequences on the human environment. Major federal actions include activities that federal agencies fully or partially fund, regulate, conduct, or approve. NMFS' allowance of directed take for the translocation of Atlantic and shortnose sturgeon in Section 10(a)(1)(A) research and enhancement permits, is a major federal action.

NMFS determined that a programmatic environmental assessment (PEA) is the appropriate level of NEPA review for considering the allowance of directed take for translocation in scientific research or enhancement permits under Section 10(a)(1)(A) of the ESA, since translocation has not been previously authorized or analyzed in PR1, and significant environmental impacts are not anticipated (40 CFR 1501.3(a)(2)). Additionally, the CEQ NEPA regulations encourage the development and use of programmatic NEPA documents and tiering to eliminate discussion of repetitive issues (40 CFR 1501.11). Programmatic NEPA reviews add value and efficiency to the

[2]This PEA is being prepared using the 2020 CEQ NEPA Regulations as modified by the Phase I 2022 revisions. The effective date of the 2022 revisions was May 20, 2022, and reviews begun after this date are required to apply the 2020 regulations as modified by the Phase I revisions unless there is a clear and fundamental conflict with an applicable statute. This PEA began on December 12, 2022, and accordingly proceeds under the 2020 regulations as modified by the Phase I revisions."

[3] NOAA Administrative Order (NAO) 216-6A, "Compliance with the National Environmental Policy Act, Executive Orders 12114, Environmental Effects Abroad of Major Federal Actions; 11988 and 13690, Floodplain Management and 11990, Protection of Wetlands," issued 22 April 2016, and the Companion Manual for NAO 216-6A, "Policy and Procedures for Implementing the National Environmental Policy Act and Related Authorities," issued 13 January 2017.

decision making process when they inform the scope of decisions and subsequent tiered NEPA reviews. Therefore, NMFS decided that completing a PEA for the proposed action was appropriate.

NMFS further determined that permitting future translocation activities is a "similar" but not "connected" action (40 CFR 1501.9(e)(1)) due to general commonalities in geography, timing, and type of targeted scientific research and enhancement, which provides a reasonable basis for evaluating the current modification request and future permitting of translocations, concurrent with other research or enhancement, together in a single environmental analysis. If there is potential for significant impacts, then an EIS is prepared. If the impacts are not expected to be significant, a Finding of No Significant Impact (FONSI) is prepared.

1.2.1 Previous NEPA Analyses

Since 2002, NMFS has prepared numerous environmental assessments (EAs) analyzing the environmental impacts of scientific research and enhancement permits issued under ESA Section 10(a)(1)(A) on all taxa, including permits authorizing take for research and enhancement activities on Atlantic and shortnose sturgeon (NMFS 2007; NMFS 2008a; NMFS 2008b; NMFS 2009a; NMFS 2009b; NMFS 2009c; NMFS 2010a; NMFS 2010b; NMFS 2010c; NMFS 2011; and NMFS 2012a). These EAs demonstrated that the proposed action of issuing sturgeon research and enhancement permits for the covered activities resulted in impacts to the target species (i.e., subject species of the permit) only, and did not affect other resources in the human environment. Furthermore, these EAs found that the associated actions resulted in less than significant impacts to the target species and the NEPA reviews concluded with Findings of No Significant Impacts (FONSIs).

Specifically, the 2012, "Environmental Assessment for the Issuance of 12 Scientific Research Permits for Research on Atlantic sturgeon" (NMFS 2012a), evaluated research activities including capture of adult, sub-adult and juvenile, eggs and larvae, of Atlantic sturgeon while also handling, holding, measuring, weighing, video/ photographing, internal and external tagging, genetic tissue sampling, biopsy, anesthetizing, gastric lavaging, laparoscopy, sex identifying, age estimating, and salvaging of dead specimens. This EA, along with hundreds of other EAs which analyzed similar categories of activities (i.e., issuance of permits for scientific or enhancement purposes under Sections 10(a)(1)(a) and 4(d) of the ESA) each resulted in a Finding of No Significant Impact (FONSI). As a result, NMFS concluded that the issuance of permits for those research and enhancement activities analyzed do not individually or cumulatively have a significant effect on the human environment (including target species) under normal circumstances and a subset of 20 of these actions formed the basis of NOAA Categorical Exclusion B1[4]

> CE **B1** is the "*Issuance of permits or permit modifications under Section 10(a)(1)(A) of the ESA for take, import or export of endangered species for scientific purposes or to enhance the propagation or survival of the affected species, or in accordance with the requirements of an ESA Section 4(d) regulation for threatened species.*"

Most of the activities analyzed in this PEA (Section 2.1) were previously analyzed in the above listed EAs and were included in this analysis because the proposed action to authorize directed

[4] NOAA's full list of approved CE categories is in Appendix E of the Companion Manual for NAO 216-6A.

take for the translocation of ESA-listed Atlantic and shortnose sturgeon, would only ever occur concurrent with one or more of these other activities. Following the establishment of CE B1, several activities (e.g., oocyte extraction device, oxytetracycline (OTC), epidermal mucus sampling) were analyzed separately under NEPA, and were found to fall within CE B1 and were therefore categorically excluded from further environmental analysis, including the need to prepare an Environmental Assessment or an Environmental Impact Statement.

1.2.2 Changes from the Draft PEA

After publishing the draft PEA for public comment (88 FR 89385; see section 1.4.1), NMFS identified one additional sampling method that was inadvertently left out of the draft PEA. As explained above, epidermal mucus sampling was found to be consistent with the CE B1 category of actions. Therefore, NMFS has included it in this final PEA after concluding that its addition does not change the analysis of impacts as described in the draft.

1.3 Purpose and Need

1.3.1 Description of Proposed Action

As stated in Section 1.0, NMFS proposes to authorize directed take for the translocation of ESA-listed Atlantic and shortnose sturgeon as a research or enhancement activity. NMFS proposes to authorize directed take for translocation, concurrent with additional research or enhancement activities, if the research or enhancement activity's objectives are 1) stated as a term and condition to implement reasonable and prudent measures of an active BO, 2) an identified objective in a NMFS recovery outline or recovery plan for the species, or 3) determined necessary by NMFS Regional Offices and NMFS OPR to recover the species.

Also as stated in Section 1.0, for purposes of the Program, translocation is the intentional capture, holding, handling, transport, and release of individuals within a river system (e.g., translocation of fish across a dam or fish passage) or between river systems within the U.S. historical range of Atlantic and shortnose sturgeon (i.e., Maine to Florida). Translocation may be necessary when sturgeon have been prevented access to previously attainable spawning, foraging, fish passage, or marine areas by natural or anthropogenic obstructions, or when a population in a river system has been extirpated. Translocation of shortnose and Atlantic sturgeon has not previously been authorized as part of the Program, therefore had not undergone prior NEPA analysis.

Individual sturgeon may purposefully or unintentionally be translocated more than once during the duration of a project. Fish could be identified by previously applied tags, as long as the tags are still functional. In this case, the researchers would determine if a sturgeon previously translocated is a good candidate to be translocated again. Whether an individual would be purposefully translocated multiple times would be described in the permit application. In addition, monitoring of the translocated animals would be conducted to determine the success of the project. Monitoring protocols would be described as part of the application and reported annually as a requirement of any ESA Section 10(a)(1)(A) permit. This may include, for example, evidence of spawning and recruitment of Atlantic and shortnose sturgeon within the systems they were translocated to. Permits require the holders to provide advance written notification of planned research to the applicable NMFS Regional Office. Researchers must also

coordinate their activities with other permitted researchers to avoid unnecessary take of animals or duplication of efforts.

The process of translocation involves the intentional capture, holding, handling, transport, and release of individuals within a river system (e.g., translocation of fish across a dam or fish passage) or between river systems within the U.S. historical range of Atlantic and shortnose sturgeon (i.e., Maine to Florida). All translocated sturgeon would also be measured, PIT tagged, and fin clip sampled (for genetics) prior to release. Any additional activities conducted on translocated sturgeon would depend on the environment, target life stages, and individual research and enhancement objectives and could involve any of the activities described in Section 2.1.2.

The proposed translocations exclude releasing captive Atlantic or shortnose sturgeon (individuals captured from the wild and currently held in captivity or captive-born) into the wild.

1.3.2 Purpose

The purpose of NMFS' action to authorize directed take for translocation of ESA-listed Atlantic and shortnose sturgeon as a research or enhancement activity is to support sturgeon conservation management and recovery objectives. Translocation involves capture and also has the potential to harm sturgeon, and thus, requires an ESA Section 10(a)(1)(A) permit from NMFS. Any proposed permitted activity must be consistent with the ESA and its implementing regulations. In addition, permits must set forth, where applicable, the permissible methods of taking and requirements pertaining to the monitoring and reporting of such takings.

1.3.3 Need

The proposed action is needed to achieve NMFS recovery objectives, as described in Section 1.1, of endangered shortnose sturgeon, and threatened and endangered Atlantic sturgeon. U.S. citizens seeking to obtain permits for take of ESA-listed species, including species proposed for listing, under NMFS' jurisdiction must submit an application. Therefore, NMFS' responsibilities under Section 10(a)(1)(A) of the ESA and its implementing regulations establish and frame the need for NMFS' proposed action. In addition, it is NMFS' responsibility under its trust mandates to enhance recovery and conservation of threatened and endangered species.

1.4 Application of the PEA

When NMFS receives an application for a new permit or a permit modification, NMFS reviews the application for adequacy (per the ESA and its implementing regulations) and to determine what level of analysis under NEPA is required to support the decision of whether to issue any given permit or permit modification. The CEQ regulations implementing NEPA require federal agencies to apply NEPA at the earliest possible stage to ensure planning and decisions consider environmental values, avoid delays later in the process, and head off potential conflicts (40 CFR 1501.2). NMFS makes an initial NEPA determination upon acceptance of a request from an applicant (i.e., when the agency determines the applicant has applied in due form). Once NMFS accepts an application as complete, a *Federal Register* notice of receipt (NOR) is published, signaling its intent to process the permit application.

During NMFS' application review process, it would also be determined whether the methods described therein are consistent with the relevant PBOs (in this case, NMFS 2017a and NMFS

2023) and fall within the scope of this PEA. If it is determined that it does, NMFS would document that in the administrative record. If it is determined that it does not, additional NEPA review would be required and completed. The Director of NMFS OPR decides whether a to issue or deny a permit based on 1) all relevant issuance criteria; 2) all comments received or views solicited on the application; and 3) any other information or data that the Director deems relevant.

1.4.1. Public Involvement

In accordance with NEPA, CEQ regulations, and NOAA policy and procedures[5], NMFS, to the fullest extent possible, integrates the requirements of NEPA with other regulatory processes required by law or by agency practice so that all procedures run concurrently, rather than consecutively. This includes coordination within NOAA (e.g., the Office of the National Marine Sanctuaries) and with other regulatory agencies (e.g., the U.S. Fish and Wildlife Service), as appropriate, during NEPA reviews prior to implementation of a proposed action to ensure that requirements are met. Regarding the issuance of any given permit under Section 10(a)(1)(A) of the ESA, we rely substantially on the public process required by that law to develop and evaluate relevant environmental information as well as provide a meaningful opportunity for public participation when we prepare corresponding NEPA documents.

Although the CEQ NEPA regulations and agency policy and procedures do not require publication of a draft prior to finalizing a PEA, in this case, NMFS relied on a public process to develop and evaluate relevant environmental information for this final PEA. The proposed action (i.e., authorize directed take for translocation) was triggered by a modification request received by the South Carolina Department of Natural Resources in response to the proposed re-licensing by FERC of the South Carolina Public Service Authority Hydroelectric Project (Second Modified Prescription for Fishways for the Santee Cooper Hydroelectric Project; NMFS 2020b). The request to re-license required consultation under Section 7 of the ESA, which resulted in a BO (SERO-2018-00325; NMFS 2020a). Translocation of Atlantic and shortnose sturgeon is a term and condition of the FERC BO, but an ESA Section 10(a)(1)(A) permit is needed for translocation to occur. As a result, a proposed permit modification was requested for which the *Federal Register* notice (86 FR 56692; October 12, 2021) included a summary of the permit application, which includes a detailed description of the proposed action (i.e., translocation) and the potential effects of the project on Atlantic and shortnose sturgeon and their habitat.

The action (i.e., the permit modification) was subsequently issued without translocation, pending additional NEPA analysis through this final PEA. The draft PEA and the corresponding public comment period were instrumental in providing the public with information on relevant environmental issues and a meaningful opportunity to provide comments for our consideration of translocation in both the ESA and NEPA processes.

Publication of a notice of the availability of the draft PEA in the *Federal Register* (88 FR 89385) initiated a 30-day public comment period from December 27, 2023 to January 26, 2024, after which all comments received were assessed and considered by NMFS in preparation of this final PEA. The draft PEA was also published on the NOAA website (*https://www.fisheries.noaa.gov/action/draft-environmental-assessment-permitting-*

[5] NAO 216-6A and the Companion Manual for the NAO 216-6A

translocation-sturgeon-scientific-research-and) on December 27, 2023, and the public was invited to submit comments via email. .

NMFS received eight substantive comments, of which one stated support of the proposed action. The other substantive comments were related to 1) appropriateness of the PEA; 2) translocation and the Atlantic sturgeon population in the Delaware River, Delaware; 3) appropriateness of translocation as a research/enhancement tool; and 4) life stage and residence of sturgeon for translocation (e.g., See Appendix 1 for a summary of comments received). The PEA was not changed as a result of any of the comments received.

The final PEA and FONSI will be made available to the public via a *Federal Register* notice and posting on the NOAA website: *https://www.fisheries.noaa.gov/action/draft-environmental-assessment-permitting-translocation-sturgeon-scientific-research-and*.

For future major permit modifications and requests for new permits that fall within the scope of this PEA, the public will have the opportunity to submit comments during a 30-day comment period once the NOR for the action is published in the *Federal Register* (50 CFR 222.303). A major modification is not defined under the ESA; however, NMFS is typically guided by the definition in the Marine Mammal Protection Act regulation (50 CFR 216.39) when determining if the request is a major modification to an ESA Section 10(a)(1)(A) permit. A major modification means any change to 1) the number and species of individuals that are authorized to be taken, imported, exported, or otherwise affected; 2) the manner in which these individuals may be taken, imported, exported, or otherwise affected, if the proposed change may result in an increased level of take or risk of adverse impact; and 3) the location(s) in which the individuals may be taken, from which they may be imported, and to which they may be exported, as applicable. A minor modification means any modification that does not constitute a major modification.

An NOR of an application for a permit or permit modification would include a summary of the proposed action including the species, number of animals to be taken, and the manner of take, locations, and time period. Substantive comments that NMFS receives during the comment period for modifications to existing permits or new permit applications would be sent to the applicant for response. These comments and responses are recorded as part of the administrative record for the permit. If it is determined at the time of the application that the modification does not fall within the scope of the PEA as noted in the protocol above, then additional NEPA review would be required and completed prior to making a decision (i.e., issuance or denial) on the application.

This public website *(https://www.fisheries.noaa.gov/permit/esa-scientific-research-and-enhancement-permits)* provides information about ESA Scientific Research and Enhancement Permits. A description of annual and final reports for scientific research and enhancement permits is available as referenced in Section 2.2.2 of this PEA.

1.5 Compliance with Other Environmental Laws or Consultations

In addition to NEPA, NMFS must comply with all applicable federal environmental laws and regulations necessary to implement a proposed action. For each permit issuance or modification, NMFS ensures compliance with all relevant laws during the NEPA review once the request is

received. NMFS' evaluation of and compliance with environmental laws and regulations is based on the nature and location of the applicant's proposed activities and NMFS' proposed action. Therefore, this section summarizes common environmental laws and associated consultations considered for NMFS' issuance of, and modifications to, Section 10(a)(1)(A) permits.

1.5.1 Endangered Species Act

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

The U.S. Fish and Wildlife Service (USFWS) and NMFS jointly administer the ESA and are responsible for listing and designating a species as either threatened or endangered as well as designating geographic areas as critical habitat for these species. The ESA generally prohibits the "take" of an ESA-listed species unless an exception or exemption applies. The term "take" as defined in Section 3 of the ESA means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harm under the ESA is defined by regulation (50 CFR 222.102) as "an act which actually kills or injures fish or wildlife." "Harass" under the ESA is defined by NMFS guidance as, to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (NMFS 2016a).

Section 7(a)(2) requires each federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. When a federal agency's action may affect a listed species or critical habitat, that agency is required to consult with NMFS and/or the USFWS under procedures set out in 50 CFR Part 402. Refer to Section 1.5.1.1 of this assessment for the status of NMFS' Section 7 consultation (NMFS 2017a) associated with the re-initiation of PR1's Program requesting authorization to add translocation as an enhancement activity concurrent with other research under the scope of the programmatic consultation.

NMFS' issuance of scientific research and enhancement permits is a federal action subject to the consultation requirements of Section 7 of the ESA. As a result, NMFS is required to ensure the issuance of scientific research and enhancement permits or permit modifications is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of designated critical habitat for these species.

Section 9 of the ESA and federal regulations pursuant to Section 4(d) of the ESA prohibit the take, import and export of endangered and threatened species without special exemption such as

by a permit. Permits to take ESA-listed species for scientific purposes or for the purpose of enhancing the propagation or survival of the species may be granted pursuant to Section 10(a)(1)(A) of the ESA. Section 10(d) requires that, to issue permits under Section 10(a)(1)(A), NMFS must find that the permit was applied for in good faith and, if granted and exercised, will not operate to the disadvantage of the species, and will be consistent with the purposes and policy set forth in Section 2 of the ESA.

NMFS promulgated regulations to implement the permit provisions of the ESA (50 CFR Part 222) and produced Office of Management and Budget approved application instructions prescribing the procedures (including the form and manner) necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the ESA. The implementing regulations and application information are available for review on NOAA Fisheries' websites: *https://www.ecfr.gov/current/title-50/chapter-II/subchapter-C/part-222* and *https://www.fisheries.noaa.gov/permit/esa-scientific-research-and-enhancement-permits*.

Section 2 of the ESA describes the purposes and policy of the Act. The purposes of the ESA are to provide a means whereby the ecosystems endangered and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in Section 2(a) of the ESA. It is the policy of the ESA that all federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of the ESA. In consideration of the ESA's definition of "conserve," which indicates an ultimate goal of bringing a species to the point where listing under the ESA is no longer necessary for its continued existence (i.e., the species is recovered), exception permits issued pursuant to Section 10(a)(1)(A) of the ESA are for activities that are likely to further the conservation of the affected species.

1.5.1.1 Related Consultations Under ESA Section 7

The 2012 "Environmental Assessment for the Issuance of 12 Scientific Research Permits for Research on Atlantic sturgeon" (NMFS 2012a), was prepared when the listing of Atlantic sturgeon under the ESA occurred (77 FR 5879 and 77 FR 5913; April 6, 2012). The EA and BO (NMFS 2012b) evaluated research activities including capture of adult, sub-adult and juvenile, eggs and larvae, of Atlantic sturgeon while also handling, holding, measuring, weighing, video/ photographing, internal and external tagging, genetic tissue sampling, biopsy, anesthetizing, gastric lavaging, laparoscopy, sex identifying, age estimating, and salvaging of dead specimens. Other activities analyzed include laboratory procedures requested by researchers on live and dead sturgeon, or parts of dead sturgeon. The BO associated with that action stated that after reviewing the current status of threatened and endangered Atlantic sturgeon and endangered shortnose sturgeon (the target species), and threatened and endangered leatherback, green, hawksbill, loggerhead, and Kemp's ridley sea turtles (non-target species); the environmental baseline for the action area; the effects of the proposed research programs, and the cumulative effects; it was NMFS' biological opinion that issuance of the 12 permits was not likely to jeopardize the continued existence of these listed species (NMFS 2012b).

In 2016, NMFS requested formal consultation for the implementation of a program for the issuance of permits for research and enhancement activities on Atlantic and shortnose sturgeon.

NMFS consulted with NMFS OPR ESA Interagency Cooperation Division, which concluded the programmatic consultation on March 20, 2017. Thirteen non-target species under NMFS' jurisdiction are listed as threatened or endangered under the ESA with confirmed or possible occurrence in the action area as well as critical habitat for several species. The cetaceans that may occur in the action area include: blue (*Balaenoptera musculus*), fin (*B. physalus*), North Atlantic right (*Eubalaena glacialis*), sei (*B. borealis*), and sperm (*Physeter macrocephalus*) whales. The 2017 PBO concluded that these species were not likely to be adversely affected by the sturgeon research and enhancement activities. In 2023, NMFS requested reinitiation of consultation of the 2017 PBO and included two species under NMFS' jurisdiction that are listed as threatened under the ESA with confirmed or possible occurrence in the action area: oceanic whitetip shark (*Carcharhinus longimanus*) and giant manta ray (*Manta birostris*). The 2023 PBO concluded that these species were not likely to be adversely affected.

The ESA-listed sea turtle species that may occur in the action area included: green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), olive ridley (*L. olivacea*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*) sea turtles. The 2017 PBO concluded that green (North Atlantic DPS), hawksbill, Kemp's ridley, loggerhead (Northwest Atlantic DPS), and leatherback sea turtles are likely to be adversely affected.
The ESA-listed fish species that may occur in the action area included: Atlantic salmon (*Salmo salar*) and smalltooth sawfish (*Pristis pectinata*). The 2017 PBO concluded that Atlantic salmon and smalltooth sawfish may be adversely affected.

Johnson's seagrass (*Halophila johnsonii*) was also included, however, it has since been removed from the federal list of threatened and endangered species (87 FR 22137; April 14, 2022).

The designated critical habitat that may occur in the action area for ESA-listed species included: Atlantic sturgeon, North Atlantic right whale, Atlantic salmon, and loggerhead sea turtles. The 2017 PBO concluded that research on sturgeon would not likely to result in the destruction or adverse modification of designated critical habitat.

Reinitiation of formal consultation of the PBO was requested to incorporate changes to other aspects of the Program, including translocation, in September 2021. Formal consultation concluded on February 7, 2023 (NMFS 2023) that research and enhancement activities, including translocation, are not likely to jeopardize the continued existence of target and non-target species or to result in the destruction or adverse modification of their designated critical habitat.

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

Under the MSFCMA, Congress defined essential fish habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). Federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency which may adversely affect EFH identified under the MSFCMA. The EFH provisions of the MSFCMA offer resource managers means to accomplish the goal of giving heightened consideration to fish habitat in resource management. NMFS OPR is required to consult with NMFS Office of Habitat Conservation for any action it authorizes (e.g., research

permits), funds, or undertakes, or proposes to authorize, fund, or undertake that may adversely affect EFH. This includes activities, such as trawling, that may negatively affect benthic habitat.

1.5.2.1 Previous MSFCMA Determinations

For these four of the fifteen currently active sturgeon permits (Nos. 20528, 21198, 21434, and 23096) under the Program, NMFS determined the permitted activities would not affect designated EFH and did not initiate consultation with any of the NMFS Regional Offices of Habitat Conservation, as noted in the administrative record for these permits. The activities proposed in these four permits do not involve alteration of substrate, or other interactions with physical features of ocean and coastal habitat. No other interactions with physical features of ocean and coastal habitat that could affect EFH may occur during research activities. It was determined that the activities are unlikely to affect the ability of the water column or substrate to provide necessary spawning, feeding, breeding, or growth to maturity functions for managed fish. Likewise, authorizing the take of Atlantic and shortnose sturgeon is not likely to directly or indirectly reduce the quantity or quality of EFH through effects on the physical, biological, or chemical parameters of EFH. Sturgeon have not been identified as a prey component of EFH for managed fish species, so it is unlikely that authorizing the take of sturgeon would reduce the quantity and/or quality of EFH.

For the remaining 11 active permits (Nos. 19641, 20314, 20347, 20340, 20351, 20548, 22671, 23200, 24016, 24020, and 25870), NMFS determined that the permitted activities may affect designated EFH and requested consultation with the applicable NMFS regional offices within the Office of Habitat Conservation. The activities proposed in these 11 permits may affect fish habitat because the activities may alter substrate via trawling. The NMFS regional Habitat offices determined that the trawling activities were unlikely to affect the ability of the water column or substrate to provide necessary spawning, feeding, breeding, or growth-to-maturity functions for managed fish. Likewise, authorizing take of Atlantic and shortnose sturgeon is not likely to directly or indirectly reduce the quantity or quality of EFH by affecting the physical, biological, or chemical parameters of EFH. More specifically, sturgeon have not been identified as a prey component of EFH for managed fish species, therefore authorizing the take of sturgeon is not expected to reduce the quantity and/or quality of prey species. The Office of Habitat Conservation stated that minor impacts caused by trawling should be mitigated by standard measures that have been provided in prior consultation with NMFS. These standard mitigation measures are included in the permits and would be included in future permits as applicable.

Authorizing translocation of shortnose and Atlantic sturgeon for future scientific research and enhancement permits and permit modifications does not change the determinations made for EFH, as long as the capture methods are not changing. Translocation would neither directly or indirectly affect the physical, biological, or chemical features of EFH. Therefore, pursuant to 2017 guidance on EFH from the regional offices within the Office of Habitat Conservation, NMFS determined that the issuance of permits and permit modifications to translocate Atlantic or shortnose sturgeon would not result in adverse impacts to EFH. However, impacts to EFH would continue to be evaluated for every permit and permit modification application, on a case-by-case basis. Past actions in the Program have not adversely affected EFH.

Any future permit modifications or new permits would continue to include standard mitigation based on the location and nature of the authorized activities (e.g., capture by trawl, anchoring) to

avoid impacts to habitat including EFH. Examples of such mitigation include: not allowing gear to be pulled across or anchored and set on submerged aquatic vegetation, coral, and hard and live bottom habitat; conditioned capture methods to avoid impacts to EFH and benthic habitat; allowance for the use of beach seines in the same location only once every 24 hours; and, limiting trawls to tows for up to 20 minutes in marine waters and up to 10 minutes in freshwater. Due to implementation of the required mitigation, minimal effects to EFH are expected.

1.5.3 Convention on International Trade in Endangered Species of Wild Fauna (CITES)

The CITES ensures that international trade in specimens of wild animals and plants does not threaten their survival; in the United States, the CITES is implemented by Section 8 of the ESA. Atlantic sturgeon are listed under Appendix II and shortnose sturgeon are listed under Appendix 1 of the CITES. Permit Holders must secure any necessary federal, state or local permits or authorizations, including a CITES permit prior to importing or exporting samples into or from the United States.

1.5.4 National Marine Sanctuaries Act

The National Marine Sanctuaries Act authorizes the Secretary of Commerce to designate and protect areas of the marine environment with special national significance due to their conservation, recreational, ecological, historical, scientific, cultural, archeological, educational or esthetic qualities, as national marine sanctuaries (NMS). Day-to-day management of NMS has been delegated by the Secretary of Commerce to NOAA's Office of National Marine Sanctuaries.

Four NMSs are located within the range of Atlantic and shortnose sturgeon: Stellwagen Bank, Mallows Bay-Potomac River, Monitor, and Gray's Reef. Stellwagen Bank NMS is located east of Boston, Massachusetts between Cape Ann and Cape Cod. Mallows Bay-Potomac River NMS is located in the Potomac River and protects remnants of more than 100 World War I-era wooden steamships. Located off of North Carolina, the Monitor NMS protects the wreck of the Civil War ironclad USS Monitor. Gray's Reef NMS is located off Georgia's coast. The proposed designation of the Hudson Canyon NMS is in the early stages of the process. The proposed NMS would be located off the coast of New York and New Jersey. Applicants are responsible for contacting the sanctuary or sanctuaries in their proposed action areas and may need to secure special use permits from the sanctuary prior to conducting research and enhancement activities.

1.5.5 Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712) implements four international conservation treaties that the United States entered into with Canada in 1916, Mexico in 1936, Japan in 1972, and Russia in 1976. It is intended to ensure the sustainability of populations of all protected migratory bird species. The law has been amended with the signing of each treaty, as well as when any of the treaties were amended, such as with Mexico in 1976 and Canada in 1995. No effects to birds or habitats protected by the Migratory Bird Treaty Act are expected because the research and enhancement activities would focus on sturgeon, the target species of the permits. Only impacts to the target species are expected.

1.5.6 Marine Mammal Protection Act

Congress passed the Marine Mammal Protection Act in 1972 in response to increasing concerns that significant declines in some species of marine mammals were caused by human activities. The MMPA established a national policy to prevent marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part. This was the first legislation to mandate an ecosystem-based approach to marine resource management.

To serve these broader goals, the MMPA prohibits take of all marine mammals in the United States, including territorial seas. Take[6] means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. Harassment[7] is any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment) or has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns (Level B harassment). Disruption of behavioral patterns includes, but is not limited to, migration, breathing, nursing, breeding, feeding or sheltering. No effects to marine mammals protected by the MMPA are expected because the research and enhancement activities would focus on Atlantic and shortnose sturgeon, the target species of the permits. In addition, as applicable, permits contain conditions to mitigate interactions with marine mammals. As discussed in the PBOs (NMFS 2017a; NMFS 2023), research and enhancement activities conducted on sturgeon are not likely to adversely affect marine mammals in the action area.

1.6 Document Scope

NMFS prepared this PEA in accordance with NEPA (42 USC 4321, *et seq*.), CEQ regulations (40 CFR Parts 1500-1508), and NOAA policy and procedures (NAO 216-6A and the Companion Manual for the NAO 216-6A). Under the proposed action, translocation would only be authorized when conducted concurrent with other research or enhancement activities, which are discussed in this PEA (Section 2.1). The analysis in this PEA addresses potential direct, indirect, and cumulative impacts to Atlantic and shortnose sturgeon resulting from NMFS' proposed action to authorize directed take for the translocation of ESA-listed sturgeon, alongside other research or enhancement activities.

The CEQ NEPA regulations define cumulative effects as "effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.1(g)(3)). However, the scope of the analysis is limited to the decision for which NMFS is responsible (i.e., whether or not to authorize directed take for translocation in the Program). Therefore, this PEA provides focused information on primary impacts of environmental concern related to issuance of ESA Section 10(a)(1)(A) permits authorizing directed take of Atlantic and shortnose sturgeon for research and enhancement activities, that include translocation, and the mitigation and

[6] As defined in the MMPA Section 1362(13).
[7] As defined in the MMPA for non-military readiness activities (Section 3(18)(A)).

monitoring measures to minimize the effects of that take. For these reasons and by incorporating certain material by reference,[8] the PEA only analyzes the resources that have the potential to be affected by the proposed action.

1.6.1 Material Incorporated by Reference

All other research and enhancement activities (sans translocation) have been previously analyzed under NEPA and the ESA, and associated relevant information is incorporated by reference into this PEA to streamline the discussion of marine resources within the scope of this document. Prior to 2012, a number of EAs were produced by NMFS for the issuance of research permits on endangered shortnose sturgeon that are natal to individual east coast river systems (NMFS 2007; NMFS 2008a; NMFS 2008b; NMFS 2009a; NMFS 2009b; NMFS 2009c; NMFS 2010a; NMFS 2010b; NMFS 2010c; and NMFS 2011). In 2012, at the listing of Atlantic sturgeon, an EA was prepared for Atlantic sturgeon research and enhancement activities. Each of these NEPA documents resulted in a FONSI determination, and each action was considered non-controversial.

NMFS 2012a. Environmental Assessment for the Issuance of 12 Scientific Research Permits for Research on Atlantic Sturgeon. Silver Spring, MD.

The most recent NEPA document analyzing the range-wide impacts of sturgeon research in fresh, brackish and marine environments, including all of the physical and biological elements of the Atlantic sturgeon's range from Canada to Florida, is the batched EA for the issuance of 12 scientific research permits at the listing of Atlantic sturgeon in 2012. Its analysis is largely identical to the present PEA with exception of updated information incorporated by reference from other documents as noted below.

In response to the receipt of requests from 12 applicants for scientific research permits at the date of listing for Atlantic sturgeon, NMFS prepared the above referenced EA to consider the environmental effects authorizing the permitted "takes" of Atlantic sturgeon and incidental interactions with other protected species, under the ESA. The EA is summarized by the following major category descriptions contained in the document.

Action Area: (page 9; NMFS 2012a) Proposed research activities on Atlantic sturgeon would take place in river systems across the range of the species, extending from the coastal waters of Maine south down the Atlantic coast to the tidal rivers of northern Florida. More broadly, the action area includes: the Atlantic Ocean, the Gulf of Maine (including coastal river systems in Maine, New Hampshire, and Massachusetts), coastal rivers of Connecticut, Long Island Sound, the Hudson River estuary, the Delaware River, the Chesapeake Bay and its tributaries, North Carolina rivers, South Carolina Rivers, Georgia rivers, and the Nassau and St. Johns Rivers in Florida. The Atlantic Sturgeon Review Team determined the U.S. Atlantic sturgeon population warranted division into five DPSs based on discreteness criteria such as separation based on physical, physiological, and genetic factors (ASSRT 2007). The five DPSs were designated 1) Gulf of Maine, 2) New York Bight DPS, 3) Chesapeake Bay DPS, 4) Carolina DPS, and 5) South Atlantic DPS.

[8] See 40 CFR 1501.12.

General Research Activities Affecting Atlantic Sturgeon: (pp. 11-21; NMFS 2012a) Specifically, the permits described in the 2012 EA authorized varying combinations of research activities directed at Atlantic sturgeon, including capture of adult, sub-adult and juvenile, eggs and larvae, handling, holding, measuring, weighing, video/ photographing, internal and external tagging, genetic tissue sampling, biopsy, anesthetizing, gastric lavaging, laparoscopy, sex identifying, age estimating, and salvaging of dead specimens. Other activities included laboratory procedures requested by researchers on live or dead captive animals or parts of salvaged dead animals.

Physical Environment: The analysis of the physical environment included discussion of applicable federal and state Marine Protected Areas (p. 26), EFH (pp. 27-29) and designated critical habitats (p. 30) of protected species occurring in the action area.

Biological Environment: The biological environment included (p. 31) analyses of ESA target and non-target species affected by the proposed research activities. A thorough assessment was conducted of the potential for adversely affecting a limited number of individual protected species, including sea turtles, shortnose sturgeon, Atlantic salmon, smalltooth sawfish, marine mammals, as well as bird and other fish species managed by the USFWS, incidental to the proposed permit activities.

Cumulative Impacts Summary: The cumulative impacts summary was discussed in the 2012 EA (NMFS 2012a), including a variety of ongoing human activities and threats adversely affecting Atlantic sturgeon, including scientific research, fisheries and recreational bycatch, poaching, ship strikes, artificial propagation, dams, dredging and blasting, poor water quality, climate change and contaminants. The analysis of past, present and reasonably foreseeable actions indicated that no cumulatively significant impacts would occur. The 2017 PBO (NMFS 2017a) provides updated information on the current impacts of human activity on the environmental baseline affecting the species.

Summary of the Program's standard permit conditions and mitigation measures: Standard permit conditions and corresponding mitigation measures are included in ESA Section 10(a)(1)(A) permits. Examples of these can be found in Appendix C of the 2017 PBO (NMFS 2017a). These are living documents and are occasionally updated using the best available science and to ensure compliance with the applicable laws and regulations. Standard permit conditions include terms and conditions such as 1) the duration of the permit, 2) the number and kinds of protected species, locations, and manner of taking, 3) qualifications, responsibilities, and designation of personnel, 4) possession of the permit, 5) reporting requirements, 6) notification and coordination, 7) observers and inspections, 8) modifications, suspension, and revocation, 9) penalties and permit sanctions, and 10) acceptance of the permit. Mitigation measures include specific conditions for captures (e.g., environmental conditions and duration), holding and handling, tagging, and biologically sampling specific to Atlantic and shortnose sturgeon.

NMFS 2017a. Biological and Conference Opinion on the Proposed Implementation of a Program for the Issuance of Permits for Research and Enhancement Activities on Atlantic and Shortnose Sturgeon Pursuant to Section 10(a) of the Endangered Species Act. Silver Spring, MD.

A programmatic consultation for the issuance of research and enhancement permits for Atlantic and shortnose sturgeon was completed in 2017 by OPR. PR1 consulted with the NMFS ESA Interagency Cooperation Division, which determined that issuance of permits under the programmatic framework was not likely to jeopardize the continued existence of NMFS ESA-listed species or result in the destruction or adverse modification of designated critical habitat. Broad topics analyzed in the PBO include: Sturgeon Research Activities and Associated Mitigation Measures (p. 14); Authorizing Take under the Sturgeon Research Permitting Program (p. 27); Status of Endangered Species Act Protected Resources (p. 59); Species and Critical Habitat Not Likely to be Adversely Affected (p. 60); Environmental Baseline (p. 114); Effects of the Action (stressors, mitigation to minimize, and exposure risk analysis) (p. 159); Cumulative Effects (p. 204); Conclusions (p. 220); Incidental Take Statement (p. 222); Conservation Recommendations (p. 228) and Reinitiating of Consultation (p. 230).

NMFS 2023. Reinitiation of the Programmatic Biological Opinion on the Implementation of a Program for the Issuance of Permits for Research and Enhancement Activities on Atlantic and Shortnose Sturgeon Pursuant to Section 10(a) of the Endangered Species Act. Silver Spring, MD.

Revised research protocols and mitigation measures are detailed within the 2023 PBO, updating the 2017 PBO. These include: a) transport of sturgeon, b) trawling, and c) laparoscopy; as well as three new research and/or enhancement methods: d) muscle biopsies, e) translocation, and f) oocyte extraction.

1.6.2 Resources Eliminated from Further Analysis

This PEA is intended to provide focused information on the primary issues and impacts of the proposed action, which are limited to the target species. As noted above, the PBOs analyzed the impacts to ESA-listed non-target species and reached a no jeopardy conclusion. Consequently, all other resources have been eliminated from detailed analysis and are listed below in Table 1.

Table 1. Components of the Human Environment Not Evaluated in this PEA		
Biological	**Physical**	**Socioeconomic/Cultural**
● Amphibians ● Humans ● Non-target species within the EEZ of the Atlantic Ocean and its estuaries and tributaries or outside the Atlantic Ocean and its estuaries and tributaries ● Non-Indigenous Species ● EFH ● Migratory Birds	● Air Quality ● Critical Habitat ● Ecologically Critical Areas ● Federal Marine Protected Areas ● Geography ● Land Use ● National Estuarine Research Reserves ● National Marine Sanctuaries ● Oceanography ● Park Land ● Prime Farmlands ● State Marine Protected Areas ● Water Quality ● Wetlands ● Wild and Scenic Rivers	● Commercial Fishing ● Equity and Environmental Justice ● Historic and Cultural Resources ● Indigenous Cultural Resources ● Low Income Populations ● Military Activities ● Minority Populations ● National Historic Preservation Sites ● National Trails and Nationwide Inventory of Rivers ● Recreational Fishing ● Shipping and Boating ● Public Health and Safety

Chapter 2 Alternatives

2.0 Introduction

As indicated in Chapter 1, NMFS' proposed action is to authorize directed take for the translocation of ESA-listed Atlantic and shortnose sturgeon as a research or enhancement activity concurrent with other research and enhancement activities, through ESA Section 10(a)(1)(A) permits and permit modifications. The proposed action was triggered by a modification request received by the South Carolina Department of Natural Resources in response to the proposed re-licensing by the FERC of the South Carolina Public Service Authority Hydroelectric Project (Second Modified Prescription for Fishways for the Santee Cooper Hydroelectric Project; NMFS 2020b). The request to re-license required consultation under Section 7 of the ESA, which resulted in a BO (NMFS 2020a). Translocation of Atlantic and shortnose sturgeon is a term and condition of the FERC BO, but an ESA Section 10(a)(1)(A) is needed for translocation to occur. As a result, a proposed permit modification was requested for which the *Federal Register* notice (86 FR 56692; October 12, 2021) included a summary of the permit application, which includes a detailed description of the proposed action (i.e., translocation) and the potential effects of the project on Atlantic and shortnose sturgeon and their

habitat. NMFS has decided to analyze directed take for translocation of ESA-listed sturgeon programmatically throughout their ranges, due to NMFS' recovery objectives for endangered shortnose sturgeon and threatened and endangered Atlantic sturgeon.

For the purposes of this PEA, an alternative would only meet the purpose and need if it satisfies the requirements under Section 10(a)(1)(A) of the ESA for listed species. Permit issuance criteria require that research and enhancement activities are consistent with the purposes and policies of these federal laws and would not have a significant adverse impact on the species or stock. Therefore, NMFS applied the following screening criteria to identify which alternatives to carry forward for analysis. Accordingly, an alternative must meet this criteria to be considered "reasonable."

- The action is consistent with the goals and requirements of the ESA including:
    - Will be conducted for *bona fide* and necessary purposes;
    - Will contribute to the recovery of the species; and
    - Will not operate to the disadvantage of the species.
- The action must not violate any federal laws or regulations.

2.1 Description of Research and Enhancement Activities and Methods Under the Proposed Action

As indicated in Chapter 1, NMFS is proposing to authorize directed take of Atlantic and shortnose sturgeon which would allow for their translocation under prescribed circumstances to support sturgeon conservation management and recovery objectives. Under the proposed action, current Permit Holders and future applicants may request to conduct translocation concurrent with other research and enhancement activities for Atlantic and shortnose sturgeon. Sturgeon that are translocated would be captured, held and handled, transported, and released. There are multiple methods of conducting capturing and holding/handling (Section 2.1.2). All sturgeon captured would be measured, PIT tagged, and fin clip sampled (for genetics) prior to release. Additional activities conducted on captured sturgeon would depend on the environment, target life stages, and individual research and enhancement objectives and could involve any of the activities described in Section 2.1.2. All of the following activities have been analyzed in either the 2017 PBO (NMFS 2017a) or the 2023 PBO (NMFS 2023), including translocation.

NMFS is required to use the current best available science. Therefore, in the future, NMFS may change mitigation or methods. For example, environmental conditions and net set durations could change based on changing science and the type of gear used, at which time additional NEPA review would occur.

2.1.1 New Research and Enhancement Activity

<u>Translocation</u>
Translocation is the intentional capture, holding, handling, transport, and release of individuals within a river system (e.g., translocation of fish across a dam or fish passage) or between river systems within the U.S. historical range of Atlantic and shortnose sturgeon (i.e., Maine to Florida). Translocation may be necessary when sturgeon have been prevented access to

previously attainable spawning, foraging, fish passage, or marine areas by natural or anthropogenic obstructions, or when a population in a river system has been extirpated.

Translocation was included in the reinitiation of the 2017 PBO; as stated above, consultation was completed on February 7, 2023 (NMFS 2023).

2.1.2 Currently Allowable Research and Enhancement Activities and Methods

Capture

All translocated sturgeon would first have to be captured. Capture activities are authorized in individual permits and vary depending on where research and enhancement activities are being conducted (e.g., river vs marine environment). Most capture activities are performed from a research vessel. Some capture activities are designed to target specific life stages. However, several activities may capture juveniles, subadult, and adult sturgeon indiscriminately. Trawls and gill nets (or entanglement nets) are the capture activities used the most often to capture Atlantic and shortnose sturgeon during research and enhancement activities. Other less commonly used methods to capture sturgeon prior to translocation are also described in this section. The available capture methods are described in detail below.

Environmental Conditions Applied during Capture:
All capture activities may only occur between water temperatures of 0° Celsius (C) and 29.9° C. To ensure the safety of the sturgeon captured in gill nets, researchers would adhere to established mitigation measures regarding environmental conditions, net set duration times, and dissolved oxygen (DO) concentration levels during sampling (Kahn and Mohead 2010). Table 2, below, is a guideline used by NMFS to establish environmental conditions regulating gill and trammel netting duration in permits.

Table 2. Summary of environmental conditions regulating netting duration for gill nets and trammel nets.

Water Temperature (ºC)	Minimum DO Level (mg/L)[9]	Minimum DO Level (%)	Maximum Net Set Duration (hour)
< 0	N.A.	N.A.	Cease netting
0 to 14.9	4.5	55%	14.0[10]
0 to 14.9	4.5	55%	3.0
15 to 24.9	4.5	55%	2.0
25 to 27.9	4.5	55%	1.0
28 to 29.9	4.0-4.5	55%	0.5
≥ 30	N.A.	N.A.	Cease netting

[9] Either minimum DO (mg/L) or percent saturation (55 percent) levels must be met for each net set duration.
[10] Unattended 14-hour set in freshwater (i.e. <2.0) and may be deployed overnight upon consulting with the Permits Division.

Presently, environmental conditions for capturing sturgeon with the described gear below, would occur between 0-29.9°C, 4.0-4.5 milligrams per liter (mg/L) DO (or at least 55 percent saturation) and net set duration would be between 0.5-14 hours. Nets would be attended during daylight hours to avoid marine mammal and sea turtle interactions where documented, and in waters having minimum DO concentrations of 4.5 mg/L. Netting would typically cease above 28°C water temperature. However, a controlled netting protocol would be authorized where soak times would be reduced to 30 minutes at water temperatures between 28 and 29.9°C and/or DO concentrations between 4.0 and 4.5 mg/L, subject to additional reporting requirements for documenting and avoiding harmful stress to animals.

Drift Gill Nets

A drift gillnet is a type of gillnet that is not fixed to the bottom substrate, but is allowed to drift with the current. Drift gillnets fish on or near the surface but can be in midwater, with the length of buoy ropes controlling the depth of the net. The net is typically adrift with the vessel or a marker (buoy and highflyer) attached to one or both ends of the gear. Drift gill nets may be used, by setting them on the bottom perpendicular to the prevailing flow where they would be allowed to move with the prevailing flow for a short period of time, depending on the tides and currents present, generally between 30 minutes and 2 hours. Environmental conditions for drift nets would be similar to that conditioned for anchored gillnets; however, because all drift net sets would be continuously tended to due to the risk of gear entanglement or loss of gear resulting in ghost nets (a fishing net that's been lost or abandoned in the water), fishing gear would be pulled immediately if it were obvious a sturgeon or non-target listed animal were captured.

Anchored Gill Nets

Anchored gillnets and entangling nets are strings of single, double or triple netting walls, vertical, near the surface, in midwater or on the bottom, in which fish will gill, entangle or enmesh. Gillnets and entangling nets have floats on the upper line (headrope) and, in general, weights on the ground-line (footrope) to anchor the net in place. Atlantic and shortnose sturgeon could be captured with anchored gill net sets fishing off the bottom (usually about 1.8 meter [m] 5 feet [ft]) up from the substrate) and in a variety of depths (but a general range would be 3 - 18 m (10 - 60 ft deep)). Gill net mesh size would vary by project, but would commonly be 3 ½ - 7 inches (in) (10 - 18 centimeters [cm]) (stretch measure), and would be appropriate for the size (i.e., life stage) of sturgeon targeted.

Trammel Net

A trammel net consists of two/three layers of netting with a slack small mesh inner netting between two layers of large mesh netting within which fish will entangle. These nets are strings of single, double or triple netting walls kept more or less vertical by floats on the headrope and mostly by weights on the groundrope. These are occasionally set in strings. Trammel nets would typically consist of 2 - 4 in (5 - 10 cm) mesh sizes for the inner panes, and 8 - 12 in (20 - 30.5 cm) in the outer panels, although experimental trammel nets would vary depending on the targeted animal. Netting material would consist of heavy multifilament nylon mesh instead of monofilament or light twine. Trammel nets would be fished in water depths comparable to gill nets, anchored on the bottom. Therefore, the same standardized netting protocol (duration, temperature, and DO) as described above for gill nets would be followed for trammel nets when fished on the bottom.

Bottom or Otter Trawls

A bottom or otter trawl is a fishing gear with a cone-shape trawl on the river or ocean bottom hauled by one boat with its horizontal spread maintained by a pair of otter boards. The trawl is spread horizontally by the otter boards and is held open vertically by floats along the headrope (also called headline) or maintained simply by the height of the otter boards. The ground contact is maintained by a weighted ground gear (also called footrope) which also protects the net from damage. Smaller skiff trawls are similar trawls (5.1 or 8 cm (2 - 3 in) mesh, 10 m (32 ft) headrope) that can be useful in the main stems of rivers and at the mouths of rivers. Typically such trawls may be set and hauled by hand and towed at speeds up to an average of 2.5 knots for 5-15 minutes using a boat equipped with an outboard engine. Likewise, smaller epibenthic trawls, referred to as "Missouri trawl," would be authorized as a smaller hand-hauled bottom trawl used over sand river bottoms.

Larger otter trawls could also be used in offshore environments, primarily on sand bottoms along the coastal areas such as is present off Long Island Sound, New Jersey, and Delaware. The same trawl could also be used in portions of the lower Hudson River. These nets would have a longer headrope than the skiff trawls (25 m (82 ft)) and larger mesh (8 or 12 cm (3 - 5 in)) and would be equipped with steel doors (1.8 m by 1.2 m (6 ft by 4 ft), 739 pounds [lbs]). Trawl times would be similar (5 - 20 minutes), but due to the environment, tow speeds would be faster than in the rivers, between 2-3.5 knots. Because of their size, these otter trawls would be mechanically hauled.

Pound Net and Fyke Nets (other trapping nets)

Pound nets consist of a fence leader interrupting the movements of target species and a heart that funnels fish into the trap (pound) via a no return mesh tunnel. The series of nets are anchored to the bottom perpendicular to shore and are set in nearshore areas, with depth often increasing toward the pound. In general, trapping gear is stationary fishing gear beginning with a length of netting called the "leader," stretching out perpendicular from the shoreline. The leader does not actively capture fish; instead, it spans the depth of the water column, diverting fish away from shore and into the trap – or pound – located offshore. These nets can be deployed without continuous checking for up to 24 hours. Additionally, NMFS intends that pound nets may also be used as holding pens along the riverbank, where fish may be held safely in the enclosure without stress.

Beach Seine

A beach seine is a seine net operated from the shore. The gear is composed of a bunt (bag or loose netting) and long wings often lengthened with long ropes for towing the seine to the beach. The headrope with floats is on the surface, and the footrope is in permanent contact with the bottom and the seine is therefore a barrier preventing the fish from escaping from the area enclosed by the net. Beach seines are designed to target Atlantic and shortnose sturgeon young-of-year or juvenile fish foraging along flat sandy areas of rivers and estuaries that are not able to out-swim the hauling action of the seine. The seine is lengthened by long ropes for towing when encircling fish and drawing them to the beach. The seine is therefore a barrier preventing the fish from escaping from the area enclosed by a centered bag portion of the net when surrounded. The headrope of the seine (~30 m (98 ft) long) would be fitted with floats on the surface and the footrope would remain in permanent contact with the bottom weighted leaded line. When setting the seine, the first towing line is fastened ashore, and then the lead wing is set out in shallow

water in a wide arc and brought back to the beach. The bottom and surface act as natural barriers preventing young sturgeon from escaping from the area enclosed by the net. The drag lines would be towed simultaneously from the beach and the fish would be herded in front of the bag. When the ground ropes reach the beach first, the catch would be gathered in the bag by bringing the gear underneath the fish.

Cast Nets

Cast nets are round nets with (typically lead) weights spaced equidistant from one another around the perimeter. Braille lines extend radially outwards from a hub in the center of the net and attach to the perimeter after being routed through a gathering ring called the horn. A hand line is attached to this assembly after being selected based on the distance the net would be thrown and allowed to sink toward the bottom. When thrown properly, the net would spread circularly; then, the lead weights around the perimeter would pull the net downward toward the lake or river bottom such that the lightweight mesh of the net takes on a domed appearance, like a parachute, capturing the target fish as it falls. Once the net either reaches the bottom or falls below the level of the fish the thrower gives the hand line a tug, thus causing the braille lines to slide through the horn, and the weights around the perimeter to gather together toward the horn in the center, forming a bag in the net to retain captured fish.

Trotline

Trotlining is a method of hook and line fishing used for sampling of target fish with multiple baited hooks attached to a long fishing line set via boat. The line is held stationary in the current by attaching anchors to both ends. Trotlines should not be confused with setlines/banklines, which typically only use one anchor with two to three hooks attached to a single line. All trotline activities must conform to the Biological Procedures and Protocols for Researchers and Managers Handling Pallid Sturgeon (Welker and M. R. Drobish 2010) and/or protocols established by NMFS. Specifications include main line length, hook size, dropper length, hook/leader spacing, number of hooks per line, bait, and floats.

Trotlines would be composed of 64.5 m (215 ft) long, 6.25 millimeter (mm) (0.3 in) diameter rope (main line) (Phelps et al 2009, Steffenson et al. 2013, Killgore et al. 2007). Forty hooks would be spaced every 1.5 m (4.9 ft) to avoid hook and fish entanglement (Phelps et al 2009, Steffenson et al. 2013, Killgore et al. 2007). Hooks would be attached to one end of a nylon tarred dropper line 38 cm in length with barrel swivels on each end, while the other end is attached to the main line via trotline snaps (Phelps et al 2009, Steffenson et al. 2013, Killgore et al. 2007). Each end of the main line would be tethered to an anchor with a buoy attached for line retrieval, and supplemental anchors would be placed off the main line in equally spaced intervals. Dropper lines would be spaced 1.5 m (4.9 ft) away from anchor attachment points to avoid fish entanglement. Methods include the use of 2/0, 3/0, 4/0, 5/0, 6/0, 7/0, and 8/0 circle hooks. Bait would consist of night crawlers or sand worms. Cut bait could also be evaluated for other rivers where sturgeon are observed eating fish.

Trotlines would be deployed for 1 to 4 hours to alleviate any potential stress to fish from longer hook times. Trotlines would be placed in depths >2 m (6.5 ft), and total depth would be based upon river stage. Upon capture, sturgeon would be netted out of the water and the hook removed before placement into a floating cage.

Egg Mats

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

D-nets or Epibenthic Sled

D-nets are bottom-anchored drift nets 5 m (16 ft) long, with a D-shaped mouth 76 cm wide by 54 cm high (30 in wide by 21 in high) (mouth opening, 0.41 m^2 [4.4 ft^2]), used to collect floating sturgeon eggs and/or larvae. The net would be fitted with a knotless mesh and is designed to capture 3 - 4 mm (0.1 - 0.16 in) diameter eggs, free embryos, and larvae while passing smaller particles. D-nets would be removed from the river once the water temperature exceeded 25°C or is less than 0°C. A modified version of a D-net is known as an epibenthic sled, equipped with a flow meter and the same netting as described in a D-net, but is towed to collect eggs or ELS. When using either D-nets, epibenthic sleds, or egg mats, eggs or larvae would be preserved and returned to the lab for identification and aging. Any excess would be placed back into the river onto suitable substrate nearby in hopes of successful maturation.

While the above capture methods are commonly authorized for sturgeon research to date, NMFS could authorize additional capture methods or variations of the above described gear as methods evolve with technological advances. This could include improvements such as in mesh size, net size or net material, or completely new net/trap designs that allow for capture or collection in areas or at times that currently are not logistically feasible.

Hold and Handle

Once captured, Atlantic and shortnose sturgeon would be removed from capture gear, and if necessary, they would recover in a floating net pen or otherwise in an onboard live well. Fish handling equipment (e.g., tanks, dip nets, buckets, measuring boards, scales, etc.) would be sanitized and neutralized prior to and after use. If chlorine or other sanitizing solutions are used to disinfect tanks (e.g., holding or anesthetizing tanks), the tanks need to be thoroughly flushed with clean water before use. Once recovered, sturgeon would be transferred to a secondary processing station (e.g., a sling) onboard for weighing, measuring, and further processing. To minimize handling stress and preserve the fish's slime coat, researchers would wear gloves. When in onboard holding tanks, sturgeon would be immersed in a continuous stream of water supplied by a pump-hose assembly mounted over the side of the research vessel; in some situations, DO would be supplemented with compressed oxygen to ensure DO concentration does not fall below acceptable levels. The total time required to complete routine handling and tagging (e.g., PIT tagging, measuring, weighing) would be approximately 1 minute. The total time for research activities for individual sturgeon would not exceed 20 minutes, which would not include recovery time from anesthesia or stressed conditions. Atlantic and shortnose sturgeon undergoing other procedures would be returned to the net pen or live well until all other sturgeon are processed. The maximum amount of time an Atlantic or shortnose sturgeon would be held after removal from capture gear is 2 hours, not including transport (if applicable). However, once

Atlantic or shortnose sturgeon are captured, they may also be held in specialized pound nets in the Chesapeake Bay, authorized for up to 24 hours, if unstressed and water quality is good.

PIT Tagging

PIT tags would be used to individually identify all captured fish. PIT tags are internal and act as a lifetime barcode for an individual animal. They are dormant until activated by an electromagnetic field generated by a close-range scanning device (Smyth and Nebel 2013). All captured Atlantic and shortnose sturgeon would be scanned with a PIT tag reader. All untagged fish (≥ 300 mm [11.8 in] total length [TL]) would be tagged with a PIT tag injected under the skin on the left side of the body, immediately anterior to the dorsal fin and posterior to the dorsal scutes with a hypodermic needle and syringe (e.g., 12 gauge). The most commonly used brand and size of PIT tag is a BioMark TX1411SST 134.2 kilohertz [kHz], 12.5 x 2.07 mm. Researchers may insert 8 mm PIT tags in juvenile Atlantic or shortnose sturgeon measuring between 250 mm (9.8 in) and 350 mm (13.8 in) TL.

Fin Clips (genetic sampling)

To characterize the genetic make-up and level of diversity of Atlantic and shortnose sturgeon within a population, a small sample (1 cm^2) of soft fin tissue would be collected from the trailing margin of a fin using a pair of sharp sterilized scissors.

Measure

Morphometric measurements (e.g., TL, fork length, interorbital width (for confirmation of species identification)) would be taken using a measuring board, solid ruler, or calipers, as appropriate.

Dart, Floy, and T-Bar Tagging

External tag types used to mark individual fish are Floy or dart tags (and other similar tags). They would be inserted with an injecting needle at the dorsal fin base in the musculature just forward and slightly downward (from the left side to the right) locking into the dorsal pterygiophores of the dorsal fin. After removing the injecting needle, the tags would be spun between the fingers and gently tugged to be locked in place. As a requirement of the permit, no juvenile fish < 300 mm (TL) may be T-bar tagged. T-bar tags are commonly used to identify fish that may be captured in distant locations by other researchers or fishermen. NMFS recommends the use of external identification tags (e.g., T-bar tags) on sturgeon species with distant migrations (e.g., Atlantic sturgeon) (Kahn and Mohead 2010). As technology advances and smaller external tags become available, these tags can be used to meet research objectives as long as the impact is equal to or less than the impact analyzed.

Administration of Chemical Anesthesia (MS-222)

MS-222 concentrations of up to 150 mg/L would be used to sedate sturgeon to a proper state of anesthesia depending on the procedures being performed. Additional chemical anesthetic drugs may be considered if the impact to the animal is equal to or less than the impact of MS-222. The time required for anesthetization and recovery varies depending on the prevailing water temperature and quality (Matsche 2011a; Coyle et al. 2004). Once anesthesia is administered, sturgeon would be continuously monitored for signs of proper sedation by squeezing the tail to gauge the fish's movement and equilibrium, and checking for steady opercula movement. Just prior to performing further procedures, sturgeon would be removed from the anesthetic bath to a

moist surgery rack. Respiration would be maintained by directing fresh ambient water pumped across the gills with a tube inserted in the fish's mouth. After the procedures, sturgeon would be allowed to recover to normal swimming behavior in boat-side net pens or holding tanks. Unused MS-222 should be disposed of by using state-adopted procedures.

Administration of Physical Anesthesia (Electronarcosis)

When anesthetizing individual sturgeon in freshwater (< 3 parts per thousand salinity) using electronarcosis, using the method described by Henyey et al. (2002), Matsche (2013), and Balazik et al. (2013), researchers would use (non-pulsed) DC voltage (0.3-0.5 V/cm, 0.01 amps) to immobilize fish during surgery to implant or attach sonic transmitters. In this procedure, fish would be placed in a tank with a screen anode at one end of the tank and a cathode screen at the other end. As voltage is applied quickly to the anode (1-2 seconds), the subject fish would lose equilibrium, relax, and sink to the bottom. Voltage would then be decreased until the fish became immobilized but still exhibiting strong opercula movement. Fish would be supported with a cradle so only their back or ventral surface emerged from the water while work would be conducted. Electronarcosis would be used as an alternative method to MS-222 for anesthetizing sturgeon.

Internal Acoustic Tagging

To determine habitat utilization, seasonal migrations, and, in general, to track movements, Atlantic and shortnose sturgeon would be fitted for internal implantation of transmitter tags. There are multiple types of internal tags which would be used; VEMCO is a widely-used brand of telemetry equipment. Due to the long-distance (often coast-wide) migrations of anadromous Atlantic sturgeon, researchers desire to use compatible telemetry technology, so as to collaborate with researchers in other areas whose equipment may detect fish initially tagged elsewhere. Fish would be tracked passively with an array of remote VR2W receivers (currently VEMCO is commonly used) positioned in the river or coastal waters to document movement or fish would be actively tracked by field crews using mobile hydrophones from a research vessel. Only sturgeon > 300 mm TL may be implanted with sonic tags and all transmitters would be limited in size to less than 2 percent of the fish's total weight (in air). The 3-5 minute procedure for implanting internal transmitters would occur as follows:

1) Captured fish would be anesthetized.
2) Anesthetized fish would be held on their backs (i.e., ventral side up) in the holding box while held motionless under narcosis.
3) Water would cover the gills; the incision site, approximately 10 cm (4 in) posterior to the pectoral girdle and just lateral of the midline, would be disinfected with iodine.
4) Using sterile instruments, a surgical opening of 4 cm (1.6 in) would then be made in the belly of the fish; an inert, sterilized sonic tag would be pushed posterior into the surgical opening; the incision would be closed with non-absorbable suture in a cruciate pattern (Matsche and Bakal 2008) and swabbed with iodine or the incision would be closed using sterile resorptive suture material; to ensure proper closure, a single interrupted suturing technique would be applied; and the fish would then be allowed to recover (to equilibrium) upright in a flow-through water system and released once active.

Surgery to implant transmitters would only be attempted when fish are in excellent condition (i.e., active, healthy weight) and would not be attempted if the water temperature exceeds 27°C (to reduce handling stress) or is less than 7°C (incisions do not heal rapidly in low temperatures). Researchers may use other brands and styles of internal acoustic tags as long as the tags are limited in size to less than 2 percent of the fish's total weight (in air) and/or impact would not be more than what was consulted on in the PBOs (NMFS 2017a and NMFS 2023).

Fin Ray Sampling (primary and secondary rays)

Fin rays may be utilized to validate age by sampling the first or second fin ray. A small section (~1 cm^2 [0.16 in^2] notch), of the primary pectoral fin ray would be collected on an anesthetized fish. When taking the first fin ray, a sterilized hacksaw, bonesaw, or other saw-like instrument, would be used to make two parallel cuts across the primary pectoral fin ray, approximately 1 cm deep and 1 cm wide (0.4 in deep and 0.3 in wide). The blade for the first cut is positioned no closer than 0.5 cm (0.2 in) from the point of articulation of the flexible pectoral base to avoid an artery at this location (Rien and Beamesderfer 1994, Rossiter et al. 1995, Collins 1995, Collins and Smith 1996). The second cut is made approximately 1 cm (0.4 in) distally (Everett et al. 2003, Fleming et al. 2003, Hurley et al. 2004, Hughes et al. 2005), where pliers are then used to remove the fin ray section.

A second method involves the removal of the second fin ray which is much less invasive and heals quickly. Baremore and Rosati (2014) describe the banding patterns as "more reliable, consistent and clear". The second marginal fin ray would be isolated from the fin spine and neighboring fin rays using a scalpel, by making an incision of approximately 1 cm (0.4 in) in length on either side of the fin ray, about 1 cm (0.4 in) from the pectoral fin origin. Fine-point nail clippers would then be used to cut through each end of the 1 cm (0.4 in) segment and remove the fin ray from the fin. When possible, a fin ray section would be removed from both the left and right sides of each individual to determine whether there is consistency between age estimates from both sides.

Blood Sampling

Blood collection in sturgeon is used to find evidence of endocrine disruption (e.g., presence of estrogenic compounds), sex determination, stress hormones, etc. Blood would be collected from the caudal veins by inserting a hypodermic needle perpendicular to the ventral midline at a point immediately caudal to the anal fin. The needle would be slowly advanced while applying gentle negative pressure with the syringe until blood freely flows into the syringe. Once a blood sample is collected, direct pressure would be applied to the site to ensure clotting and prevent further blood loss (Stoskopf 1993). Blood volume, needle and syringe size would be dependent on fish weight, as presented below in Table 3.

Table 3. Needle and Syringe Sizes for Blood Collection Based on Fish Weight

Weight (gram(g))	Sample Size (milliliter)	Needle Size (Gauge x Length)	Syringe Size (ml)
≤ 1000	2	22g x ⅝ in	3
1000 – 2000	3	22g x ⅝ in	3
> 2000	6	20g x 1 in	6

Weigh

The method of weighing Atlantic and shortnose sturgeon would vary based on the individual applicant's available equipment; however, weighing protocols would fall into two categories: spring scale or platform scale. Sturgeon weighed on a spring scale would be supported using a sling or net. Sturgeon would be weighed on a platform scale fitted with a small waterproof cushion attached to the surface of the weighing platform to fully support the fish.

Photograph/Video

Photography and videography are used to document the health of the fish, research methods, and any identifying marks on sturgeon that may be useful for future identification. Researchers would take photography/videography as long as it does not interfere with other research activities.

Recaptures

Depending on specific research objectives, the recapture of animals is necessary to provide valuable feedback to evaluate the impacts of other research activities or to achieve specific objectives of proposed research. Sturgeon may be recaptured by any capture method, as described earlier in this chapter, which is authorized in a permit. Additional research and enhancement activities may be performed on recaptured activities (e.g., weigh, measure, blood sampling).

External Tagging

External acoustic telemetry tags would be used to track Atlantic and shortnose sturgeon movement and behavior. NMFS recommends using external attachment of tags for smaller fish or pre-spawning fish in the fall or winter to document short-term telemetry objectives (typically 10-12 months depending on battery life). External tags typically range in size between 18 and 46 mm long (0.7 and 1.8 in) and 7-9 mm (0.3 - 0.35 in) in diameter and are less than 2 precent of the body weight of the fish (in air). External transmitters would be attached to Atlantic and shortnose sturgeon using the 3-5 minute procedure outlined in Kahn and Mohead (2010) or other similar protocols. Eventually the leader attaching the external tag will corrode, freeing the external tag from the fish. Following the procedure as outlined in Kahn and Mohead (2010), captured fish would not require anesthetization to attach external telemetry tags.

Pop-up Satellite Archival Tags (PSATs) could be used to track movements and habitat use of tagged fish. PSATs are archival tags similar to external telemetry tags, attached externally without surgery by fastening the tag to the dorsal fin of the sturgeon by a monofilament (Erickson and Hightower 2007; Erickson et al. 2011) and are designed to be neutrally buoyant in marine environments. Another option available to researchers for attachment of PSATs involves having the attachment drilled through two scutes and silicone tubing, approximately 10 cm (4 in) long coated in a topical antibiotic, pushed through the hole. A 300-lb monofilament line would be threaded through both tubes, one to attach the tag to and the other to hold down the float of the tag. The satellite tag itself is also fixed with a tether comprised of two crimp sleeves and about 15 cm (6 in) length of monofilament, entirely encased in a length of tubing. At a pre-programmed time, the pin attaching the tether to the PSAT would corrode, releasing the tag, allowing it to float to the surface and transmit the archived data to a satellite for retrieval. In some models, the tag transmits data via satellite in real time during deployment. PSATs are

especially suited for species spending time offshore, outside where it is practical or possible to maintain an acoustic receiver array required for traditional telemetry studies.

Gill Biopsy

Gill biopsies are typically conducted to ascertain the presence or absence of parasites. Researchers would biopsy the outer portion of the gill (not the inner portion where blood flow is greatest), typically using scissors, or scrape the gill filaments, depending on the research objectives. Each sample would be 2 mm (0.08 in) in size.

Scute/Apical Hook Sampling

Altenritter et al. (2015) developed a new technique using scute spines as an alternate hard part for potential age determination and chemical reconstruction of natal life histories and origins, and have developed a minimally invasive approach for field sampling scute spines. The fish would be anesthetized and then positioned on a firm surface and held down fore and aft by a field assistant. The most prominently-ridged dorsal scute in the set anterior of the dorsal fin would be sampled. The person sampling uses a fine-toothed manual saw to cut a wedge shaped sample of scute material with two oblique cuts perpendicular to the long-axis of the scute spine (i.e., across the back), one starting at the anterior (leading) edge of the scute spine and angling posteriorly, and one starting at the posterior edge of the spine and angling forward to meet the first cut. This procedure results in collection of a roughly 0.5 - 1.5 cm^3 (0.03 - 0.09 in^3) piece of material, depending on the size of the fish. Fish sampled in this way retain the majority of the scute that was sampled and experience little if any bleeding (only if the saw nicks the soft tissue below the scute). This sampling would be carried out on adult, sub-adult, and juvenile sturgeon.

Gastric Lavage

Understanding foraging habits of Atlantic and shortnose sturgeon can be accomplished by using gastric lavage to evacuate the stomach contents for analysis. Researchers would use methods described by Haley (1998), Murie and Parkyn (2000), Savoy and Benway (2004), Collins et al. (2008), and Kahn and Mohead (2010) or as further described in the PBO (NMFS 2017; NMFS 2023).

Sturgeon undergoing gastric lavage would be anesthetized to relax the alimentary canal prior to the procedure. An appropriately-sized flexible polyethylene tube would be passed through the sturgeon's alimentary canal (Table 4) and properly positioned. Stomach contents would then be removed by gently flooding the stomach cavity with water delivered from a low pressure hand pump. Savoy and Benway (2004) performed a modified 2 minute method of water delivery using a garden sprayer to lavage shortnose sturgeon collected on the Connecticut River between 2000 and 2003. The lavage method described by Savoy and Benway (2004) has researchers navigating the lavage tube to the appropriate stomach position beyond the swim bladder, but ending at the anterior stomach position to avoid injuring sturgeon when performing the insertion. Fish would recover within a floating net pen alongside the boat prior to release. No other invasive procedure would be performed on lavaged fish.

Table 4. Examples Of Appropriate Size Tubing For Gastric Lavage	
Size Range (mm)	Outside Diameter (OD) of Tubing (mm)
250 – 350	1.90
350 – 1,250	4.06
>1,250	10.15

Boroscopy

Boroscopy is a minimally invasive method to determine the sex and maturity of sturgeon (Moser et al. 2000). During the exam, the fish's head and most of the body would remain in water under a relaxed anesthetized condition. The probe (typically 7 in (17.8 cm) long x 0.16 in (0.4 cm). wide) would be inserted through the genital opening and into genital tract (Kynard and Kieffer 2002). Eggs, if present, would be viewed through the wall of the genital tract and staged as early stage, late stage, or potential spawners.

Laparoscopy

Laparoscopic examinations are minimally invasive procedures that have been used extensively in fisheries research and refined for sturgeon work (Hernandez-Divers et al. 2004; Matsche et al. 2011b) for determining the sex and reproductive health of sturgeon. Using sterile techniques and equipment, a small (~4 mm [0.16 in]) incision would be made in the ventral body wall slightly off midline, midway between the pectoral and pelvic girdle through which a trocar would be inserted. A rigid laparoscope (typically 5 mm [0.2 in] in diameter) would then be inserted through the trocar to allow visualization of gonads. If necessary, the body cavity would be insufflated with ambient air by attaching a battery-powered air pump to the insufflation port of the trocar to increase the working space within the body cavity. Determination of sex and reproductive status would be recorded. In those instances where the sex of the fish is not readily apparent, a gonad biopsy would be taken (described below). Air pressure in the body cavity is released naturally. The incision would be closed with a single suture in a cruciate pattern using suture material and swabbed with iodine or a similar disinfectant or antibiotic.

Gonadal Biopsy Sampling

In instances where the sex of the sturgeon is not readily apparent following laparoscopy, gonad biopsies would be taken for histological evaluation and sex determination. A second small (~5 mm) incision would be made midway between the first incision and the pectoral girdle on the lateral aspect of the body approximately 1 cm (0.4 in) dorsal to the ventral scutes. A second 5 mm (2 in) trocar would then be inserted through the new incision, followed by a laparoscopic biopsy instrument to biopsy the gonad material. The sample would be approximately 5 mm (2 in) in size (2-3 g) and would be placed in a solution (e.g., 10 percent neutral, buffered formalin) for preservation. Upon completion of the biopsy, the body cavity and biopsy site would again be visually assessed to ensure that there is no obvious hemorrhaged or herniated tissue. The laparoscope and the two trocars would be removed from the body and the incisions would be closed with a single suture in a cruciate pattern using suture material and swabbed with iodine or a similar disinfectant or antibiotic.

Juvenile Sturgeon Acoustic Telemetry Tagging

NMFS may authorize the injection of internal acoustic juvenile sturgeon acoustic telemetry (JSAT) tags (~ 1.5 cm [0.6 in.] long) into Atlantic or shortnose sturgeon greater than 300 mm.

These tags would not require anesthesia or surgery and are very similar to a PIT tag. Sturgeon would be tagged in a similar location as described for PIT tags.

OTC Mark

Researchers whose procedures include marking skeletal structures of fish (e.g., primary and secondary fin rays) to assist in their identification and ageing, may use OTC as part of their research. Researchers may also use OTC to mark all life stages of sturgeon as part of future ageing studies, as the mark provides a definitive date to use for ageing and establishes "known age" fish. However, for captured fish in the wild, OTC would be used to mark adult, subadult, and juvenile sturgeon. Researchers may use a dosage of 25-35 mg/kilogram (kg) or as prescribed by the attending veterinarian. Administration is according to a veterinary-approved protocol defining dosage and injection site, typically intramuscular injection. Depending on the volume of OTC needed to be administered, multiple injections may be needed. Needle sizes would be comparable to those established for blood sampling.

Ultrasound

Ultrasound is one of the safest and least invasive methods for sexual identification or reproductive status (Kahn and Mohead 2010). When conducting ultrasound analyses, the procedures described by Wildhaber et al. (2006), or slightly different variations, appear to be the safest. Sturgeon would be placed in prone position in a holding tank with the ventral surface exposed to air. The ultrasound transducer would be coated with ultrasound gel. The transducer would be maneuvered along the abdomen between the gills and the anus.

Muscle Biopsy

Muscle biopsy would be performed as described in Moser et al (2000), Davis, J.A. (2015), and USEPA (2003). Nitrile gloves should be worn when conducting muscle biopsy sampling on sturgeon, and temperatures should be at least 8°C during such sampling. Up to two muscle plugs may be taken from each fish using a disposable 5-mm (0.2 in) biopsy punch. Samples should be taken from the epaxial muscle near or slightly in front of the dorsal fin, offset from the midline. First, a v-shaped flap of skin should be peeled back using a sterilized scalpel. The punch would then be used to cut a small core of tissue, inserted into the muscle tissue using a twisting motion and removed with a scooping motion. Two thin forceps should then be used to remove the tissue plug from the biopsy as completely as possible and placed in a 2 ml long term storage cryovial. The flap of skin is replaced over the muscle and two sutures should be used to close the wound.

Syringe Oocyte Extraction Device

This device is designed using a stainless steel needle with beveled cutting tip, connected to a 30 ml syringe using polyvinyl chloride tubing. The device would be filled with saline solution prior to inserting the needle into the abdominal wall, and thereafter egg samples would be extracted via aspiration from the fish. The total time taken to collect oocyte samples would be less than 30 seconds. The sampling procedure leaves a minute, self-sealing wound, which heals rapidly without suturing.

Epidermal Mucus Samples

Epidermal mucus sampling involves the passive absorption of epidermal mucus by untreated filter paper placed on the ventral surface of a sturgeon. The filter paper would be in place for less than one minute allowing enough time for the filter paper to saturate with mucus. The filter paper would be removed with clean tweezers and placed in a sterile test tube. While sampled, animals would be placed on their back in water or moist surface, and released to normal activity after collection.

Hydroacoustics/Sonar

Sonar can produce high quality images of fishes in dark or turbid water from echoes created as the fish pass through the beam. Due to their distinct body shape, sturgeon can be distinguished from other fishes using this technology (Brundage and Jung 2009). This imaging technique offers unique advantages as it allows researchers the opportunity to study sturgeon without capture.

Import and Export of Biological Samples

The import and export of biological samples (e.g., carcasses or parts) may occur in conjunction with translocation efforts; researchers are responsible for securing additional required permits (e.g., CITES). Biological samples are routinely collected by researchers during research and enhancement activities (e.g., fin clips, blood) and thus may occur in conjunction with translocation efforts. The import and export of biological samples would occur after 'take' has already occurred, but since import and export are prohibited activities under Section 9 of the ESA, a Section 10(a)(1)(A) permit would need to authorize import and/or export as an authorized activity. If the action only involves the import or export of Atlantic or shortnose sturgeon parts with no take or activities involving live animals, a Section 10(a)(1)(A) permit for scientific research for protected species parts would be required to import or export the parts.

Transport

Transporting sturgeon for translocation would result in moving captured Atlantic and shortnose sturgeon from one location and releasing them in another location. Transport is authorized for wild and captive sturgeon under the PBOs for transporting between facilities or temporarily removing them from the wild for laboratory research. However, for the proposed action, only wild sturgeon would be transported and translocated. The identity of the individual or groups of live sturgeon transported for translocation would be established by appropriate means (e.g., by PIT tags, genetic tissue sample) prior to transport. The following mitigation measures would be required:

- Fish transport and handling equipment (e.g., tanks, dip nets, buckets, measuring boards, scales, etc.) would be sanitized and neutralized prior to and after use.
- DO concentration in hauling water would be maintained optimally during transport (typically between 7 and 12 mg/L) using dual or redundant oxygen support systems (e.g. primary compressed oxygen system with backup mechanical aerators).
- The ratio of fish mass to water volume during transport should not exceed 0.75 lbs per gallon and the duration of transport should not exceed 48 hours. For shorter transports of up to 4 hours in duration, the ratio of fish mass to water volume should not exceed 2 lbs per gallon.

- While under transport, the condition of fish must be checked at least at hourly intervals, measuring dissolved oxygen, temperature, condition and activity of fish, and system efficiency.
- Water used for live sturgeon transport would be similar to the source water, and should be maintained at ≤ 20°C during transit, if possible. During transport of live sturgeon, salt (0.1 to 0.3 percent), or other osmoregulator (i.e., "slimecoat") is recommended to be added to transport water to minimize osmoregulatory stress.
- After sturgeon are in transport, no fish and/or transport water would be released from transport tanks until the destination is reached, except under emergency conditions, or until the fish and/or transport water are secured in other quarantine conditions.

2.2 Alternative 1 – Issuance of Scientific Research and Enhancement Permits and Permit Modifications that Allow Translocation with Standard Mitigation and Conditions (*Preferred*)

Under this alternative, NMFS would consider requests to authorize translocation of Atlantic and shortnose sturgeon as a permitted activity in either current or new NMFS ESA Section 10(a)(1)(A) permits.

New permits or permit amendments authorizing translocation would include relevant mitigation and monitoring measures (see Sections 2.2.1 and 2.2.2), in addition to having to satisfy the issuance criteria under the ESA and the implementing regulations. The current permits authorize take "range-wide" for Atlantic and shortnose sturgeon from research activities and methods described in Section 2.1.1 and 2.1.2. Researchers would not know the DPS at the time of capture, therefore permits authorize the capture of Atlantic sturgeon from all DPSs; noted as "range-wide" in permits. Shortnose sturgeon are ESA-listed as range-wide.

Translocation would only be considered if the activity is: 1) stated as a term and condition to implement reasonable and prudent measures of an active BO, 2) identified as an objective in a NMFS recovery outline or recovery plan for the species, or 3) determined necessary by the NMFS Regional Offices and NMFS OPR to conserve and recover the species. The use of translocation is expected to be limited to uncommon situations where the effects to the sturgeon population remaining in place would be less favorable than translocating them. For example, only one active NMFS biological opinion currently prescribes translocation as a reasonable and prudent measure to translocate shortnose and Atlantic sturgeon to historical spawning locations. Translocation may be necessary when sturgeon have been prevented access to previously attainable spawning, foraging, fish passage, or marine areas by natural or anthropogenic obstructions, or when a population in a river system has been extirpated. NMFS believes these would be uncommon situations.

2.2.1 Proposed Mitigation Measures for Alternative 1

Under Alternative 1, new permits and any permits modified to authorize translocation would continue to include the standard mitigation conditions that all sturgeon permits do, including required monitoring of acoustically tagged sturgeon. In addition, on a case-by-case basis, additional mitigation or reporting may be required in permits.

2.2.2. Proposed Monitoring and Reporting for Alternative 1

Permit Holders must submit an annual report at the end of each permit year describing the activities conducted under the permit. These reports allow NMFS to assess beneficial and adverse impacts of authorized take associated with the research and enhancement activities and to develop or further refine best management practices. Researchers are also required to notify the appropriate NMFS Regional Office of planned activities so these offices can coordinate field activities and monitor take for species among all Permit Holders working in their regions. Adaptive management is an integral component of the proposed action. For the purposes of translocation, actions would cease if they do not result in survival of translocated sturgeon and recruitment. This may be determined by monitoring tagged sturgeon post-release or other permit conditions deemed necessary by the permit or action. NMFS staff and researchers would meet to discuss the next steps needed to meet the project's objectives as part of our adaptive management plan. Through this adaptive management, NMFS would ensure they are meeting the objectives of authorizing sturgeon research and enhancement necessary for the conservation and recovery of ESA-listed species while mitigating and minimizing any adverse effects on individual fish and sturgeon populations.

2.3 Alternative 2 – No Action

For NMFS, denial of permit modification requests or applications that include translocation constitutes the No Action Alternative. In this case, translocation would not be authorized as a permitted activity although currently authorized research and enhancement activities would continue. New ESA Section 10(a)(1)(A) permit applications would still be considered for other research and enhancement activities on sturgeon. For the Santee-Cooper Hydroelectric Project, the No Action Alternative would trigger the need for reinitiation of the biological opinion (NMFS 2020a) and Second Modified Prescription for Fishways for the Santee Cooper Hydroelectric Project (NMFS 2020b) since the translocation of shortnose sturgeon (and Atlantic sturgeon in the future) are terms and conditions of that biological opinion. All activities currently authorized under Section 10(a)(1)(A) permits for Atlantic and shortnose sturgeon would remain valid.

Under the No Action Alternative, without the ability to conduct research activities such as capture, PIT tagging, and fin clip sampling for genetics, there is no way to collect the data needed to inform their status, management, and recovery efforts for sturgeon translocated for research or enhancement purposes. These research activities (e.g., capture and tagging) have been used for decades on Atlantic and shortnose sturgeon to address these objectives and are the appropriate means to collect such data.

Although the No Action Alternative would not meet the purpose and need to authorize take for the translocation of ESA-listed Atlantic and shortnose sturgeon as a research and enhancement activity to achieve NMFS recovery objectives, as described in Section 1.1, CEQ's regulations require consideration and analysis of a No Action Alternative for the purposes of presenting a comparative analysis to the action alternatives.

Chapter 3 Affected Environment

3.0 Introduction

NMFS considered and reviewed all possible environmental, cultural, historical, social, and economic resources based on the geographic location (i.e., where sturgeon research and enhancement activities are known to occur or may occur in the future in waters from Canada to Florida) associated with NMFS' proposed action to authorize directed take for the translocation of Atlantic and shortnose sturgeon as an allowable research and enhancement activity in Section 10(a)(A)(1)(A) permits and permit modifications. This chapter describes the affected environment and existing (baseline) conditions for select resource categories (e.g., marine environment). As explained in Chapter 1, certain resource categories were not carried forward for further consideration or evaluation in this PEA (See Section 1.6) and where appropriate, the analysis in the 2012 EA for permitting research on Atlantic sturgeon after their listing (NMFS 2012a) and the PBO (NMFS 2017a; NMFS 2023) related to baseline conditions and select resource categories is incorporated by reference.

3.1 Biological Environment

3.1.1 Target Species

The resources of the biological environment impacted by the proposed translocation and associated concurrent research and enhancement activities, are limited to the target species of Atlantic and shortnose sturgeon. Both species may be found in waters from Canada to Florida.

Shortnose sturgeon

Shortnose sturgeon were listed as endangered on March 11, 1967, (32 FR 4001) pursuant to the Endangered Species Preservation Act of 1966 until it was listed as endangered throughout its range in 1974 under the ESA (38 FR 41370). This species was first listed on the International Union for Conservation of Nature and Natural Resources Red List in 1986 where they are still listed as Vulnerable and facing a high risk of extinction. Critical habitat has not been designated for shortnose sturgeon. Sturgeon are among the most primitive of the bony fishes. Their body surface contains five rows of bony plates, or "scutes." They are typically large, long-lived fish that inhabit a great diversity of riverine habitat, from the fast-moving freshwater riverine environment downstream to the offshore marine environment of the continental shelf. The shortnose sturgeon is the smallest of the three sturgeon species that occur in eastern North America; they grow up to 4.7 ft (1.4 m) and weigh up to 50.7 lbs (23 kg).

Historically, shortnose sturgeon are believed to have inhabited nearly all major rivers and estuaries along nearly the entire east coast of North America. The Shortnose Sturgeon Recovery Plan (NMFS 1998) describes 19 shortnose sturgeon populations that exist in the wild (Figure 1 and Table 5), but are not formally recognized by NMFS as DPSs under the ESA. Two additional geographically separate populations occur behind dams in the Connecticut River (above the Holyoke Dam) and in Lake Marion on the Santee-Cooper River system in South Carolina (above the Wilson and Pinopolis Dams). Shortnose sturgeon are anadromous, inhabiting large coastal rivers or nearshore estuaries with river systems. This species migrates periodically into fresh water areas to spawn but regularly enters saltwater habitats during their life cycle (Kieffer and

Kynard 1993; SSSRT 2010). Adult shortnose sturgeon typically prefer deep downstream areas with vegetated bottoms and soft substrates. The shortnose sturgeon is relatively slow growing, late maturing, and long-lived, attaining lengths of 14 to 30 cm in the first year and maturity at approximately 45 to 55 cm fork length depending on location. They appear to live longer in the northern portion of their range than those in the southern extent (Gilbert 1989a). The maximum age reported for female shortnose sturgeon include: 67 years in the St. John River (New Brunswick), 40 years for the Kennebec River, 37 years for the Hudson River, 34 years in the Connecticut River, 20 years in the Pee Dee River, and 10 years in the Altamaha River (Gilbert 1989b using data presented in Dadswell et al. 1984). Female shortnose sturgeon appear to outlive and outgrow males (COSEWIC 2005; Dadswell et al. 1984; Gilbert 1989a). For a full description of the species, refer to the PBOs (NMFS 2017a; NMFS 2023).

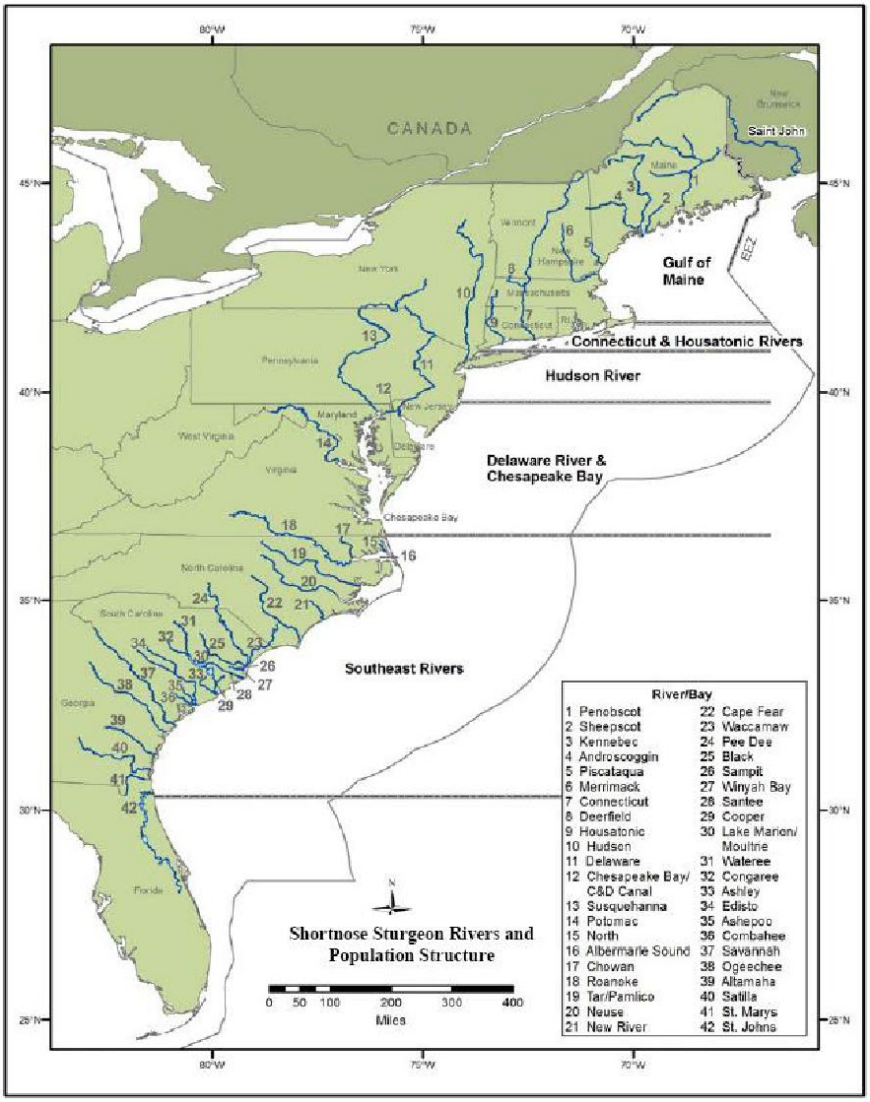

Figure 1. Shortnose sturgeon rivers and population structure.

Table 5. Populations defined in the Shortnose Sturgeon Recovery Plan (NMFS 1998)	
Population Segments:	**Rivers Inhabited by Shortnose Sturgeon**
Saint John	Saint John River (New Brunswick, Canada)
Penobscot	Penobscot River (Maine)
Kennebec System	Sheepscot, Kennebec, and Androscoggin Rivers (Maine)
Merrimack	Merrimack River (Massachusetts)
Connecticut	Connecticut River (Massachusetts and Connecticut)
Hudson	Hudson River (New York)
Delaware	Delaware River (New Jersey, Delaware, Pennsylvania)
Chesapeake Bay	Chesapeake Bay, Potomac River (Maryland and Virginia)
Cape Fear	Cape Fear River (North Carolina)
Winyah Bay	Waccamaw, Pee Dee, and Black Rivers (South Carolina)
Santee	Santee River (South Carolina)
Cooper	Cooper River (South Carolina)
"ACE" Basin	Ashepoo, Combahee, and Edisto Rivers (South Carolina)
Savannah	Savannah River (South Carolina, Georgia), and hatchery
Ogeechee	Ogeechee River (Georgia)
Altamaha	Altamaha (Georgia)
Satilla	Satilla River (Georgia)
St. Marys	St. Marys River (Florida)
St. Johns	St. Johns River (Florida)

Atlantic sturgeon

On February 6th, 2012, four Atlantic sturgeon DPSs were listed as endangered and one as threatened, under the ESA (77 FR 5880, 77 FR 5914) (Figure 2). The Chesapeake Bay, New York Bight, Carolina, and South Atlantic populations of Atlantic sturgeon are listed as endangered, while the Gulf of Maine population is listed as threatened. The Atlantic sturgeon is a long-lived (approximately 60 years), late maturing, iteroparous, estuarine dependent species (ASSRT 2007; Bigelow and Schroeder 1953; Dadswell 2006; Mangin 1964; Pikitch et al. 2005; Vladykov and Greely 1963). Atlantic sturgeon are anadromous, spawning in freshwater, but spending most of their subadult and adult life in the marine environment. While intensely studied since the 1970s, many important aspects of Atlantic sturgeon life history are still unknown.

Subadult and adult Atlantic sturgeon undertake long marine migrations and utilize habitat up and down the U.S. East Coast for rearing, feeding, and spawning (Bain 1997; Dovel and Berggren 1983; Stevenson 1997). These migratory subadults, as well as adults, are normally located in shallow (10-50 m) near shore areas dominated by gravel and sand substrates (Stein et al. 2004). Atlantic sturgeon can grow to over 14 ft weighing 800 lbs (Pikitch et al. 2005). They can reach 60 years of age (Mangin 1964); however, this should be considered an approximation because modern age validation studies demonstrated that ages cannot be reliably estimated after 15-20 years (Stevenson and Secor 1999). The average age at which 50 percent of maximum lifetime egg production is achieved is estimated to be 29 years, approximately 3-10 times longer than for other bony fish species examined (Boreman 1997).

For a full description of the species, refer to the PBOs (NMFS 2017a; NMFS 2023) and the past EA (NMFS 2012a). In addition, the 5-year reviews for the Gulf of Maine DPS, New York Bight DPS, and Chesapeake Bay DPS were published in February 2022 (NMFS 2022a, b, and c).

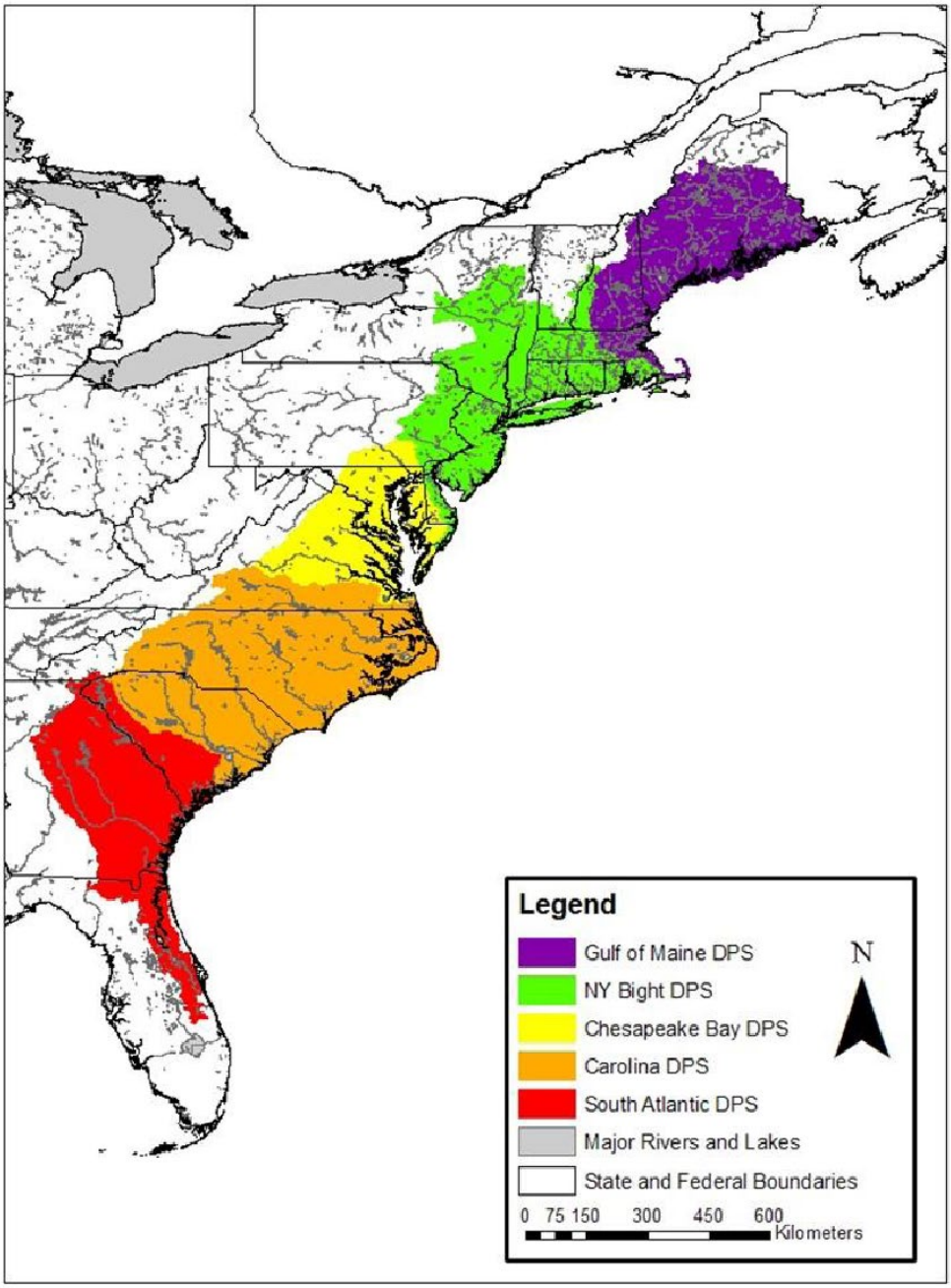

Figure 2. Range and boundaries of the five Atlantic sturgeon DPSs.

Chapter 4 Environmental Consequences

4.0 Introduction

NMFS reviewed all possible direct, indirect, cumulative, short-term, and long-term impacts associated with NMFS' proposed action and alternative. Based on this review, this section describes the potential environmental consequences on the two target species of ESA-listed sturgeon as noted in Chapter 3.

4.1 Approach for Assessing Impacts

This PEA is intended to provide focused information on the primary issues and impacts of the proposed action and alternative, which are limited to the target species. Therefore, NMFS assessed the potential of the research and enhancement methods to result in "take," and whether collectively, the take from conducting the activities could result in population- or species-level effects, when formulating its approach for assessing impacts. Impacts are characterized as follows (40 CFR 1508.1(g)):

- Direct impacts are caused by the action and occur at the same time and place as the action.
- Indirect effects are caused by the action and occur later in time or farther removed in distance but are still reasonably foreseeable.
- Cumulative effects result from the incremental effect of the activity, added to other past, present, or reasonably foreseeable future actions.

To characterize the nature and scale of impacts resulting from "take" as evaluated in this PEA:

- Negligible impacts are those that result in no more than disturbance or very low risk of injury to a target animal.
- Minor impacts are those that may result in minor injury or superficial harm to a target animal with animals recovering and healing.
- Moderate impacts are those that could pose a risk of serious injury or death to a target animal.
- Major impacts are those that could result in population-level impacts.

NMFS evaluates the duration of impacts in this PEA as follows:

- Short-term impacts are those from which a target animal can recover in the course of the day (minutes to hours) or within days to weeks of the event.
- Long-term impacts are those in which the target animal is impacted for more than several months to approximately a year, or permanently (never recovers).

As described in Chapter 2, future modification and permit requests that include translocation of either Atlantic or shortnose sturgeon may be considered under specific criteria, as discussed in Chapter 1. The majority of research and enhancement activities were analyzed in other EAs[11] for Atlantic and shortnose sturgeon Program and the PBO and reinitiated PBO (NMFS 2017a; NMFS 2023). The environmental baseline describes habitat's health based on information available at the time of this PEA. In addition, the PBOs (NMFS 2017a; NMFS 2023) describes the species' health and impacts of research in Chapters 2 and 4.

The previous analyses referenced above presented the potential impacts from research and enhancement to Atlantic and shortnose sturgeon and described the following key concerns related to the target species:

- Handling may result in short-term minor disruptions in behavioral patterns and would not likely reduce fitness of individual fish, and would not affect the viability of either species in rivers or Atlantic Coast sturgeon populations.
- Tagging (PIT, Floy, Dart, T-bar) and biological sampling (biopsies, blood) may result in small wounds but they are not likely to reduce the fitness of individual fish, or the viability of Atlantic sturgeon and shortnose sturgeon.
- Gastric lavage and associated anesthetization may result in elevated stress but it is not likely to reduce the fitness of individual fish, or the viability of Atlantic sturgeon and shortnose sturgeon.
- Internal acoustic tagging and associated anesthetization may result in delayed mortality and capture activities may result in in-hand mortality; however these activities are not likely to reduce the viability of Atlantic or shortnose sturgeon.

4.2 Effects of Alternative 1 – Issuance of Scientific Research and Enhancement Permits and Permit Modifications as Requested with Standard Mitigation and Conditions that Allow Translocation (*Preferred*)

Under this alternative, NMFS would consider requests to authorize translocation as a permitted activity to new or active NMFS ESA Section 10(a)(1)(A) research and enhancement permits. The permits or permit modifications would allow directed take of Atlantic and shortnose sturgeon with mitigation, monitoring, and coordination requirements, and restrictions on the

[11] Since 2002, NMFS has prepared numerous EAs analyzing the environmental impacts of scientific research and enhancement permits issued under ESA Section 10(a)(1)(A) on all taxa, including permits authorizing take for research and enhancement activities on Atlantic and shortnose sturgeon. The EAs for sturgeon research and enhancement permits demonstrated that the issuance of a given permit does not affect other aspects of the human environment and only affects animals that are the subject of the permit. These EAs resulted in FONSIs and therefore NMFS concluded that the issuance of permits for those research and enhancement activities analyzed do not individually or cumulatively have a significant effect on the target threatened or endangered species on which the research is conducted. The Biological Opinions associated with these EAs and permits further support the finding that issuance of research permits are not likely to adversely affect listed species. Furthermore, based on the review of monitoring reports submitted by Permit Holders, there is no evidence to date that the effects of permit issuance for take of species listed under the ESA results in adverse effects on stocks or species. All permits for research on sturgeon require submission of annual reports, which include information on responses of animals from the various research activities and methods that result in intentional take.

annual take numbers for this species. Assuming that a translocation proposal meets the criteria discussed in Chapter 1, NMFS could authorize it as a research or enhancement activity. In addition, all current Section 10(a)(1)(A) permits would continue to perform research and enhancement activities as authorized. Translocation would always involve the capture, holding, handling, transport, and release of sturgeon because these activities are necessary for transporting a sturgeon from one location to another. Therefore, these currently authorized activities are considered connected and are included in the analysis of this alternative.

4.2.1 Impacts to the Biological Environment from Alternative 1

Translocation has the potential to result in take, as defined by the ESA, of individual shortnose and Atlantic sturgeon. It is important to recognize that an adverse effect on a single individual or a small group of animals does not translate into an adverse effect on the population or species unless it results in mortality or reduced reproduction or survival of the individual(s) that causes an appreciable reduction in the likelihood of survival or recovery for the species.

For the proposed action to have an adverse effect on a species, the exposure of individual animals to the research and enhancement activities would have to 1) cause death or a serious injury that would lead to death, or 2) disrupt essential behaviors (migration, foraging, spawning) to a degree that the individual's likelihood of successful reproduction or survival was substantially reduced.

Any modified scientific research and enhancement permits or new permits authorizing translocation would require Permit Holders to follow standard permit conditions for transporting sturgeon as described in Section 2.1.2. All other mitigation measures in the permit would remain unchanged and in effect. NMFS does not expect population- or species- level impacts because the animals would recover quickly within minutes to hours of translocation. By requiring measures to protect and minimize impacts on ESA-listed species from directed take through ESA Section 10(a)(1)(A) research and enhancement permits, impacts from these activities are expected to be lessened. Specific mitigation and monitoring measures required are identified below under their associated activity.

4.2.2.1 Impacts from Translocation

NMFS expects minor adverse responses from sturgeon undergoing translocation. Such sturgeon would not be kept in captivity and are not expected to be held for long periods from capture to release so their natural behavior (e.g., foraging, spawning, migrating) would not be substantially altered (Kahn and Mohead, 2010; Kahn et al. 2014). Currently, Atlantic and shortnose sturgeon may be transported for up to 48 hours.

Although translocated sturgeon may require a period of adjustment after handling and release (e.g., days or weeks) (Kahn and Mohead, 2010), NMFS believes sturgeon would resume their natural behavior within a timeframe in which the fitness or reproductive success of the sturgeon would not be compromised. Because in some circumstances in the future, sturgeon may potentially exit a translocated area (i.e., after capture, handling, processing and release) within days or weeks (Rust 2011; Kahn et al. 2019), especially if the fish are adults in spawning condition, monitoring in such situations is key to assess the success of translocations. All permits require researchers to discuss their attempts at follow-up monitoring in their annual reports. In

some cases, it may be difficult for researchers to monitor individual sturgeon annually, especially Atlantic sturgeon, since they spend a majority of their time in the marine environment and may not return to the river system annually. In addition, monitoring acoustically tagged sturgeon requires the presence of telemetry arrays in river systems or the marine environment. The number of arrays in an area may depend on funding, staffing requirements, and research objectives which can change year to year. Researchers, including those who are proposing translocation, must include a monitoring protocol as part of their ESA Section 10(a)(1)(A) permit application and would be expected to adhere to that plan. NMFS does not expect mortality to occur from translocation, especially if the fish can leave the river system or find other suitable habitat after translocation.

NMFS also does not expect translocation of sturgeon to affect the genetic structure of one or more populations of sturgeon. Shortnose sturgeon are listed range-wide and genetic analyses suggest individual shortnose sturgeon move between some populations each generation (Quattro et al. 2002; Wirgin et al. 2005; Wirgin et al. 2010). Atlantic sturgeon are listed as five DPSs: Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic. Although some river systems where translocation may occur may have genetic differences (Wirgin et al. 2000; Grunwald et al. 2008), Atlantic sturgeon would not be intentionally moved outside of the range of their DPS for research and enhancement purposes and in most cases, translocation would typically occur between systems where, for example, manmade structures have disrupted the migrations between systems or within a system (e.g., Connecticut River) or inadvertently created a pathway between systems (e.g., Lakes Marion and Moultrie, Santee-Cooper Rivers). Atlantic sturgeon from other DPSs that are inadvertently captured and translocated during permitted projects would be able to leave the system of their own accord after release.

The use of translocation is expected to be limited to uncommon situations where the effects to the sturgeon population resulting from remaining in place would be less favorable than translocating them. It is unknown how often this would occur or which life stages or sexes may be affected, but when NMFS determines it to be necessary, the response is expected to result in indirect long-term beneficial effects to the population (e.g., improved survival and recruitment), despite minor, direct short-term adverse effects due to an initial stress response to individual sturgeon. This action is in accordance with the Final Recovery Plan for shortnose sturgeon (NMFS 1998) and with the Atlantic sturgeon recovery outline.

4.2.2.2 Impacts from Currently Authorized Research and Enhancement Activities

The activities below are currently authorized by NMFS in scientific research and enhancement permits for sturgeon. The impacts from these activities are fully described in the PBO (NMFS 2017a; NMFS 2023) or informal consultations and were considered in the 2012 EA (NMFS 2012a) and corresponding biological opinion (NMFS 2012b). Sturgeon that are translocated would always undergo capture, holding, handling, transport, and release, and may additionally undergo some of the other procedures during research activities prior to transport and translocation.

Impacts from Capture

Capture in Gill Nets, Trammel Nets, and Trawl Nets

Entanglement in gillnets, trammel nets, and trawl nets can constrict a sturgeon's gills, resulting in increased stress and risk of suffocation (Collins et al. 2000; Kahn and Mohead 2010; Moser et al. 2000). Sturgeon stress and mortality associated with capture in nets has been directly related to environmental conditions which would be mitigated by permit conditions. Except for very rare instances, results from previous sturgeon research indicate that capture in nets does not cause any effects on the vast majority of fish beyond 24 hours. For all species of sturgeon, research has revealed that stress from capture is affected by temperature, DO, and salinity, and this vulnerability may be increased by the research-related stress of capture, holding, and handling (Kahn and Mohead 2010). Other factors affecting the level of stress or mortality risk from netting include the amount of time the fish is caught in the net, mesh size, net composition, and, in some instances, the researcher's experience level or preparedness. Analysis of the empirical evidence suggests that individuals collected in high water temperatures and low DO concentrations, combined with longer times between net checks, were more at risk of mortality and stress (Kahn and Mohead 2010). As a condition of their permit, researchers would be required to take necessary precautions while deploying capture gear to ensure sturgeon are not unnecessarily harmed, including: 1) continuously monitoring nets, 2) removing animals from nets as soon as capture is recognized, and 3) following the required water temperature, minimum DO level, and net set duration permit conditions. These actions are expected to substantially reduce the likelihood of injuring or killing sturgeon during research activities.

In summary, the capture of Atlantic and shortnose sturgeon in gill nets, trammel nets, and trawls may result in minor, short-term, direct adverse impacts (i.e., elevated stress levels, net abrasion), with the exception of very rare instances which would result in moderate, long-term direct adverse impacts.

Capture in Pound Nets, Trap Nets, Cast Nets, and Beach Seines

Atlantic and shortnose sturgeon may be captured using pound nets and trap nets where authorized by state regulations or exemptions. NMFS may also authorize the holding of Atlantic sturgeon in specialized, enclosed pound nets (without wings) for up to 24 hours when environmental conditions are favorable. These gear would serve as an expanded "holding pen," for maintaining sturgeon over a longer period when necessary.

Because fish would be trapped within pound, beach seines, or other trapping nets, and not gilled or immobilized, sturgeon captured in these gears would be less likely to be injured, stressed, or affected by net abrasion compared to capture in gill nets. If researchers follow the proper sampling protocols and mitigation measures, the level of stress associated with capture in pound nets and trap nets is anticipated to be low enough to result in no long-term behavioral change or reduced fitness of individual Atlantic or shortnose sturgeon.

Beach seines may be used to target early life stages, young of year, and early juvenile sturgeon foraging along flat sandy areas of rivers and estuaries that would not be able to out-swim the hauling action of the seine. This method could potentially expose captured animals to increased turbidity and reduced water quality due to their crowding among debris and other non-targeted

fish species as the seine is gathered. However, the stress of this sampling method on sturgeon would be mitigated by the following permit conditions:

- When drawing a beach seine's lead line close to shore, animals must not be crowded, and clear waters with minimal turbidity or mud bottoms must be maintained when fish are gathered,
- All animals would be handled and released within 15 minutes after pooled along the shore,
- Bycatch would be minimally handled and released unharmed,
- Areas sampled would not be seined more than once in a 24-hour period, and
- Areas sampled would be characterized by sandy, flat bottoms free of organic matter, debris, or bottom snags.

In summary, while the capture of Atlantic and shortnose sturgeon in pound nets, trap nets, cast nets, and beach seines may result in negligible, short-term, direct adverse impacts (i.e., elevated stress levels), these activities are not expected to result in reduced fitness, long-term adverse effects, or mortality.

Trotlines

Atlantic and shortnose sturgeon may be captured with trotlines. Stress and mortality resulting from capture on trotlines have not been evaluated for shortnose or Atlantic sturgeon, but have been for other sturgeon species. Based on research on surrogate species, the potential for mortality from this gear appears to be low. Elliot and Beamesderfer (1990) reported one direct mortality of white sturgeon out of 826 individuals captured with trotlines. Steffensen et al. (2013) reported one mortality during the capture of 1,366 pallid and shovelnose sturgeon, and noted that they believed this was not a direct effect of hooking. The authors also found a positive relationship between fish stress and the amount of time the individual was hooked, but that all fish retracted their mouths to a normal position within 10 minutes.

Based on previous studies with other sturgeon species, there appears to be an extremely small risk (< 0.1 percent) of mortality resulting from the capture of Atlantic and shortnose sturgeon using trotlines resulting in moderate, long-term, direct adverse impacts. However, NMFS expects the majority of captures of Atlantic and shortnose sturgeon using trotlines to result in minor, short-term, direct adverse impacts (i.e., elevated stress levels, hook wounds).

Egg Mats, D nets, or Epibenthic Sleds

Some research permits would authorize the use of egg mats, D nets, or epibenthic sleds to collect early life stages (eggs and larvae) of shortnose and Atlantic sturgeon. These gears typically result in the mortality of early life stage individuals collected. As part of the Program, up to 16,000 Atlantic sturgeon and 1,080 shortnose sturgeon eggs and larvae < 60 mm TL may be lethally taken by researchers per year from each river system (i.e., spawning stock). In summary, the capture of early life stage Atlantic and shortnose sturgeon would result in moderate, direct adverse impacts to individual animals. This activity is not expected to result in major, long-term, adverse impacts to the species due to the limits set forth in the Program.

Impacts from Hold and Handle

After capture, all sturgeon would be handled for length, and sometimes weight, measurements. The number of individual juvenile, subadult, and adult Atlantic and shortnose sturgeon exposed to the stressors associated with handling and taking measurements would be the same as the number captured. Despite their general hardiness, handling sturgeon after capture can lead to severe stress or even mortality if done improperly or in combination with unfavorable environmental conditions such as elevated water temperatures or low DO (Kahn and Mohead 2010; Moser et al. 2000). Handling stress generally increases the longer sturgeon are held out of the water. Total handling time and associated stress would be greater for individual sturgeon undergoing additional procedures (e.g. tagging, biological sampling). Signs of handling stress are redness around the neck and fins and soft fleshy areas, excess mucus production on the skin, and a rapid flaring of the gills. Sturgeon may also inflate their swim bladder when held out of water, and if they are not returned to neutral buoyancy prior to release they would float and possibly be susceptible to sunburn and bird attacks (Kahn and Mohead 2010; Moser et al. 2000). A study by Moser and Ross (1995) suggested that under certain circumstances pre-spawning adults that are captured may interrupt or abandon their spawning migrations after being handled (Moser and Ross 1995). However, based on telemetry data and other observations of individual animals captured on the spawning ground, Kahn et al. (2014) found that adult sturgeon did not stray far from the site of capture and many immediately returned to spawning behavior as soon as they were released.

Although sturgeon can be sensitive to handling stress, handling of fish by researchers would be kept to a minimum. Permitted researchers must follow NMFS recommended research protocols developed by Kahn and Mohead (2010) and endorsed by Damon-Randall et al. (2010) to minimize potential handling stress and indirect effects resulting from handling. Permit conditions require that once a fish is captured the total handling time for onboard procedures does not exceed 20 minutes. However, for fish that are not anesthetized, handling times would be considerably lower (i.e., under two minutes) and recovery times, though variable, are expected to last for approximately 30 seconds on average. Researchers would be required to maintain captured sturgeon in net pens or in onboard aerated tanks until they are processed, at which time they would be transferred to another processing station onboard the research vessel. Following processing, fish would be returned to the net pen for observation to ensure full recovery (return to equilibrium, reaction to touch stimuli, return of full movement) prior to release.

In summary, while holding and handling can increase stress if done incorrectly, permitted researchers would be required to follow the appropriate protocols such that the stress of handling does not increase above the initial stress response from capture. Therefore NMFS believes handling would result in negligible, short-term, direct adverse impacts on sturgeon. The impacts from procedures that may be performed during the handling of sturgeon are discussed below.

<u>PIT Tagging</u>

PIT tagging is a common research technique for identifying individuals and has been widely used on a variety of fish species (Clugston 1996; Dare 2003; Eyler et al. 2004; Skalski et al. 1998), as well as other taxa (i.e., amphibians, birds, and mammals). PIT tags, which are biologically inert, have not been shown to cause some of the problems associated with other fish tagging methods such as scarring, tissue damage, or adverse effects on growth and survival

(Brännäs et al. 1994). Previous studies have demonstrated that when PIT tags are inserted into animals with large body sizes relative to the tag size, this procedure has no adverse effect on the growth, survival, reproductive success, or behavior of individual animals (Brännäs et al. 1994; Clugston 1996; Elbin and Burger 1994; Hockersmith et al. 2003; Jemison et al. 1995; Skalski et al. 1998). The large majority of sturgeon that would be exposed to PIT tagging as part of the proposed action would be relatively large in size (> 300 mm TL). Typical tag sizes used for sturgeon are 11.5 mm and 14 mm. NMFS would only authorize the use of the larger (14 mm) tags on sturgeon that are at least 450 mm TL.

NMFS may authorize some Permit Holders to PIT tag smaller sturgeon (250 mm to 300 mm TL) under particular circumstances and conditions. To minimize the risk of adverse effects from PIT tagging smaller sturgeon, only PIT tags that are 8.4 mm or smaller would be authorized on Atlantic and shortnose < 300 mm TL. Empirical studies show that PIT tagging Atlantic and shortnose sturgeon using the required sampling protocols, mitigation measures and tag sizes does not appear to result in long-term adverse effects or reduced fitness to individual sturgeon (Damon-Randall et al. 2010; Henne and Crumpton 2008; Kahn and Mohead 2010). To avoid double-tagging by different parties, researchers would be required to scan the entire dorsal surface of each sturgeon captured to detect prior PIT tags.

In summary, PIT tagging Atlantic and shortnose sturgeon may result in minor, short-term, direct adverse impacts (i.e., elevated stress levels, bleeding).

Dart, Floy, T-Bar Tagging

Some sturgeon captured as part of the proposed action would be tagged with an external identifier tag (e.g., Floy t-bar, dart, and anchor tags). T-bar and other anchor tags are typically interlocked between inter-neural cartilages in the dorsal fin. This can result in injury from the injecting needle used to insert such tags and potential bleeding (Collins et al. 1994). Injection of T-bar tags into the dorsal musculature may also result in raw sores, enlarging over time with tag movement (Collins et al. 1994; Guy et al. 1996). To minimize the potential for adverse effects, external identifier tags would not be authorized for sturgeon less than 300 mm TL.

In summary, placing external identifier tags on Atlantic and shortnose sturgeon may result in minor, short-term, adverse direct impacts (i.e., elevated stress levels, bleeding, sores).

Fin Clip Sampling

To limit the chance of infection occurring from the procedure, researchers would be required to follow disinfection protocols described in the permit conditions. Based on results from previous studies, this procedure does not appear to result in any serious injury or long-term adverse effect on Atlantic or shortnose sturgeon (Kahn and Mohead 2010). Sturgeon bleed very little, if at all, after the procedure, and researchers report healing occurs within days to a couple of weeks. There is also no indication that the removal of such a small portion of the fin impairs the sturgeon's ability to swim.

In summary, tissue sampling may result in minor, short-term, adverse direct impacts (i.e., elevated stress levels, bleeding).

Anesthesia

When immersed in MS-222, sturgeon would initially experience rapid gill movement followed by marked reduced gill movement as the agent begins to have an effect. As gill movement slows, sturgeon would lose equilibrium and eventually turn upside down or float to the surface. MS-222 is excreted in fish urine within 24 hours and tissue levels decline to near zero in the same amount of time (Coyle et al. 2004). While there are potential risks associated with anesthesia using MS-222, long-term effects can generally be avoided by following the recommended protocols and use concentrations (Kahn and Mohead 2010; Moser et al. 2000). MS-222 concentrations used by authorized researchers under this program are up to 150 mg/L for transmitter implantation and gastric lavage. Based on previous research results, exposure of Atlantic and shortnose sturgeon to these MS-222 concentration levels would result in only minimal short-term risk with quick recovery time. In addition, this procedure would only be performed on animals that are in excellent condition.

Electronarcosis is an alternative anesthetic method using prescribed electrical currents. Due to the varying results that can occur from electrical current, it is important to use an ideal electrical anesthetic, inducing anesthesia rapidly with minimum hyperactivity or stress (Coyle et al. 2004). When using the authorized constant direct current, the risks to sturgeon are over-applying the direct current resulting in either tetany, cessation of opercular movement, or involuntary respiration (Kahn and Mohead 2010). These adverse effects would be mitigated through proper training, closely monitoring sturgeon, and reducing the voltage, as necessary, in response to changes in fish behavior. Recovery time from electronarcosis is shorter than for chemical anesthesia, as fish can swim upright as soon as the electricity is turned off (Henyey et al. 2002; Holliman and Reynolds 2002; Summerfelt et al. 1990).

Atlantic and shortnose sturgeon would only be anesthetized prior to particular research procedures for which it has been determined that the risks of performing the procedure without anesthesia outweigh the risks associated using anesthesia. Research procedures authorized as part of the proposed action that are conducted under anesthesia include fin ray sampling, internal tagging, gonad biopsy, gastric lavage, boroscopy, and laparoscopy.

In summary, the use of anesthetics (MS-222 and electronarcosis) on Atlantic and shortnose sturgeon may result in minor, short-term, direct adverse impacts (i.e., increased stress levels, temporary loss of equilibrium); responses to this activity are not likely to manifest into any long-term adverse effects, reduced fitness, or mortality. While mortality from anesthetization is considered unlikely if the proper protocols are followed, we recognize that there is some risk of mortality associated with these procedures which could result in moderate, long-term, direct impacts.

Internal Acoustic Telemetry Tagging

Adverse effects associated with the placement of internal telemetry tags in fish include handling discomfort, hemorrhage at the site of incision, risk of infection from surgery, affected swimming ability, reduced growth rates, abandonment of spawning runs, and some incidence of delayed mortality (Adams et al. 1998; Welch et al. 2007; Wildgoose 2000). Since implanting internal telemetry tags can result in stress to sturgeon, this procedure also requires the use of anesthesia (see above for discussion of responses to anesthesia). Factors that can affect proper healing of surgical wounds resulting from this invasive procedure include secondary infection and

inflammation (Wildgoose 2000). Expulsion or rejection of surgically implanted transmitters in fish can occur as transmitters can be expelled through the incision, through an intact part of the body wall, through the intestine, or with eggs deposition during spawning (J. Kahn, NMFS OPR, pers.comm. to R. Salz, NMFS OPR, December 22, 2016). The risk of tag rejection or expulsion is less likely to occur because all internal telemetry tags come from the manufacture coated in a biologically inert substance (Kynard et al. 1997; Moser and Ross 1995). Although expulsion has been reported in a number of studies, this occurrence does not appear to result in further complications or subsequent mortality (Chisholm and Hubert 1985; Jepsen et al. 2002; Kieffer and Kynard 1993; Lacroix et al. 2004; Moore et al. 1990; Moser and Ross 1995).

Factors that can affect the success of telemetry transmitter implantation in fish include choice of surgical procedure or technique, fish size, tag size/weight, fish condition, and environmental conditions (Bunnell and Isely 1999; Jepsen et al. 2002; Kahn and Mohead 2010; Moser et al. 2000). To minimize the risk of adverse effects on sturgeon, internal tagging would not be conducted when the water temperature exceeds 27°C (to reduce handling stress) or is less than 7°C since incisions do not heal as rapidly in low temperatures (Kieffer and Kynard 2012; Moser et al. 2000; Ream et al. 2003). Internal tagging would only be authorized on sturgeon > 300 mm TL and on fish that are in excellent condition (i.e., active, healthy weight). In addition, the weight of the internal telemetry tag selected for implanting must be less than 2 percent of the fish's total weight (in air). Because sturgeon researchers would be required to follow the protocols and mitigation measures of their permits, we anticipate the sub-lethal effects associated with internal tagging would be greatly reduced, and primarily limited to short-term effects with no lasting impact on sturgeon fitness or survival.

We anticipate low rates of mortality associated with internal tagging as part of the Program. As discussed above, implantation of internal transmitter tags in Atlantic and shortnose sturgeon may also result in sub-lethal effects including increased stress levels, bleeding, risk of inflammation or infection, tag expulsion, and potential reduction in growth rate or swimming ability resulting in moderate, short-term, direct, adverse impacts. However, given the sampling protocols, mitigation measures, and other required conditions of the sturgeon research permit, we expect minor, short-term, direct adverse impacts that are not likely to result in long-term reduced fitness of individual sturgeon.

Fin-ray Sampling

While fin-ray sampling may cause short-term discomfort, bleeding, and minor temporary loss of swimming hydrodynamics in some fish, it is not expected to have a significant impact on the survivability or normal behavior of individuals. To minimize the adverse effects noted, samples would be collected using sterilized surgical instruments while fish are under anesthesia.

In summary, fin-ray sampling (first or second fin) Atlantic and shortnose sturgeon may result in minor, short-term, direct adverse impacts (i.e., increased stress levels, discomfort, bleeding).

Blood Sampling

Effects of drawing blood samples could potentially include pain, handling discomfort, possible hemorrhage at the site, and risk of infection. To mitigate these effects, the needle would be slowly advanced while applying gentle negative pressure to the syringe until blood freely flows into the syringe. Once collected, direct pressure would be applied to the site of venipuncture to

ensure clotting and prevent subsequent blood hemorrhaging (Stoskopf 1993). The site would then be disinfected and checked again after recovery prior to release. Thus, sampling blood from Atlantic and shortnose sturgeon may result in minor, short-term, direct adverse impacts (i.e., increased stress levels, pain, and blood loss).

Photograph/Video

Photography and videography would be allowed during permitted research to document the health of the fish, research methods, and any identifying marks on sturgeon that may be useful for future identification. Photography and videography would be performed in conjunction with other research activities as long as it does not interfere with these activities. NMFS believes photography and videography would result in negligible, short-term, direct adverse impacts as a result of stress associated with the holding and handling of individual sturgeon.

Recapture

Individual Atlantic and shortnose sturgeon could potentially be captured more than once during a sampling day. Cumulative physiological stress can result from net abrasion, injury, and handling of sturgeon when fish are captured multiple times within a relatively short period (i.e., a few hours). As a mitigation measure to minimize the risks associated with recapture, as a condition of the permit, sturgeon researchers would be required to cease all sampling for the day after an individual Atlantic or shortnose sturgeon is captured three times on the same day. With this mitigation measure in place, Permit Holders would have incentive to avoid recapturing the same fish on a given day. Although recaptures may still occur, we anticipate they would be limited in number because of this permit condition. For recaptured fish, researchers would still be required to adhere to the sampling protocols and mitigation measures for safe handling of sturgeon (discussed above), including returning fish to a net pen or holding tank for observation to ensure full recovery (return to equilibrium, reaction to touch stimuli, return of full movement) prior to release. Recaptured fish may need more time to achieve full recovery prior to release.

In summary, while the recapture of sturgeon in a given day may result in minor, short-term, direct adverse impacts due to increased levels of stress responses, those responses are not likely to manifest into long-term adverse effects, reduced fitness, or mortality because Permit Holders would be required to adhere to sampling protocols, measures, and any other required conditions designed to mitigate these risks.

External Tagging

To minimize the risks associated with external tagging, particularly on smaller sturgeon, NMFS would not authorize the use of external tags weighing more than 2 percent of the fish's body weight. Mitigation measures for use of external transmitter tags include applying them only to sturgeon that are in excellent condition after capture and not applying to pre-spawning fish, or in water temperatures greater than 27°C or less than 7°C. Placement of tags would result in needle wounds from threading through the dorsal fin, but these are expected to heal normally after the tag is shed with no lasting effects on individual sturgeon.

External PSAT tags have been used by sturgeon researchers to track movement and behavior. However, due to the high cost of tags, this tagging method is used infrequently compared to other sturgeon tracking methods that are less expensive and have proven to be effective in environmental conditions where most sturgeon research occurs.

In summary, placement of external tags on Atlantic and shortnose sturgeon may result in minor, short-term, direct adverse impacts (i.e., elevated stress levels, wounds, pain).

Gill Biopsy

Fast et al. (2009) conducted gill biopsies on 83 Atlantic sturgeon caught in the New York Bight from 2007-2008 and reported no adverse effects resulting from this procedure. As a mitigation measure to minimize bleeding, researchers may only biopsy the outer portion of the gill, not the inner portion where blood flow would be greatest. Conducting gill biopsies on Atlantic and shortnose sturgeon may result in minor, short-term, direct adverse impacts (i.e., increased stress levels, minor bleeding. and bruising).

Scute/Apical hook Sampling

Sampling of sturgeon scute spines is a technique for age determination and chemical reconstruction of natal life histories that may be authorized (Altenritter et al. 2015). The scute tissue itself is a calcified hard structure with relatively little vascularization. The technique of sawing a wedge shaped sample from the scute may result in minor bleeding if the saw penetrates through the scute to underlying tissue at the deepest part of the cut (right under the spinous process). The size of any such wound is likely to be small (a few millimeters across) and shallow. This minimally invasive technique is considered far less injurious than taking a full scute or fin spine, and is more akin to the amount of tissue trauma associated with fin-clipping or PIT tagging (Altenritter et al. 2015).

In summary, scute/apical hook sampling Atlantic and shortnose sturgeon may result in minor, short-term, direct adverse impacts (i.e., increased stress levels, minor bleeding).

Gastric Lavage

Due to the difficulty in navigating the lavage tube past the U-shaped bend of the alimentary canal in sturgeon and the position of the sturgeon swim bladder, care must be taken to avoid injuring sturgeon when performing gastric lavage. Additionally, potential negative growth responses of sturgeon (going off-feed) after gastric lavage could result from the procedure. Haley (1998) modified existing gastric lavage techniques and developed a lavage protocol using anesthesia and flexible tubing that is safe and effective for use on sturgeon (Kahn and Mohead 2010; Moser et al. 2000).

In summary, gastric lavage may result in minor, short-term, direct adverse impacts, including impacts from the use of anesthesia.

Boroscopy

The potential for injury with this procedure is from passing the fiber optic internally at the juncture of the oviduct and urogenital canal (Kynard and Kieffer 2002); no incision is made. The borescope must be maneuvered carefully beyond the oviduct to clearly view and stage eggs to avoid rupturing the oviduct with the borescope probe tip.

In summary, conducting boroscopy on Atlantic and shortnose sturgeon may result in negligible, short-term, direct adverse impacts (i.e., increased stress levels, discomfort).

Laparoscopy

Laparoscopy would be used by sturgeon researchers as part of the proposed action to assist in identifying the sex and egg maturity of individual sturgeon. Compared to most traditional surgical procedures, laparoscopy is considered a minimally invasive form of surgery that typically involves relatively minor tissue trauma, shorter postoperative recovery periods, decreased postoperative care, and fewer postoperative complications (Kahn and Mohead 2010). Based on information in past annual reports submitted by sturgeon researchers to NMFS, laparoscopy is a safe procedure that can be routinely performed without complications when carried out by experienced researchers following recommended protocols. The small incision and insertion of the laparoscope typically heals rapidly with no long-term sub-lethal effects on individual fish.

In summary, conducting laparoscopy on Atlantic and shortnose sturgeon may result in minor, short-term, direct adverse impacts (i.e., increased stress levels, puncture wound).

Gonadal Biopsy Sampling

Due to the increased risk of this procedure, as a mitigation measure gonad biopsies would only be performed if the researcher is also implanting an internal acoustic tag, in which case the gonad biopsy can be performed in the field (Kahn and Mohead 2010). We recognize that there is a slight risk of delayed mortality but we assume that the delayed mortality rate for internal tagging already accounts for the risk of mortality due to gonad biopsy. Refer to Internal Acoustic Telemetry Tagging above for a discussion of impacts.

For gonad biopsies performed in the lab, researchers would be able to ensure that the fish is fully recovered prior to release into the wild. Because researchers must follow the proper protocols and mitigation measures for laparoscopy as a condition of their permit, this procedure may result in minor, short-term, direct adverse impacts.

Juvenile Sturgeon Acoustic Telemetry Tagging

NMFS may authorize the injection of internal acoustic juvenile sturgeon acoustic telemetry (JSAT) tags (~ 1.5 cm long) into Atlantic or shortnose sturgeon greater than 300 mm TL.

This method of internal tagging, which does not require surgery or anesthesia, is considered less invasive compared to traditional internal tagging methods. Tests on salmon indicate that the adverse effects of this procedure are likely minimal (Deng et al. 2015). NMFS anticipates this less invasive method would enable sturgeon to heal faster, reduce the risk of infection, lower the risk of mortality, and possibly provide more reliable information about fish behavior.

In summary, JSAT tagging Atlantic and shortnose sturgeon may result in minor, short-term, direct adverse impacts (i.e., elevated stress levels, injection needle wound).

OTC Mark

When sturgeon are exposed to OTC injections, the animals may experience stress from the puncture of the needle when injecting OTC. The animals could also suffer an overdose if the dosage of OTC used is too high. Using OTC would have no indirect effects on the subject animal or any other animals in the population. The injection is quick and would be done at the same time as other research methods, such as fin clipping, PIT tagging, and T-bar tagging. OTC

injections could result in comparable discomfort to the target animals as blood sampling or PIT tagging, as a small gauge needle would be used to administer the drug. Little or no bleeding would be expected to occur at the site of the injections and animals would recover rapidly from their effects. In summary, OTC marking may result in minor, short-term, direct adverse impacts.

Ultrasound

Ultrasound is one of the safest and least invasive methods for sexual identification (Kahn and Mohead 2010). The procedure would not result in injury. Handling of individuals undergoing the procedure would be minimized by adhering to standard mitigation measures. In summary, ultrasound may result in negligible, short-term, direct adverse impacts.

Muscle Biopsy

Muscle biopsy on sturgeon species is a nonlethal method of collecting sturgeon muscle tissue (Moser et al. 2000; Davis 2015; Damon-Randall et.al. 2010). In this regard, researchers have a long history of assessing the impacts of biopsies on other fish species, with the bulk of studies on teleost fishes, and have concluded that there is generally very low mortality risk or harm associated with the procedure (Van Meter, 1995; Evans, 2008; Schielke and Post, 2010) and few, if any, long-term sub-lethal effects on fish (Tyus et al., 1999; Smith et al., 2016). NMFS expects that sturgeon may experience minor injury at the biopsy site and may experience short-term stress due to handling and biopsy with a chance of infection. However, sturgeon are expected to recover from handling once released, with the biopsy site healing within weeks of the procedure. NMFS expects recovery to occur without any reduction in fitness. Thus, NMFS considers muscle biopsies minimally invasive with low risk of mortality. In summary, muscle biopsy may result in minor, short-term, direct adverse impacts.

Syringe Oocyte Extraction Device

The sampling procedure (Candrl et al. 2011) leaves a minute, self-sealing wound, and is described as suture-less, rapid healing, with reduced handling time and stress. The extractor device can be used in the field and has been used regularly by USFWS (Holmquist et. al., 2019) for sampling endangered pallid sturgeon eggs. We expect recovery to occur without any reduction in fitness. Thus, NMFS considers oocyte extraction minimally invasive and expects healing to occur within days to weeks. In summary, extracting oocytes may result in minor, short-term, direct adverse impacts.

Epidermal Mucus Sampling

Epidermal mucus sampling is considered non-invasive and increased stress during handling time of individual sturgeon is expected to be minimal. Moreover, because the procedure would take place concurrently with other typical non-invasive handling and research methods authorized, including (e.g., measure, weigh, PIT tag, tissue sample), the impact of the procedure would be negligible. In summary, epidermal mucus sampling may result in negligible, short-term, direct adverse impacts.

Hydroacoustics/Sonar

Hydroacoustic testing is considered a non-invasive method that would result in no detrimental effects on sturgeon or within the action area. Studies show that, with few exceptions, most fish species cannot hear sounds above about 3 to 4 kHz (Popper and Schilt 2008). In the proposed action, sturgeon researchers would make use of broadband sonar systems operating at 110 to 220

kHz. Therefore, Atlantic sturgeon and shortnose sturgeon are not expected to respond to hydroacoustic testing. In summary, the use of hydroacoustics or sonar may result in negligible, short-term, direct adverse impacts.

Import and Export of Biological Samples
The import and export of sturgeon biological samples may occur. However, the import and export of biological samples would take place after 'take' of live fish has already occurred or from an already deceased animal and therefore would not result in any additional impacts to the target species. Shipping of biological samples must follow all required guidelines stated by the couriers. Applicants would have to abide by the CITES treaty.

Impacts from Transport

Permit holders may be authorized to transport Atlantic and shortnose sturgeon. NMFS has specific guidelines and mitigation measures that Permit Holders must follow when transporting sturgeon to minimize stress and risk of injury or death. These include specifications for the concentration of fish relative to tank size (i.e., cubic footage), transport water quality (i.e., DO, temperature) and quantity, acclimation to new environment, and researcher observation requirements to assure fish are healthy.

In summary, transporting sturgeon may cause minor, short-term, direct adverse impacts due to increased levels of stress responses. There have not been any reported mortalities of Atlantic or shortnose sturgeon during transport for permitted activities.

Summary of Impacts Under Alternative 1
Translocation is expected to result in minor, short-term, direct adverse impacts with long-term, indirect beneficial impacts due to the potential conservation and recovery of the species. Under most circumstances, impacts from other potential procedures are anticipated to result in negligible to minor direct short-term adverse impacts.

4.3 Effects of Alternative 2- No Action Alternative

Under the No Action Alternative, NMFS would not issue new permits or modified permits authorizing the translocation of Atlantic and shortnose sturgeon under this PEA. Previously authorized research and enhancement activities authorized in Section 10(a)(1)(A) permits would still occur.

Under the No Action Alternative, future permits or modifications for translocation would not be issued under this PEA which may lead to lost opportunities to recover sturgeon populations that would benefit from translocation to, for example, more suitable habitat for development or spawning. Individual requests may be considered by NMFS but would be required to undergo separate NEPA analysis.

4.3.1 Impacts to the Biological Environment from Alternative 2

Target Species

Under the No Action Alternative, translocation of Atlantic and shortnose sturgeon would not be an authorized research and enhancement activity, and therefore, no indirect or direct impacts to target species from translocation would occur. Atlantic and shortnose sturgeon populations that

would benefit from translocation activities may be more at risk for reduced survival and fitness if translocation is not authorized. Not issuing the permits or permit modifications to allow translocation would prevent the applicants from achieving their research and enhancement objectives that would aid conservation and recovery of the species. Were an applicant to conduct translocation under the No Action Alternative, they would be in violation of the ESA's prohibition of take of these species and thus risk sanctions and enforcement actions. All other authorized research and enhancement activities in ESA Section 10(a)(1)(A) permits would continue. See Section 4.2 for impacts to target species from research and enhancement activities.

4.4 Cumulative Effects

NEPA defines cumulative effects as "effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over time." (40 CFR 1508.1) In accordance with NEPA and to the extent reasonable and practical, this PEA considers the combined incremental programmatic effects of Alternatives 1 and 2 with the effects of other past, present, and reasonably foreseeable actions on the target species. No other resources are expected to be affected. When applying the concept of cumulative impacts to a programmatic analysis, additional consideration must be given to uncertainty. The exact locations where translocation would occur and number of permits allowing translocation are unknown, so the analysis is qualitative.

4.4.1 Past, Present, or Future Research Activities

Atlantic and shortnose sturgeon have been the subject of field studies for many years. Since their listings, NMFS has issued numerous research and enhancement permits for the take of Atlantic and shortnose sturgeon for a variety of activities, including capture, tagging, biological sampling, measuring, and weighing in the action area. The objective of translocation is to increase the survival and recruitment of Atlantic and shortnose sturgeon, ultimately aiding in their recovery, by releasing them in more suitable habitat for spawning and foraging.

Given the anticipated number of permits, associated takes and personnel presently associated with permitted research and enhancement, repeated disturbance of individual Atlantic and shortnose sturgeon may occur in some instances, but most work would occur in geographically distinct areas. In addition, the translocation of Atlantic and shortnose sturgeon would be highly coordinated and only one Permit Holder would be authorized to perform the associated research and enhancement activities associated with the translocation of the species within a specified area (e.g., river system, DPS) at any given time. As discussed in Chapter 1 and Chapter 2, under Alternative 1, take would be limited through coordination of Permit Holders and an adaptive management approach to avoid and mitigate the potential for population-level effects from research and enhancement activities. NMFS would continue to monitor the effectiveness of these conditions and the management approach in avoiding unnecessary repeated takes and to determine if the research and enhancement activities are meeting the specified objectives.

Coordination efforts as described in Chapter 1 by Permit Holders, OPR, and NMFS Regional Office staff should effectively eliminate the take of individual, translocated Atlantic or shortnose sturgeon by multiple permitted researchers. Therefore, research and enhancement efforts across permits are not expected to overlap temporally or spatially. Only when Atlantic and shortnose

sturgeon migrate to the marine environment, would there be a possibility for individuals to be captured by other permitted researchers. All permits issued by NMFS for research on protected species, including the issuance of permit modifications, contain conditions requiring the Permit Holders coordinate their activities with the NMFS Regional Offices and other Permit Holders conducting research on the same species in the same areas, and, to the extent possible, share data to avoid unnecessary duplication of research and disturbance of animals.

NMFS expects that most researchers will request new permits, or renewals, to continue their work once the current permit expires. There are currently 13 active permits authorizing research activities on sturgeon in the wild; 10 are renewal permits and three are permits issued within the last five years. Translocation would not be authorized in all of these permits; it would only be authorized in very specific circumstances, as described in the above chapters, so the impact of that activity concurrent with additional research and enhancement activities would be very minimal. Currently, only one Permit Holder, in response to the NMFS biological opinion (NMFS 2020a) and Second Modified Prescription for Fishways for the Santee Cooper Hydroelectric Project (NMFS 2020b), is requesting translocation with the initial target species being shortnose sturgeon.

NMFS cannot predict with certainty the level of take of each species that may be requested in the future but, conservatively, expects the amount of future research and enhancement activities (not including translocation) to be similar to or slightly greater than currently authorized levels as interest in conservation, biology, and management of these species grows or new sources of funding become available. For translocation specifically, NMFS expects the total number of Atlantic or shortnose sturgeon to be transported annually to a new location to be relatively small compared to the overall number of takes authorized in permits. The maximum number is anticipated to be <3 percent of all authorized takes, or approximately 260 individuals annually, if all permits included translocation. However, at this time, only one project fits the criteria to translocate shortnose sturgeon and that project describes future actions to translocate up to 20 Atlantic sturgeon annually (NMFS 2020a; NMFS 2020b). NMFS does not believe translocation would occur frequently as a means to assist in the recovery of populations. Only under specific criteria, as described in Chapter 1, would translocation be considered a research or enhancement activity in the Program.

The number of takes currently proposed for translocation (n = 20 annually), which likely represents future numbers, is not expected to result in a significant adverse impact on the target species. In addition, future proposed takes for translocation by Permit Holders is not expected to result in a significant adverse impact on the target species or their populations.

NMFS has taken steps to limit the impact of translocation through its adaptive management plan as part of Alternative 1. NMFS would continue to monitor the effectiveness of the adaptive management plan in enhancing the spawning and recruitment of Atlantic and shortnose sturgeon within those systems where translocated individuals occur.

4.4.2 Climate Change

Global climate change could significantly affect marine and estuarine resources in the Atlantic. Broadly, possible impacts include temperature and rainfall changes, rising sea levels, and changes to ocean conditions, such ocean circulation patterns and storm frequency. These changes

may affect Atlantic and shortnose sturgeon in the future as described in the PBO (NMFS 2017a). Such changes include: 1) rising sea level shifting the salt wedge, 2) rising temperatures, and 3) longer and more frequent droughts. Indirect effects of climate change include altered reproductive seasons/locations, shifts in migration patterns, reduced distribution and abundance of prey, and changes in the abundance of competitors and/or predators. The precise effects of global climate change on the locations where research and enhancement for Atlantic and shortnose sturgeon occurs, however, cannot be predicted at this time because the marine and estuarine ecosystems are highly variable in their spatial and temporal scales. While the risks posed by climate change are gradual, and likely have been exacerbated over the last 5 years, there is no information available to suggest to what additional extent the effects of climate change are affecting Atlantic or shortnose sturgeon in the action area since the 2017 PBO was completed (NMFS 2023).

4.4.3 Marine and Estuarine Pollution: Water Quality and Contaminants

The quality of water in river/estuary systems is affected by human activities conducted in the riparian zone and those conducted more remotely in the upland portion of the watershed. As described in the PBO (NMFS 2017a), industrial activities can result in discharge of pollutants, changes in water temperature and levels of DO, and the addition of nutrients. In addition, forestry and agricultural practices can result in erosion, run-off of fertilizers, herbicides, insecticides or other chemicals, nutrient enrichment and alteration of water flow. The reinitiated PBO states "there have been no new water quality reports for East Coast watersheds since 2017. The effects to sturgeon from these stressors in the action area are ongoing and we have no new information to indicate that they have changed appreciably from those discussed in the 2017 opinion" (NMFS 2023).

Research activities, such as blood sampling, are already authorized in permits and these samples may be used to determine contaminant loads in Atlantic and shortnose sturgeon. For the proposed modifications and new permits, translocation of Atlantic and shortnose sturgeon would occur in areas where these species already exist or where they existed historically, therefore NMFS does not believe translocated individuals would be more exposed to contaminants than those individuals already occupying the systems.

4.4.4 Disease

Disease is more common in captive-reared Atlantic and shortnose sturgeon. Disease is typically not a cause of mortality in Atlantic and shortnose sturgeon in the wild (77 FR 5880; SSSRT 2010). Researchers are required to disinfect surgical equipment and change gloves between surgeries to avoid disease transmission and ensure proper closure of the surgical incision. Implementing these measures is expected to minimize potential adverse effects of surgeries. Atlantic and shortnose sturgeon migrate between systems and within the marine environment. Translocated sturgeon would only be held and transported for a short period of time prior to release. Only healthy individuals (e.g., good body condition) would be chosen to be translocated, therefore the chances of transmitting disease to another location is considered minimal. Individuals would not be held in a hatchery or other captive facility, therefore eliminating exposure to other sturgeon that were reared or held in a captive environment. There are no known diseases threatening Atlantic and shortnose sturgeon in their geographic range at this time that could potentially affect these species.

4.4.5 Increased Vessel Traffic

Vessel strikes have been identified as a threat to both Atlantic sturgeon and shortnose sturgeon (ASSRT 2007, SSSRT 2010). The proposed action to authorize translocation of Atlantic and shortnose sturgeon would not significantly increase vessel traffic. Most monitoring would occur using acoustic arrays to detect tagged sturgeon within the system. Researchers would occasionally download these receivers and under most circumstances, they would use a vessel to get to the receivers locations. However, NMFS has never received a report of a sturgeon being struck by a research vessel when in transit to a research and enhancement location or undergoing research and enhancement activities. Impacts from research vessel interactions is further described in Section 4.2.

4.4.6 Additional Threats to Atlantic and Shortnose Sturgeon

A review of other threats to Atlantic and shortnose sturgeon can be found in the PBOs (NMFS 2017a; NMFS 2023). Other threats include dams and diversions, dredging, blasting and bridge construction/demolition, liquefied natural gas facilities, impingement and entrainment, and fisheries interactions and bycatch. However, translocating individual sturgeon would not increase their chances of encountering these threats. The purpose of translocating individual Atlantic and shortnose sturgeon is to increase survival, spawning, and recruitment of these species, therefore locating them to an area where they would be exposed to additional threats would be counterintuitive to the goal of the research and enhancement activities.

4.4.7 Cumulative Effects Analysis

Alternative 1 is expected to result in long-term, indirect beneficial impacts to the population. Cumulatively, the beneficial impacts may be dampened by external factors (e.g., climate change) but the potential for conservation and recovery of the species still exists. Alternative 2 would not result in any beneficial impacts to the population when considering that populations are not anticipated to naturally recover, and in light of the other factors presented here, the populations could experience further degradation.

4.5 Conclusions and Comparison of Alternatives

By selecting Alternative 1, NMFS expects the overall impacts to Atlantic and shortnose sturgeon would be similar to what has been analyzed in past EAs and biological opinions, including the PBOs (NMFS 2017a; NMFS 2023) for individual sturgeon. At the population level, the impacts to Atlantic and shortnose sturgeon would be minimized through implementation of the Program's adaptive management plan as discussed in Chapter 2. NMFS' adaptive management plan ensures all Permit Holders will collaborate and coordinate research efforts to prevent or minimize impacts to Atlantic and shortnose populations. Translocation would only be authorized when the proposed research or enhancement activity meets the specific criteria discussed in Chapter 1. NMFS may modify, suspend, or revoke a permit at any time if needed to ensure compliance with all permit requirements. Regarding translocation, animals are expected to recover quickly from being transported and released. Impacts are not expected to lead to negative effects at the population or species level. The draft PEA did not identify any significant effects and no public comment has been received to the contrary. The final determination of significance will be made in a Finding of No Significant Impact (FONSI) decision document for this final PEA. The final PEA and FONSI will be made available to the public via a *Federal Register*

notice and posting on the NOAA website: *https://www.fisheries.noaa.gov/action/draft-environmental-assessment-permitting-translocation-sturgeon-scientific-research-and*.

Under Alternative 1, NMFS expects requests to translocate Atlantic or shortnose sturgeon to be approximately 20 fish translocated annually per issued permit or permit modification. Currently permitted and authorized research and enhancement activities would continue for Atlantic and shortnose sturgeon.

Under Alternative 2 (No Action), future requests for translocation would not be issued under this programmatic EA, but individual requests may be considered and undergo separate NEPA analysis. Currently permitted and authorized research and enhancement activities would continue for Atlantic and shortnose sturgeon. However, as discussed in Section 1, without authorizing this activity for these species, recovery goals for both species would likely not be met and thus the purpose and need for the action would not be met.

Chapter 5 List of Preparers

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Chapter 6 Literature Cited

Adams, N. S., D. W. Rondorf, S. D. Evans, J. E. Kelly, and R. W. Perry. 1998. Effects of surgically and gastrically implanted radio transmitters on swimming performance and predator avoidance of juvenile chinook salmon (*Oncorhynchus tshawytscha*). Canadian Journal of Fisheries and Aquatic Sciences 55(4):781-787.

Altenritter, M. E., M. T. Kinnison, G. B. Zydlewski, D. H. Secor, & J. D. Zydlewski. 2015. Assessing dorsal scute microchemistry for reconstruction of shortnose sturgeon life histories. Environmental Biology of Fishes 98:2321–2335.

Atlantic Sturgeon Status Review Team (ASSRT). 2007. Status Review of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Report to National Marine Fisheries Service, Northeast Regional Office. February 23, 2007. 174 pp.

Bain, M.B. 1997. Atlantic and shortnose sturgeons of the Hudson River: Common and divergent life history attributes. Environmental Biology of Fishes 48(1-4):347-358.

Balazik, M.T., B.C. Langford, G.C. Garman, M.L. Fine, J.K. Stewart, R.J. Latour, & S.P. McIninch. 2013. Comparison of MS-222 and Electronarcosis as Anesthetics on Cortisol Levels in Juvenile Atlantic Sturgeon, Transactions of the American Fisheries Society, 142:6, 1640-1643.

Baremore, I.E., & J.D. Rosati. 2014. A validated, minimally deleterious method for aging sturgeon. Fishery Bulletin, 112:4, 274-282.

Bigelow, H.B., & W.C. Schroeder. 1953. Sawfishes, guitarfishes, skates and rays. Pages 1-514 in: Tee-Van, J., C.M. Breder, A.E. Parr, W.C. Schroeder, & L.P. Schultz (eds.), Fishes of the Western North Atlantic, Part Two. Memoir, Sears Foundation for Marine Research.

Boreman, J. 1997. Sensitivity of North American sturgeons and paddlefish to fishing mortality. Environmental Biology of Fishes 48:399-405.

Brännäs, E., and coauthors. 1994. Use of the passive integrated transponder (PIT) in a fish identification and monitoring system for fish behavioral studies. Transactions of the American Fisheries Society Symposium 12:395-401.

Brundage, H. M., and J.-B. Jung. 2009. Experiments with broadband sonar for the detection and identification of endangered shortnose sturgeon. Marine Technology Society Journal 43(3):78-82.

Bunnell, D. B., and J. J. Isely. 1999. Influence of temperature on mortality and retention of simulated transmitters in rainbow trout. North American Journal of Fisheries Management 19(1):152-154.

Candrl, J. S., D,M. Papoulias, & D.E. Tillitt. 2010. A minimally invasive method for extraction of sturgeon oocytes. *North American Journal of Aquaculture*, *72*, 184–187. https://doi.org/10.1577/A09-006.1

Chisholm, I. M., and W. A. Hubert. 1985. Expulsion of dummy transmitters by rainbow trout. Transactions of the American Fisheries Society 114(5):766-767.

Clugston, J. P. 1996. Retention of T-bar anchor tags and passive integrated transponder tags by gulf sturgeons. North American Journal of Fisheries Management 16(3):4.

Collins, M. R., T. I. Smith, and L. D. Heyward. 1994. Effectiveness of six methods for marking juvenile shortnose sturgeons. The Progressive Fish-Culturist 56(4):250-254.

Collins, M.R. 1995. Report to the USFWS: Evaluation of the effects of pectoral spine removal on shortnose sturgeon. Final Report, South Carolina Department of Natural Resources, Charleston, South Carolina.

Collins, M. R., & T. I. J. Smith. 1996. Sturgeon fin ray removal is nondeleterious. North American Journal of Fisheries Management 16(4): 939 - 941.
Collins, M.R., Rogers, S.G., Smith, T.I.J., & Moser, M.L. 2000. Primary factors affecting sturgeon populations in the southeastern U.S.: fishing mortality and degradation of essential habitat. Bull Mar Sci. 66:917–928.
Collins, M.R., C. Norwood, & A. Rourk. 2008. Shortnose and Atlantic sturgeon age growth, status, diet, and genetics. Final Report to National Fish and Wildlife Foundation. South Carolina Department of Natural Resources, Charleston, South Carolina, 2006-0087-009. 41 pp.
Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2005. Assessment and update status report on the shortnose sturgeon *Acipenser brevirostrum* in Canada. Ottawa, Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Canada.vi + 27 pp.
Coyle, S.D., R.M. Durborow, & J.H. Tidwell. 2004. Anesthetics in Aquaculture. SRAC Publication No. 3900, Texas, 6 pp.
Dadswell, M.J., B.D. Taubert, T.S. Squiers, D. Marchette, & J. Buckley. 1984. Synopsis of Biological Data on Shortnose Sturgeon, *Acipenser brevirostrum*, LeSuer 1818. NOAA Technical Report, NMFS 14. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.
Dadswell, M. 2006. A review of the status of Atlantic sturgeon in Canada, with comparisons to populations in the United States and Europe. Fisheries 31: 218-229.
Damon-Randall, K., and coauthors. 2010. Atlantic sturgeon research techniques. NOAA Technical Memorandum NMFS-NE 215:64pp.
Dare, M. R. 2003. Mortality and long-term retention of passive integrated transponder tags by spring Chinook salmon. North American Journal of Fisheries Management 23(3):1015-1019.
Davis, J. 2015. 2015 RMP Selenium in Sturgeon Muscle Plug Study Sampling Plan**.** San Francisco Bay Regional Water Quality Control Board; Online citation https://www.sfei.org/sites/default/files/biblio_files/2015%20Sturgeon%20Muscle%20Plug%20Study%20SAP.pdf
Deng, Z.D., T.J. Carlson, H. Li, J. Xiao, M.J. Myjak, J. Lu, J.J. Martinez, C.M. Woodley, M.A. Weiland, & M.B. Eppard. 2015. An injectable acoustic transmitter for juvenile salmon. *Scientific Reports*, 2015; 5: 8111 DOI: 10.1038/srep08111
Dovel, W.L., & T.J. Berggren. 1983. Atlantic sturgeon of the Hudson River estuary, New York. New York Fish and Game Journal 30: 140-172.
Elbin, S. B., and J. Burger. 1994. Implantable microchips for individual identification in wild and captive populations. Wildlife Society Bulletin 22:677-683.
Elliot, J., and R. C. Beamesderfer. 1990. Comparison of efficiency and selectivity of three gears used to sample white sturgeon in a Columbia River reservoir. California Fish and Game 76(3):174-180.
Erickson, D. L., & J.E. Hightower. 2007. Oceanic distribution and behavior of green sturgeon. Am. Fish. Soc. Symp. 56, 197–201.
Erickson, D.L., A. Kahnle, M. J. Millard, E.A. Mora, M. Bryja, A. Higgs, J. Mohler, M. DuFour, G. Kenney, J. Sweka, & E. K. Pikitch. 2011. Use of pop-up satellite archival tags to identify oceanic- migratory patterns for adult Atlantic Sturgeon, Acipenser oxyrinchus oxyrinchus Mitchell, 1815. J. Appl. Ichthyol. 27 (2002), 356–365.
Evans, R. 2008. Assessment of an underwater biopsy probe for collecting teleost fish tissue samples. *Mar Ecol Prog Ser* 368: 305–308.

Everett, S.R., D.L. Scarnecchia, G.J. Power, & C.J. Williams. 2003. Comparison of age and growth of shovelnose sturgeons in the Missouri and Yellowstone Rivers. North American Journal of Fisheries Management 23:230-240.

Eyler, S., M. Mangold, and S. Minkkinen. 2004. Atlantic Coast sturgeon tagging database. US Fish and Wildlife Service, Maryland Fishery Resources Office, Annapolis.

Fast, M. D., M. S. Sokolowski, K. J. Dunton, and P. R. Bowser. 2009. *Dichelesthium oblongum* (Copepoda: Dichelesthiidae) infestation in wild-caught Atlantic sturgeon, *Acipenser oxyrinchus oxyrinchus*. ICES Journal of Marine Science: Journal du Conseil 66(10):2141-2147.

Fleming, J.E., T.D. Bryce, & J.P. Kirk. 2003. Age, growth, and status of shortnose sturgeon in the lower Ogeechee River, Georgia. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 57:80-91.

Gilbert, C.R. 1989a. Atlantic and shortnose sturgeons. United States Department of Interior Biological Report 82: 28 pp.

Gilbert, C.R. 1989b. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic Bight): Atlantic and shortnose sturgeons. United States Fish and Wildlife Service Biological Report-Report Number-82 (11.91).

Grunwald, C., L. Maceda, J. Waldman, J. Stabile, & I. Wirgin. 2008. Conservation of Atlantic sturgeon Acipenser oxyrinchus oxyrinchus: delineation of stock structure and distinct population segments. Conservation Genetics 9:1111-1124. https://doi.org/10.1007/s10592-007-9420-1

Guy, C. S., H. L. Blankenship, and L. Nielsen. 1996. Tagging and marking. Pages 353-383 *in* B. R. M. D. W. Willis, editor. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, MD.

Haley, N. 1998. A gastric lavage technique for characterizing diets of sturgeons. North American Journal of Fisheries Management 18: 978-981.

Henne, J., and K. Crumpton. 2008. Guidelines for marking and tagging juvenile endangered shortnose sturgeon, *Acipenser brevirostrum*. Aquaculture America.

Henyey, E., B. Kynard, & P. Zhuang. 2002. Use of electronarcosis to immobilize juvenile lake and shortnose sturgeons for handling and the effects on their behavior. Journal of Applied Ichthyology 18:502-504.

Hernandez-Divers, S., R. Bakal, B. Hickson, C. Rawlings, H. Wilson, M. Radlinsky, S. Hernandez- Divers, & S. Dover. 2004: Endoscopic sex determination and gonadal manipulation in Gulf of Mexico Sturgeon (*Acipenser oxyrinchus desotoi*). J. Zoo Wildl. Med. 35, 459–470.

Hockersmith, E. E., and coauthors. 2003. Comparison of migration rate and survival between radio-tagged and PIT tagged migrating yearling chinook salmon in the Snake and Columbia rivers. North American Journal of Fisheries Management 23:404-413.

Holliman, F. M., and J. B. Reynolds. 2002. Electroshock-induced injury in juvenile white sturgeon. North American Journal of Fisheries Management 22(2):494-499.

Holmquist, L. M., C.S. Guy, A. Tews, & M.A, Webb. 2019. First maturity and spawning periodicity of hatchery-origin pallid sturgeon in the upper Missouri River above Fort Peck Reservoir, Montana. Journal of Applied Ichthyology, 35, 138–148. https://doi.org/10.1111/jai.13751

Hughes, T.C., C.E. Lowie, & J.M. Haynes. 2005. Age, growth, relative abundance, and SCUBA capture of a new or recovering spawning population of lake sturgeon in the lower Niagara River, New York. North American Journal of Fisheries Management 25:1263-1272.

Hurley, K.L., R.J. Sheehan, & R.C. Heidinger. 2004. Accuracy and precision of age estimates for pallid sturgeon from pectoral fin rays. North American Journal of Fisheries Management 24:715- 718.

Jemison, S. C., L. A. Bishop, P. G. May, and T. M. Farrell. 1995. The impact of PIT-tags on growth and movement of the rattlesnake, *Sistrurus miliarus*. Journal of Herpetology 29(1):129-132.

Jepsen, N., A. Koed, E. B. Thorstad, and E. Baras. 2002. Surgical implantation of telemetry transmitters in fish: how much have we learned? Pages 239-248 *in* Aquatic Telemetry. Springer.

Kahn, J., & M. Mohead. 2010. A protocol for use of shortnose, Atlantic, Gulf, and green sturgeon. U.S. Department of Commerce. NOAA Tech. Memo. NMFS-OPR-45,62p.

Kahn, J.E. C. Hager, J.C. Watterson, J. Russo, K. Moore, & K. Hartman, 2014. Atlantic Sturgeon Annual Spawning Run Estimate in the Pamunkey River, Virginia. Transactions of the American Fisheries Society, 143: 6, 1508-1514. https://doi.org/10.1080/00028487.2014.945661

Kahn, J.E., C. Hager, J.C. Watterson, N. Mathies, and K.J. Hartman. 2019. Comparing abundance estimates from closed population mark-recapture models of endangered adult Atlantic sturgeon. Endangered Species Research 39: 63-76. http://dx.doi.org/10.3354/esr00957

Kieffer, M.C., & B. Kynard. 1993. Annual Movements of shortnose and Atlantic sturgeons in the Merrimack River, Massachusetts. Transactions of the American Fisheries Society 122:1088–1103.

Kieffer, M., and B. Kynard. 2012. Spawning and non-spawning migrations, spawning, and the effect of river regulation on spawning success of Connecticut River Shortnose Sturgeon. Life history and behaviour of Connecticut River shortnose and other sturgeons. B. Kynard, P. Bronzi and H. Rosenthal (Eds.). WSCS. Demand GmbH, Norderstedt, Spec. Publ 4:73-113.

Killgore, K.J., J.J. Hoover, S.G. George, B.R. Lewis, C.E. Murphy & W.E. Lancaster. 2007. Distribution, relative abundance and movements of Pallid Sturgeon in the free-flowing Mississippi River. Journal of Applied Ichthyology. 23, 476-483.

Kynard, B., M. Kieffer, and G. Boelert. 1997. Rejection of internal telemetry transmitters by shortnose sturgeon. Washington, DC, USA: US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center: 58.

Kynard, B., & M. Kieffer. 2002. Use of a borescope to determine the sex and egg maturity stage of sturgeons and the effect of borescope use on reproductive structures. Journal of Applied Ichthyology 18:505-508.

Lacroix, G. L., D. Knox, and P. McCurdy. 2004. Effects of implanted dummy acoustic transmitters on juvenile Atlantic salmon. Transactions of the American Fisheries Society 133(1):211-220.

Mangin, E. 1964. Croissance en Longueur de Trois Esturgeons d'Amerique du Nord: *Acipenser oxyrhynchus,* Mitchill, *Acipenser fulvescens*, Rafinesque, et *Acipenser brevirostris* LeSueur. Verh. Int. Ver. Limnology 15: 968-974.

Matsche, M.A. 2011a. Evaluation of tricaine methanesulfonate (MS-222) as a surgical anesthetic for Atlantic Sturgeon Acipenser oxyrinchus oxyrinchus. Journal of Applied Ichthyology. Vol. 27: 2, April 2011, Pages: 600–610.

Matsche, M.A. 2013. A portable electro-immobilization and laparoscopy system for sex determination and gonadal biopsy in largemouth bass Micropterus salmoides. Journal of Fish Biology, 83: 1391-1400.

Matsche M., & R. Bakal. 2008. General and reproductive health assessments of shortnose sturgeon with application to Atlantic sturgeon: anesthesia, phlebotomy, and laparoscopy. Oxford (MD): Maryland Department of Natural Resources.

Matsche M.A., R.S. Bakal, & K.M. Rosemary. 2011b. Use of laparoscopy to determine sex and reproductive status of shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). J. Appl. Ichthyol. 27: 627-636.

McCabe Jr., G.T., & L.G. Beckman. 1993. Use of an artificial substrate. Pages 29-34 *in* R.C. Beamesderfer, & A.A. Nigro, editors. Status and Habitat Requirements of the White Sturgeon Populations in the Columbia River Downstream from McNary Dam, volume II - Supplemental Papers and Data Documentation. Oregon Department of Fish and Wildlife, National Marine Fisheries Service.

Moore, A., I. Russell, and E. Potter. 1990. The effects of intraperitoneally implanted dummy acoustic transmitters on the behaviour and physiology of juvenile Atlantic salmon, *Salmo salar L*. Journal of fish biology 37(5):713-721.

Moser, M. L., and S. W. Ross. 1995. Habitat use and movements of shortnose and Atlantic sturgeons in the lower Cape Fear River, North Carolina. Transactions of the American Fisheries Society 124(2):225.

Moser, M.L., M. Bain, M.R. Collins, N. Haley, B. Kynard, J.C. O'Herron II, G. Rogers, & T.S. Squiers. 2000. A Protocol for Use of Shortnose and Atlantic Sturgeons. U.S. Department of Commerce, NOAA Technical Memorandum-NMFS-OPR-18. 18pp.

Murie, D.J., & D.C. Parkyn. 2000. Development and implementation of a non-lethal method for collection of stomach contents from sturgeon related to diel feeding periodicity. Report to the Florida Marine Research Institute, Florida Fish and Wildlife Conservation Commission, St. Petersburg, FL.

NMFS. 1998. Final Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Silver Spring, Maryland.

NMFS. 2007 Environmental Assessment of the Issuance of a Scientific Research Permit to the South Carolina Department of Natural Resources (SCDNR) to Conduct Research on Endangered Shortnose Sturgeon (File No. 1447). National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD.

NMFS. 2008a. Environmental Assessment of Issuance of a Scientific Research Permit to Dr. Douglas Peterson, University of Georgia, to Conduct Research on Endangered Shortnose Sturgeon (File No. 10037). National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD.

NMFS. 2008b. Environmental Assessment on the Effects of the Issuance of a Scientific Research Permit to Conduct Research on Shortnose Sturgeon in the Saint Marys River and Satilla Rivers, Georgia and Florida (File No. 10115). National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD.

NMFS. 2009a. Environmental Assessment on the Effects of the Issuance of a Scientific Research Permit to Conduct Research on Shortnose Sturgeon in the Altamaha River, Georgia (File No 14394). National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD.

NMFS. 2009b. Supplemental Environmental Assessment (Sea) of the Issuance of a Scientific Research Permit Modification to New York State Department of Environmental

Conservation (NYSDEC) for Conducting Research on Endangered Shortnose Sturgeon (File No. 1547-02).
NMFS. 2009c. Environmental Assessment on the Effects of the Issuance of a Scientific Research Permit to Conduct Scientific Research on Shortnose Sturgeon in the Delaware River (File No. 14396). National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD.
NMFS. 2010a Environmental Assessment on the Effects of the Issuance of a Scientific Research Permit to Conduct Scientific Research on Shortnose Sturgeon in the Delaware River (File No. 14604). National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD.
NMFS. 2010b Environmental Assessment on the Effects of the Issuance of a Scientific Research Permit to Conduct Research on Shortnose Sturgeon in the Potomac River, Maryland and Virginia (File No. 14176). National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD.
NMFS. 2010c. Environmental Assessment on the Effects of the Issuance of a Scientific Research Permit to Conduct Scientific Research on Shortnose Sturgeon in North Carolina Rivers File No. 14759). National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD.
NMFS. 2011. Environmental Assessment on the Effects of the Issuance of a Scientific Research Permit to Conduct Scientific Research on Shortnose Sturgeon in South Carolina Rivers (File No. 15677). National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD.
NMFS. 2012a. Environmental Assessment for the Issuance of 12 Scientific Research Permits for Research on Atlantic Sturgeon. Silver Spring, MD.
NMFS. 2012b. Biological opinion on the issuance of multiple permits to conduct scientific research on all Atlantic sturgeon DPSs along the Atlantic coast pursuant to section 10(a(1) of the Endangered Species Act of 1973. Silver Spring, MD.
NMFS. 2016. Interim Guidance on the Endangered Species Act Term "Harass." National Marine Fisheries Service Procedural Instructions 02-110-19. Silver Spring, MD.
NMFS. 2017a. Biological and Conference Opinion on Proposed implementation of Program for the Issuance of Permits for Atlantic and shortnose sturgeon Research and Enhancement Activities pursuant to Section 10(a) of the Endangered Species Act. Silver Spring, MD.
NMFS. 2017b. Continued operation of the Holyoke Hydroelectric Project (FERC #2004) per the terms of an amended license (reinitiation to incorporate shortnose sturgeon downstream monitoring plan). Greater Atlantic Regional Fisheries Office GARFO-2017-01088.
NMFS. 2020a. Re-licensing of the South Carolina Public Service Authority (SCPSA) Hydroelectric Project (FERC #199-205). Southeast Regional Office (SERO), Protected Resources Division (PRD) SERO-2018-00325.
NMFS. 2020b. United States Department of Commerce Second Modified Prescription for Fishways Pursuant to Section 18 of the Federal Power Act. Project No. 199.
NMFS. 2022a. Gulf of Maine Distinct Population Segment of Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus) 5-Year Review: Summary and Evaluation. Greater Atlantic Regional Fisheries Office, Gloucester, Massachusetts.
NMFS. 2022b. New York Bight Distinct Population Segment of Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus) 5-Year Review: Summary and Evaluation. Greater Atlantic Regional Fisheries Office, Gloucester, Massachusetts.

NMFS. 2022c. Chesapeake Bay Distinct Population Segment of Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus) 5-Year Review: Summary and Evaluation. Greater Atlantic Regional Fisheries Office, Gloucester, Massachusetts.

NMFS. 2023. Reinitiation of the Programmatic Biological Opinion on the Implementation of a Program for the Issuance of Permits for Research and Enhancement Activities on Atlantic and Shortnose Sturgeon Pursuant to Section 10(a) of the Endangered Species Act. Silver Spring, MD.

Phelps, Q.E., D.P. Herzog, R.C. Brooks, V.A. Barko, D.E. Ostendorf, J.W. Ridings, S.J. Tripp, R.E. Colombo, J.E. Garvey & R.A. Hrabik. 2009. Seasonal comparison of catch rates and size structure using three gear types to sample sturgeon in the middle Mississippi River. North American Journal of Fisheries Management. 29:5, 1487-1495

Pikitch, E.K., P. Doukakis, L. Lauck, P. Chakrabarty, & D.L. Erickson. 2005. Status, trends and management of sturgeon and paddlefish fisheries. Fish and Fisheries 6(3):233-265.

Popper, A. N., and C. R. Schilt. 2008. Hearing and acoustic behavior: basic and applied considerations. Pages 17-48 *in* Fish bioacoustics. Springer.

Quattro, J., T. Greig, D. Coykendall, B. Bowen, & J. Baldwin. 2002. Genetic issues in aquatic species management: The shortnose sturgeon in the southeastern Unites States. Conservation Genetics 3: 155-166.

Ream, R. A., J. A. Theriot, and G. N. Somero. 2003. Influences of thermal acclimation and acute temperature change on the motility of epithelial wound-healing cells (keratocytes) of tropical, temperate and Antarctic fish. Journal of Experimental Biology 206(24):4539-4551.

Rien, T.A. & R.C. Beamesderfer. 1994. Accuracy and precision of white sturgeon age estimates from pectoral fin rays. Transactions of the American Fisheries Society 123:255-265.

Rossiter, A., D.L.G. Noakes, & F.W.H. Beamish. 1995. Validation of age estimation for the lake sturgeon. Transactions of the American Fisheries Society 124:777-781.

Rust, P.J. 2011. Short communication: Translocation of prespawn adult Kootenai River white sturgeon. Journal of Applied Ichthyology 27: 450-453. https://doi.org/10.1111/j.1439-0426.2010.01488.x

Savoy, T.F., & J. Benway. 2004. Food habits of shortnose sturgeon collected in the lower Connecticut River from 2000 through 2002. American Fisheries Society Monograph 9:353–360.

Schielke EG, Post DM (2010) Size matters: comparing stable isotope ratios of tissue plugs and whole organisms. Limnol Oceanogr Methods 8: 348–351. https://doi.org/10.4319/lom.2010.8.348

Shortnose Sturgeon Status Review Team (SSSRT). 2010. A biological assessment of shortnose sturgeon (*Acipenser brevirostrum*). Report to National Marine Fisheries Service, November 1, 2010. 417 pp.

Skalski, J. R., S. G. Smith, R. N. Iwamoto, J. G. Williams, and A. Hoffmann. 1998. Use of passive integrated transponder tags to estimate survival of migrant juvenile salmonids in the Snake and Columbia rivers. Canadian Journal of Fisheries and Aquatic Sciences 55(6):1484-1493.

Smith, A, K. Smokorowski, J. Marty, and M. Power. 2016. Stable isotope characterization of Rainy River, Ontario, lake sturgeon diet and trophic position. *Journal of Great Lakes Research* 42:2, pages 440-447. DOI:10.1016/j.jglr.2015.12.016

Smyth, B., & S. Nebel. 2013. Passive integrated transponder (PIT) tags in the study of animal movement. Nature Education Knowledge 4(3):3.

Steffensen, K.D., B.L. Eder & M.A. Pegg. 2013. Trotline efficiencies and catch rates in a large river. Fisheries Management and Ecology. 20, 526-532

Stein, A.B., K.D. Friedland, & M. Sutherland. 2004. Atlantic sturgeon marine distribution and habitat use along the northeastern coast of the United States. Transactions of the American Fisheries Society 133:527-537.

Stevenson, J.T. 1997. Life History Characteristics of Atlantic Sturgeon (*Acipenser oxyrinchus*) in the Hudson River and a Model for Fishery Management. M.S. thesis, Marine Environmental and Estuarine Studies Program, University of MD, College Park, MD. 222 pp.

Stevenson, J.T. & D.H. Secor. 1999. Age determination and growth of Hudson River Atlantic sturgeon, Acipenser oxyrinchus. Fishery Bulletin 97:153-166.

Stoskopf, M.K., 1993. Clinical Pathology. In: Fish Medicine, Stoskopf, M.K. (Ed.). PA: W.B. Saunders, Philadelphia, London and Toronto PA, USA., pp: 113-131.

Summerfelt, R.C., & L.S. Smith. 1990. Anesthesia, surgery, and related techniques. Pages 213 - 272 *in* C.B. Schreck, & P.B. Moyle, editors. Methods for fish biology. American Fisheries Society, Bethesda, Maryland.

Tyus, H.M., W. C. Starnes, C.A. Karp and J. F. Saunders. 1999. Effects of Invasive Tissue Collection on Rainbow Trout, Razorback Sucker, and Bonytail Chub, North American Journal of Fisheries Management, 19:3, 848-855, DOI: 10.1577/1548-8675(1999)019<0848:EOITCO>2.0.CO;2

Welch, D., S. Batten, and B. Ward. 2007. Growth, survival, and tag retention of steelhead trout (*O. mykiss*) surgically implanted with dummy acoustic tags. Hydrobiologia 582(1):289-299.

Welker, T.L., & M.R. Drobish. (editors), 2010. Missouri River Standard Operating Procedures for Fish Sampling and Data Collection, Volume 1.5. U.S. Army Corps of Engineers, Omaha District, Yankton, SD.

Wildgoose, W. 2000. Fish surgery: an overview. Fish veterinary journal 5:22-36.

Wildhaber, M.L., D.M. Papoulias, A.J. DeLonay, D.E. Tillitt, J.L. Bryan, & M.L. Annis. 2006. Development of methods to determine the reproductive status of pallid sturgeon in the Missouri River. U.S. Geological Survey final report to U.S. Fish and Wildlife Service. 88 pp.

Wirgin, I, J.R. Waldman, J. Rosko, R. Gross, M.R. Collins, S.G. Rogers, and J. Stabile. 2000. Genetic structure of Atlantic sturgeon populations based on mitochondrial DNA control region sequences. Transactions of the American Fisheries Society 129: 476-486. https://doi.org/10.1577/1548-8659(2000)129%3C0476:GSOASP%3E2.0.CO;2

Wirgin, I., C. Grunwald, E. Carlson, J. Stabile, D.L. Peterson, & J.R. Waldman. 2005. Range-wide population structure of shortnose sturgeon Acipenser brevirostrum based on sequence analysis of the mitochondrial DNA control region. Estuaries 28:406–421. http://dx.doi.org/10.1007/BF02693923

Wirgin, I., C. Grunwald, J. Stabile, & J.R. Waldman. 2010. Delineation of discrete population segments of shortnose sturgeon *Acipenser brevirostrum* based on mitochondrial DNA control region sequence analysis. Conservation genetics 11(3):689-708. http://dx.doi.org/10.1007/s10592-009-9840-1

Vladykov, V.D. & J.R. Greely. 1963. Order Acipenseroidei. In: Fishes of Western North Atlantic. Sears Foundation. Marine Research, Yale Univ. 1 630 pp.

Van Meter, D.E. 1995. Needle Biopsy Procedure for Electrophoresis in Fishes, The Progressive Fish-Culturist, 57:2, 166-167, DOI: 10.1577/1548-8640(1995)057<0166:NBPFEI>2.3.CO;2

United States of America Environmental Protection Agency (US EPA). 2003. Technical Standard Operating Procedure: Non-Lethal Fish Tissue Plug Collection (SOP #EH-07). East Helena Site, Montana. https://www.epa.gov/sites/production/files/documents/r8-src_eh- 07.pdf

Appendix 1. Reponses to public comments received on the draft PEA.

NMFS published the draft PEA for public comment from December 27, 2023, to January 26, 2024. All written comments received during the public comment period were compiled and grouped into four categories. NMFS received eight substantive comments, of which one stated support of the proposed action. The other substantive comments were related to 1) appropriateness of the PEA; 2) translocation and the Atlantic sturgeon population in the Delaware River, Delaware; 3) appropriateness of translocation as a research/enhancement tool; and 4) life stage and residence of sturgeon for translocation (e.g., See Appendix 1 for a summary of comments received). Similar comments from multiple submissions have been treated as one comment for purposes of response. The PEA was not changed as a result of any of the comments received. Substantive comments received are summarized below, followed by NOAA's response.

Appropriateness of a Programmatic Environmental Assessment

Comment 1. The commenter stated that the purpose and need detailed by NMFS is too vague and hypothetical to justify a programmatic approach to the required NEPA analysis for translocation of sturgeon. The commenter also stated 1) programmatic NEPA analyses are not appropriate where a proposed action is merely hypothetical, 2) the limitations proposed by NMFS are not sufficient to further define the circumstances under which translocation will be covered by the Draft PEA, and 3) translocation of sturgeon is subject to many variables, which makes a programmatic NEPA analysis inappropriate.

The federal action undergoing NEPA analysis is the authorization of directed take for translocation of ESA-listed Atlantic and shortnose sturgeon as a research and enhancement activity. The proposed action is needed to achieve NMFS recovery objectives of endangered shortnose sturgeon and threatened and endangered Atlantic sturgeon. NMFS' responsibilities under Section 10(a)(1)(A) of the ESA and its implementing regulations establish and frame the need for NMFS' proposed action. For the purposes of this PEA, an alternative would only meet the purpose and need if it satisfies the requirements under Section 10(a)(1)(A) of the ESA for listed species. Permit issuance criteria require that research activities are consistent with the purposes and policies of these federal laws and would not have a significant adverse impact on the species or stock.

The proposed action is not hypothetical. A permit modification was requested for which the *Federal Register* notice (86 FR 56692; October 12, 2021) included a summary of the permit application, which includes a detailed description of the proposed action (i.e., translocation) and the potential effects of the project on Atlantic and shortnose sturgeon and their habitat.

The permit modification was subsequently issued without the proposed translocation, pending additional NEPA analysis through this PEA. The CEQ NEPA regulations encourage the development and use of programmatic NEPA documents for actions that have relevant similarities, such as common timing, impacts, alternatives, methods of implementation, media, or subject matter (40 CFR 1502.4(b)) and tiering to eliminate discussion of repetitive issues (40 CFR 1501.11). Programmatic NEPA reviews can provide the basis for approving broad or high-level decisions such as identifying geographically bounded areas within which future proposed activities may be taken or identifying broad mitigation and conservation measures that may be

applied in subsequent tiered reviews for project- or site-specific actions. Therefore, NMFS' decision for completing a PEA for the proposed action was appropriate.

NMFS identified three criteria for scenarios whereby translocation may be appropriate. These criteria for translocation include if the research or enhancement activity's objectives are 1) stated as a term and condition to implement reasonable and prudent measure(s) of an active BO, 2) an identified objective in a NMFS recovery outline or recovery plan for the species, or 3) determined necessary by NMFS Regional Offices and NMFS OPR to recover the species. Atlantic and shortnose sturgeon research and enhancement permitting operates under a programmatic framework. Applications are reviewed on a case-by-case basis to determine whether 1) the action is consistent with the goals and requirements of the ESA and would not violate any federal laws or regulations; 2) the methods described therein are consistent with the relevant PBOs (in this case, NMFS 2017a and NMFS 2023); and 3) fall within the scope of this PEA. If it is determined that it does, NMFS would document that in the administrative record. If it is determined that it does not, additional NEPA review would be required and completed.

Comment 2. There is insufficient information in the administrative record to identify a concerted program or plan associated with the translocation of sturgeon. NMFS is aware of one project in South Carolina and is seeking to use information relevant to that system to make an unsupported determination that translocation is appropriate for any sturgeon population on any river for any reason regardless of the specific facts and science.

See above response to Comment 1. Programmatic NEPA reviews address the general environmental issues relating to broad decisions, such as those establishing policies, plans, programs, or suite of projects, and can effectively frame the scope of subsequent site- and project-specific Federal actions."

For all future permits and major permit modifications that fall within the scope of this PEA, the public would have the opportunity to submit comments during a 30-day comment period once the NOR for the action is published in the *Federal Register* (50 CFR 222.303). A notice of receipt of an application for a permit or permit modification would include a summary of the proposed action including the species, number of animals to be taken, and the manner of take, locations, and time period. Substantive comments that NMFS receives during the comment period for modifications to existing permits or new permit applications would be sent to the applicant for response. These comments and responses are recorded as part of the administrative record for the permit. If it is determined at the time of the application that the modification does not fall within the scope of the PEA, as noted in the protocol above, then additional NEPA review would be required and completed prior to making a decision (i.e., issuance or denial) on the application.

NMFS expects minor adverse responses from sturgeon undergoing translocation. Such sturgeon would not be kept in captivity and are not expected to be held for long periods from capture to release so their natural behavior (e.g., foraging, spawning, migrating) would not be substantially altered (Kahn and Mohead, 2010; Kahn et al. 2014). NMFS also does not expect translocation of sturgeon to affect the genetic structure of one or more populations of sturgeon. The use of translocation is expected to be limited to uncommon situations where the effects to the population as a result of remaining in place would be less favorable than translocating them.

Comment 3. It [translocation program] also risks violating the National Environmental Policy Act (NEPA) because it would fail to meet the "hard look" and alternatives-analysis requirements of said Act.

See above responses to Comments 1 and 2. Additionally, an alternative would only meet the purpose of authorizing directed take needed to achieve NMFS endangered shortnose sturgeon, and threatened and endangered Atlantic sturgeon recovery objectives, if it satisfies the requirements under Section 10(a)(1)(A) of the ESA for listed species. Consequently, NMFS used the following screening criteria when considering alternatives to the proposed action. The action is consistent with the goals and requirements of the ESA including, it: will be conducted for *bona fide* and necessary purposes; will contribute to the recovery of the species; will not operate to the disadvantage of the species; and the action must not violate any federal laws or regulations. The commenter did not suggest other potential alternatives. The commenter did not provide support for the assertion that NMFS failed to meet the "hard look" requirements of NEPA.

Translocation and the Atlantic sturgeon population in the Delaware River, Delaware

Comment 4. If a translocation project involving the Delaware River systems were undertaken it is foreseeable that the end result would be the extinction of the "genetically unique line" of Atlantic sturgeon that only reside in the Delaware River. Given that the sturgeon of the Delaware River are not impeded by dams or other structures, if translocation were carried out within the Delaware River system, it would either involve removing Delaware River Atlantic sturgeon for translocation to another river system; or moving genetically differentiated Atlantic sturgeon from another river system and translocating them to the Delaware where they could interbreed and "genetically dilute our unique population."

See response to Comment 2 with regard to expecting minor adverse responses from sturgeon undergoing translocation. NMFS used the best available science when developing this PEA. According to White et al. (2021) which established a microsatellite baseline for North American Atlantic sturgeon, "the only exception was the Delaware River, which was not as clearly distinguished from the Hudson River." The Delaware River and Hudson River Atlantic sturgeon populations are part of the New York Bight distinct population segment (DPS). A recent 90-day finding on a petition to list Delaware Atlantic sturgeon as an endangered DPS determined the petition did not present substantial scientific or commercial information indicating the petitioned actions may be warranted (89 FR 47089); therefore the Delaware River Atlantic sturgeon population will remain as part of the New York Bight DPS. NMFS does not expect translocation of sturgeon to affect the genetic structure of one or more populations of sturgeon. Shortnose sturgeon are listed range-wide and genetic analyses suggest individual shortnose sturgeon move between some populations each generation (Quattro et al. 2002; Wirgin et al. 2005; Wirgin et al. 2010). Atlantic sturgeon are listed as five DPSs: Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic. Although some river systems where translocation may occur may have genetic differences (Wirgin et al. 2000; Grunwald et al. 2008), Atlantic sturgeon would not be intentionally moved outside of the range of their DPS for research and enhancement purposes and in most cases, translocation would typically occur between systems where, for example, manmade structures have disrupted the migrations between systems or within a system. Atlantic sturgeon from other DPSs that are inadvertently captured and

translocated during permitted projects would be able to leave the system of their own accord after release.

Appropriateness of Translocation as a Research/Enhancement Tool

Comment 5. "The U.S. Department of Agriculture's Wildlife Services program (WS Directive 2.501) and other wildlife professionals state that translocation of wild mammals is not a biologically sound practice. Several national and international veterinary associations including the American Veterinary Medical Association, The National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists, oppose the translocation of wildlife because of disease risks."

The document cited by the commenter, WS Directive 2.501, states translocation is not biologically sound for *wild mammals* (it does not specifically mention fish species) due to stress, difficulty in animals adapting to and remaining at new locations, and the potential for disease transmission among wild mammals (especially raccoons, skunks, foxes and cervids). The Directive also states "Translocation of wildlife from one geographic area to another may be conducted by WS personnel as a *wildlife damage management activity*." The purpose of translocating sturgeon is summarized in the response to Comment 1, and it is not for wildlife damage management.

Although translocated sturgeon may require a period of adjustment after handling and release (e.g., days or weeks) (Kahn and Mohead, 2010), NMFS believes sturgeon would resume their natural behavior within a timeframe in which the fitness or reproductive success of the sturgeon would not be compromised. In addition, translocated sturgeon would only be held and transported for a short period of time prior to release. Only healthy individuals (e.g., good body condition) would be chosen to be translocated, therefore the chances of transmitting disease to another location is considered minimal. Individuals would not be held in a hatchery or other captive facility, therefore eliminating exposure to other sturgeon that were reared or held in a captive environment. There are no known diseases threatening Atlantic and shortnose sturgeon in their geographic range at this time that could potentially affect these species.

NMFS used the best available science when developing this PEA and determining the appropriateness of translocation for fish species. The proposed action is consistent with the Final Recovery Plan for shortnose sturgeon and is also in accordance with the Atlantic sturgeon recovery outline. Not issuing the permits or permit modifications to allow translocation would prevent the applicants from achieving their research and enhancement objectives that would aid conservation and recovery of the species. Atlantic and shortnose sturgeon populations that would benefit from translocation activities may be more at risk for reduced survival and fitness if translocation is not authorized.

Life stage and Residence of Sturgeon for Translocation

Comment 6. The commenter recommends measures to ensure that sturgeon collected for translocation are adult sturgeon located in their natal river. The focus of translocation should be on adult sturgeon; an appropriate minimum size for each species would allow for translocation of adults while leaving sub-adult fish, which may be from another river system, in the waterbody where they are found.

See response to Comment 2. The age class of sturgeon that may be translocated would be determined separately on a case-by-case basis for each permit application submitted. The request received from South Carolina Department of Natural Resources stated the initial stage would focus on translocation of adult shortnose sturgeon. For future major permit modifications and requests for new permits that fall within the scope of this PEA, the public will have the opportunity to submit comments during a 30-day comment period once the NOR for the action is published in the *Federal Register* (50 CFR 222.303). An NOR of an application for a permit or permit modification would include a summary of the proposed action including the species, number of animals to be taken, and the manner of take, locations, and time period.

Comment 7. Translocation could be limited to upriver habitat areas that are presumed to be used only by fish whose natal origin is in that river; this guidance would reduce or eliminate translocation of fish that may move to another waterbody to spawn.

See response to Comment 7. The request received from South Carolina Department of Natural Resources stated the initial stage would focus on translocation of adult shortnose sturgeon. Monitoring of the translocated animals would be conducted to determine the success of the project. Monitoring results would be reported annually as a requirement of any ESA Section 10(a)(1)(A) permit. This may include, for example, evidence of spawning and recruitment of Atlantic and shortnose sturgeon within the systems they were translocated to. NMFS would monitor the effectiveness of the adaptive management plan in enhancing the spawning and recruitment of Atlantic and shortnose sturgeon within those systems where translocated individuals occur.

FINDING OF NO SIGNIFICANT IMPACT OF AUTHORIZATION OF DIRECTED TAKE FOR THE TRANSLOCATION OF ATLANTIC (ACIPENSER OXYRINCHUS) AND SHORTNOSE (A. BREVIROSTRUM) STURGEON AS A PERMITTED RESEARCH OR ENHANCEMENT ACTIVITY IN ENDANGERED SPECIES ACT SECTION 10(a)(1)(A) PERMITS

I. Purpose of Finding of No Significant Impact (FONSI): The National Environmental Policy Act (NEPA) requires the preparation of an Environmental Impact Statement (EIS) for any proposal for a major federal action significantly affecting the quality of the human environment. 42 U.S. Code (U.S.C.) § 4332(C). The Council on Environmental Quality (CEQ) Regulations direct agencies to prepare a Finding of No Significant Impact (FONSI) when an action not otherwise excluded will not have a significant impact on the human environment. 40 Code of Federal Regulations (CFR) §§ 1500.4(b), 1500.5(b), & 1501.6. To evaluate whether a significant impact on the human environment is likely, the CEQ regulations direct agencies to analyze the potentially affected environment and the degree of the effects of the proposed action. 40 CFR § 1501.3(b). In doing so, agencies should consider the geographic extent of the affected area (i.e., national, regional or local), the resources located in the affected area (40 CFR § 1501.3(b)(1)), and whether the project is considered minor or small-scale (National Oceanic and Atmospheric Administration (NOAA) Administrative Order (NAO) 216-6A Companion Manual (CM)[1], Appendix A-2). In considering the degree of effect on these resources, agencies should examine, as appropriate, short- and long-term effects, beneficial and adverse effects, and effects on public health and safety, as well as effects that would violate laws for the protection of the environment (40 CFR § 1501.3(b)(2)(i)-(iv); NAO 216-6A CM Appendix A-2 - A-3), and the magnitude of the effect (e.g., negligible, minor, moderate, major). CEQ identifies specific criteria for consideration. 40 CFR § 1501.3(b)(2)(i)-(iv). Each criterion is discussed below with respect to the proposed action and considered individually as well as in combination with the others.

In preparing this FONSI, NMFS reviewed the **Authorizing Directed Take for the Translocation of Shortnose and Atlantic Sturgeon as a Permitted Research or Enhancement Activity in Endangered Species Act Section 10(a)(1)(A) Permits Programmatic Environmental Assessment (PEA)** which evaluates the affected area, the scale and geographic extent of the proposed action, and the degree of effects on those resources (including the duration of impact, and whether the impacts were adverse and/or beneficial and their magnitude). The PEA is hereby incorporated by reference. 40 CFR § 1501.6(b).

II. Approach to Analysis: NMFS proposes to authorize directed take for the translocation of Endangered Species Act (ESA)-listed Atlantic and shortnose sturgeon as a research or enhancement activity in Section 10(a)(1)(A) permits. NMFS proposes to authorize directed take for translocation, concurrent with additional research or enhancement activities, if the research or enhancement activity's objectives are 1) stated as a term and condition to implement reasonable and prudent measures of an active Biological Opinion (BO), 2) an identified objective in a NMFS recovery

[1] NOAA Administrative Order (NAO) 216-6A, "Compliance with the National Environmental Policy Act, Executive Orders 12114, Environmental Effects Abroad of Major Federal Actions; 11988 and 13690, Floodplain Management and 11990, Protection of Wetlands," issued 22 April 2016, and the Companion Manual for NAO 216-6A, "Policy and Procedures for Implementing the National Environmental Policy Act and Related Authorities," issued 13 January 2017.

outline or recovery plan for the species, or 3) determined necessary by NMFS Regional Offices and NMFS Office of Protected Resources (OPR) to recover the species.

Translocation is the intentional capture, holding, handling, transport, and release of individuals within a river system (e.g., translocation of fish across a dam or fish passage) or between river systems within the U.S. historical range of Atlantic and shortnose sturgeon (i.e., Maine to Florida). Translocation may be necessary when sturgeon have been prevented access to previously attainable spawning, foraging, fish passage, or marine areas by natural or anthropogenic obstructions, or when a population in a river system has been extirpated. All translocated sturgeon would also be measured, PIT tagged, and fin clip sampled (for genetics) prior to release. Any additional activities conducted on translocated sturgeon would depend on the environment, target life stages, and individual research and enhancement objectives and could involve any of the activities described in Section 2.1.2 of the PEA. The proposed translocation excludes releasing captive Atlantic or shortnose sturgeon (individuals captured from the wild and currently held in captivity or captive-born) into the wild.

The proposed action was triggered by a modification request submitted to NMFS OPR, Permits and Conservation Division by the South Carolina Department of Natural Resources in response to the proposed re-licensing by the Federal Energy Regulatory Commission (FERC) of the South Carolina Public Service Authority Hydroelectric Project (Second Modified Prescription for Fishways for the Santee Cooper Hydroelectric Project; NMFS 2020b). The request to re-license required consultation under Section 7 of the ESA, which resulted in a BO (SERO-2018-00325; NMFS 2020a). Translocation of Atlantic and shortnose sturgeon is a term and condition of the FERC BO, but an ESA Section 10(a)(1)(A) permit is needed for translocation to occur.

These documents state the proposed action of translocation (i.e., capture, transport, and release of sturgeon in a new location within its original range) of shortnose sturgeon is needed for enhancing the shortnose sturgeon populations. For example, the primary goal of translocating endangered sturgeon in the Santee-Cooper project in South Carolina is to provide previously unattained spawning habitat to sturgeon on the Santee River by moving the sturgeon blocked from spawning below the Pinopolis Dam on the Cooper River (an unsuccessful spawning location), to traditional spawning and recruitment areas below the St. Stephens Dam on the Santee River. Translocation is included as a Term and Condition to implement Reasonable and Prudent Measures within the ESA Section 7 Biological Opinion (NMFS 2020a). This action is also in accordance with the Final Recovery Plan for shortnose sturgeon (NMFS 1998) identifying the recovery objective: "To recover populations to levels of abundance at which they no longer require protection under the [ESA]. For each population segment, the minimum population size will be large enough to maintain genetic diversity and avoid extinction, aiding the recovery of the species." This action is also in accordance with the Atlantic sturgeon recovery outline objectives focusing on fish passage and improving access to known historical habitats.

NMFS determined that an environmental assessment is the appropriate level of NEPA review for considering the allowance of directed take for translocation in scientific research or enhancement permits under Section 10(a)(1)(A) of the ESA, since translocation had not been previously authorized or analyzed and significant environmental impacts were not anticipated (40 CFR 1501.3(a)(2)). Additionally, the CEQ NEPA regulations encourage the development and use of programmatic NEPA documents and tiering to eliminate discussion of repetitive issues (40 CFR 1501.11). NMFS further determined that future translocation activities and subsequent scientific

research and enhancement modification requests are "similar" but not "connected actions" (40 CFR 1508.25(a)(3)) due to general commonalities in geography, timing, and type of targeted scientific research and enhancement which provides a reasonable basis for evaluating them together in a single environmental analysis. The proposed action is not connected to other actions that have caused or may cause effects to the resources in the affected areas, and there is then no potential for the effects of the proposed action to add to the effects of other projects, such that the effects taken together could be significant.

Atlantic sturgeon and shortnose sturgeon research and enhancement activities are expected to result in limited impacts to the target species only. Previous EAs have concluded that Atlantic sturgeon and shortnose sturgeon research and enhancement activities have limited impacts on non-target species, and negligible impacts on riverine, estuarine, or marine habitats; therefore these were not analyzed further in the PEA. Translocation is expected to result in minor, short-term, direct adverse impacts with long-term, indirect beneficial impacts due to the potential conservation and recovery of the species. Under most circumstances, impacts from other potential procedures are anticipated to result in negligible to minor, short-term, direct adverse impacts. The proposed action will not meaningfully contribute to adverse impacts to specific resources. Atlantic and shortnose sturgeon research and enhancement permits authorize annual take limits for each species. Permits must meet the issuance criteria and provide the information found at 50 CFR §222.308(c) and would be issued on a case-by-case basis, and Atlantic and shortnose sturgeon research is small in terms of environmental impacts.

III. Geographic Extent and Scale of the Proposed Action: Under the proposed action, translocations could occur within or between any river systems from Maine to Florida that are within the U.S. historical range of Atlantic and shortnose sturgeon. The proposed translocations exclude releasing captive Atlantic or shortnose sturgeon (individuals captured from the wild and currently held in captivity or captive-born) into the wild.

The number of takes currently proposed for translocation, 20 annually, is not expected to result in a significant adverse impact on the target species. NMFS cannot predict with certainty the level of take of each species for translocation that may be requested in the future but, conservatively, expects the amount of future research and enhancement activities to be similar to or slightly greater than current levels as interest in conservation, biology, and management of these species grows or new sources of funding become available. For translocation specifically, NMFS expects the number of Atlantic or shortnose sturgeon to be transported annually to a new location to be relatively small compared to the overall number of takes authorized in permits (<3% or approximately 260 individuals). At this time, only one project fits the criteria to translocate shortnose sturgeon and that project describes future actions to translocate Atlantic sturgeon (NMFS 2020a; NMFS 2020b). NMFS does not believe translocation will occur frequently as a means to assist in the recovery of populations.

IV. Degree of Effect:

A. The potential for the proposed action to threaten a violation of federal, state, or local law or requirements imposed for environmental protection.

This proposed action will not threaten a violation of any federal, state, or local law, or requirement imposed for the protection of the environment. The proposed action is designed to be consistent

with all applicable federal laws including the ESA, Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Convention on International Trade in Endangered Species of Wild Fauna (CITES), National Marine Sanctuaries Act (NMS), Migratory Bird Treaty Act (MBTA), and Marine Mammal Protection Act (MMPA). See PEA Section 1.5: Compliance with Other Environmental Laws or Consultations. Anticipated impacts are limited to the target listed species and are not expected to result in a significant adverse impact. In addition, future proposed takes for translocation by Permit Holders as described in the PEA are not expected to result in a significant adverse impact on the target species or their populations. Translocation is expected to result in indirect long-term beneficial effects to the population (e.g., improved survival and recruitment), despite minor, direct short-term adverse effects due to an initial stress response to individual sturgeon. Previous EAs have concluded that Atlantic sturgeon and shortnose sturgeon research and enhancement activities have limited impacts on non-target species, and negligible impacts on riverine, estuarine, or marine habitats; therefore these were not analyzed further in the PEA.

B. The degree to which the proposed action is expected to affect public health or safety.

The proposed action will not have significant impacts on public health or safety because the action is the translocation of Atlantic or shortnose sturgeon and does not involve the public or expose the public directly (e.g., chemicals, zoonotic diseases) or indirectly (e.g., food sources). Research may occur concurrently with translocation and researchers must follow established protocols for biological sampling, including the collection, transport, and receipt of samples. Biological samples shipped via FedEx, United Parcel Service, U.S. Postal Service, etc., must follow regulations and guidelines established by those carriers. All research and enhancement activities target Atlantic and shortnose sturgeon, the species identified in this action. Impacts are limited to the target species.

C. The degree to which the proposed actions is expected to affect a sensitive biological resource, including:
   a. Federal threatened or endangered species and critical habitat;
   b. stocks of marine mammals as defined in the Marine Mammal Protection Act;
   c. essential fish habitat identified under the Magnuson–Stevens Fishery Conservation and Management Act;
   d. bird species protected under the Migratory Bird Treaty Act;
   e. national marine sanctuaries or monuments;
   f. vulnerable marine or coastal ecosystems, including, but not limited to, shallow or deep coral ecosystems;
   g. biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.)

NMFS must comply with all applicable federal environmental laws and regulations necessary to implement a proposed action. For each permit issuance or modification, NMFS ensures compliance with all relevant laws during the NEPA review once the request is received. NMFS' evaluation of, and compliance with, environmental laws and regulations is based on the nature and location of the applicant's proposed activities and NMFS' proposed action. Section 1.5 in the PEA summarizes common environmental laws and associated consultations considered for NMFS' issuance of, and modifications to, Section 10(a)(1)(A) permits, including the ESA, MSFCMA, CITES, NMS, and MBTA.

Impacts are limited to the target species. The 2017 and 2023 programmatic biological opinions (NMFS 2017; NMFS 2023) concluded that ESA-listed marine mammals that may occur in the action area were not likely to be adversely affected by the sturgeon research and enhancement activities. The 2017 biological assessment prepared for the Atlantic and shortnose sturgeon permitting program stated potential threats to non-listed marine mammals in the action area are discountable given the mitigation measures in place for permitted activities.

D. *The degree to which the proposed action is reasonably expected to affect a cultural resource: properties listed or eligible for listing on the National Register of Historic Places; archeological resources (including underwater resources); and resources important to traditional cultural and religious tribal practice.*

The action would not take place in any district, site, highway, structure, or object listed in or eligible for listing in the National Register of Historic Places; thus, none would be impacted. The proposed action would also not occur in an area of significant scientific, cultural or historical resources and would not cause their loss or destruction. Impacts are limited to the target species.

E. *The degree to which the proposed action has the potential to have a disproportionately high and adverse effect on the health or the environment of minority or low-income communities, compared to the impacts on other communities (EO 12898).*

The proposed action is not expected to disproportionately affect minority or low-income communities. The proposed action would only affect Atlantic and shortnose sturgeon. It does not involve fisheries or other human activities, nor is it expected to have an effect on other human activities. Conduct of the permitted research will result in insignificant effects on the natural and physical environment, but there are no significant social or economic impacts interrelated with these effects. The research does not involve and is not associated with factors typically related to effects on the social and economic environment such as inequitable distributions of environmental burdens or differential access to natural or depletable resources in the action area. Impacts are limited to the target species.

F. *The degree to which the proposed action is likely to result in effects that contribute to the introduction, continued existence, or spread of noxious weeds or nonnative invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of the species.*

The proposed action is not reasonably expected to result in the spread, continued existence, or introduction of noxious weeds or non-indigenous species. The research involves capturing animals in the wild and/or transporting animals among locations, and nonnative species would not be transported. The research does involve movement of vessels, or researchers and their equipment, among water bodies, however, all equipment is cleaned or disinfected prior to use in another system. Vessels used in research do not contain ballast water. There are no routes by which non-indigenous organisms can be transmitted or introduced by the research. Impacts are limited to the target species.

G. *The potential for the proposed action to cause an effect to any other physical or biological resources where the impact is considered substantial in magnitude (e.g., irreversible loss of*

coastal resource such as marshland or seagrass) or over which there is substantial uncertainty or scientific disagreement.

The proposed action is not expected to have a substantial effect to any biological or physical resource, nor is there substantial uncertainty or scientific disagreement on the impacts of the proposed action. The draft PEA was made available for public review and comment. Public comments were received and addressed in the final PEA. The effects of the proposed action to translocate Atlantic and shortnose sturgeon are not highly uncertain and the activities do not involve unique or unknown risks. The proposed activities do not involve techniques for which the risks to and effects on the biological and physical environment cannot reasonably be predicted based on published literature on the effects of human activities on sturgeon and other wildlife. Further, the permit will contain requirements designed to mitigate impacts to Atlantic and shortnose sturgeon and closely monitor the efficacy and observed effects of the proposed research and enhancement. Impacts to the target species are anticipated to be negligible to minor, short-term, direct and adverse, with long-term, indirect beneficial impacts due to the potential conservation and recovery of the species.

V. Other Actions Including Connected Actions:

The PEA considered the combined incremental programmatic effects of Alternatives 1 and 2 with the effects of other past, present, and reasonably foreseeable actions on the target species. Atlantic and shortnose sturgeon have been the subject of field studies for many years. Since their listings, NMFS has issued numerous research and enhancement permits for the take of Atlantic and shortnose sturgeon for a variety of activities, including capture, tagging, biological sampling, measuring, and weighing in the action area. The objective of translocation is to increase the survival and recruitment of Atlantic and shortnose sturgeon, ultimately aiding in their recovery, by releasing them in more suitable habitat for spawning and foraging. Given the anticipated number of permits, associated takes and personnel presently associated with permitted research and enhancement, repeated disturbance of individual Atlantic and shortnose sturgeon may occur in some instances, but most work would occur in geographically distinct areas. In addition, the translocation of Atlantic and shortnose sturgeon would be highly coordinated and only one Permit Holder would be authorized to perform the associated research and enhancement activities associated with the translocation of the species within a specified area (e.g., river system, distinct population segment [DPS]) at any given time. Currently, only one Permit Holder, in response to the NMFS biological opinion (NMFS 2020a) and Second Modified Prescription for Fishways for the Santee Cooper Hydroelectric Project (NMFS 2020b), is requesting translocation with the initial target species being shortnose sturgeon. The number of takes currently proposed for translocation (n = 20 annually) is not expected to result in a significant adverse impact on the target species. In addition, future proposed takes for translocation by Permit Holders is not expected to result in a significant adverse impact on the target species or their populations. For translocation specifically, NMFS expects the number of Atlantic or shortnose sturgeon to be transported annually to a new location to be relatively small compared to the overall number of takes authorized in permits (e.g., <3 percent takes across all permits). NMFS has taken steps to limit the impact of translocation through its adaptive management plan. NMFS would continue to monitor the effectiveness of the adaptive management plan in enhancing the spawning and recruitment of Atlantic and shortnose sturgeon within those systems where translocated individuals occur.

VI. Mitigation and Monitoring:

Mitigation and monitoring measures that would be required for the proposed action are outlined in Chapter 2 of the PEA. New permits and any permits modified to authorize translocation would continue to include the standard mitigation conditions that all sturgeon permits do, including required monitoring of acoustically tagged sturgeon. In addition, on a case-by-case basis, additional mitigation or reporting may be required in permits. Permit Holders must submit an annual report at the end of each permit year describing the activities conducted under the permit. These reports allow NMFS to assess beneficial and adverse impacts of authorized take associated with the research and enhancement activities and to develop or further refine best management practices. Therefore, NMFS can modify this permit if there is reason to believe the authorized activities are having or have the potential to have an adverse effect on the species or DPS. For the purposes of translocation, actions would cease if survival of translocated sturgeon and recruitment does not occur (i.e., there are no young fish entering the population). This may be determined by monitoring tagged sturgeon post-release or other permit conditions deemed necessary by the permit or action. Through this adaptive management, NMFS would ensure sturgeon research and enhancement is necessary for the conservation and recovery of ESA-listed species while mitigating and minimizing any adverse effects on individual fish and sturgeon populations.

DETERMINATION

The CEQ NEPA regulations, 40 CFR § 1501.6, direct an agency to prepare a FONSI when the agency, based on the PEA for the proposed action, determines not to prepare an EIS because the action will not have significant effects. In view of the information presented in this document and the analysis contained in the supporting PEA prepared for authorizing directed take for the translocation of shortnose and Atlantic sturgeon as a permitted research or enhancement activity in ESA Section 10(a)(1)(A) Permits, the 2017 and 2023 programmatic BOs (NMFS 2017; NMFS 2023), it is hereby determined that the directed take for the translocation of shortnose and Atlantic sturgeon as a permitted research or enhancement activity will not significantly impact the quality of the human environment. The **Authorizing Directed Take for the Translocation of Shortnose and Atlantic Sturgeon as a Permitted Research or Enhancement Activity in Endangered Species Act Section 10(a)(1)(A) Permits PEA** is hereby incorporated by reference. In addition, all beneficial and adverse impacts of the proposed action as well as mitigation measures have been evaluated to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not necessary.

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9/25/2024

Kimberly Damon-Randall
Office Director
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Date