



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

FEB - 9 2018

Benjamin Beasley, Chief
Environmental Review and NEPA Branch
Division of Materials and License Renewal
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington DC 20555-0001

Dear Mr. Beasley,

Pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, we issued a Biological Opinion to you on January 30, 2013, that considered the effects of the continued operations of Indian Point Units 2 and 3 (IP2 and IP3) pursuant to their existing licenses and the licenses that you proposed to issue which were anticipated to authorize commercial electricity-generating operations until September 28, 2033, and December 12, 2035, respectively. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (a) the amount or extent of taking specified in the incidental take statement is exceeded; (b) new information reveals effects of the action that may not have been previously considered; (c) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) a new species is listed or critical habitat designated that may be affected by the identified action. As explained below, one or more of those criteria have been met; therefore, we are reinitiating consultation. However, we are not producing a new biological opinion given anticipated effects fall within the scope of those analyzed in the existing 2013 Opinion. Together, this letter and the enclosed revised Incidental Take Statement (ITS) serve as an amendment to the January 30, 2013, Opinion and its ITS. The analysis contained in this letter is based on our 2013 Opinion and the literature cited therein, your November 27, 2017, letter to us regarding the reinitiation of consultation, an October 27, 2017, letter from Goodwin Procter, LLP, on behalf of Entergy, and other correspondence received by us from NRC and Entergy since the 2013 Opinion was issued including numerous draft monitoring plans. The draft revised Incidental Take Statement, including the Reasonable and Prudent Measures and Terms and Conditions were provided to you and Entergy on January 19, 2017; we received comments and suggested edits that were incorporated as appropriate.

Changes to the Action Considered in the 2013 Opinion

There are two events that have modified the action considered in the 2013 Opinion. On January 9, 2017, Entergy entered into an agreement with the State of New York to permanently cease commercial operations at IP2 and IP3 prior to the dates specified in the previously requested 20-



year license. On February 8, 2017, Entergy submitted to NRC amendments to the pending license renewal application. These amendments modified the proposed terms of the renewed licenses for commercial operations from 20 years for each unit to periods ending April 30, 2024 (IP2), and April 30, 2025 (IP3). The closure agreement specifies that IP2 and IP3 will cease commercial electric generating operations by April 30, 2020 and 2021, respectively. However, the closure agreement allows that in certain extraordinary circumstances, New York State and Entergy may mutually agree to extend the operation of IP2 and IP3 to no later than April 30, 2024 (IP2), and April 30, 2025 (IP3).

In their November 27, 2017, letter, NRC determined that because the effects of commercial operation over a shortened license period would be less than those considered in our 2013 Opinion, reinitiation is not required to reassess those lesser effects. We agree that while the proposed action has changed, it has not changed in such a way as to cause an effect to listed species that was not considered in the 2013 Opinion and, as noted above, have determined that issuance of a new Opinion is not necessary. During the shortened period that IP2 and IP3 continue to generate electricity, the effects to listed species of operations of IP2 and IP3 will be the same type (collection/capture, death, injury due to impingement) and the same intensity (numbers) on an annual basis as those analyzed in our 2013 Opinion. However, the duration of those effects will be reduced by 9-13 years for IP2 and 10-14 years for IP3. As explained below, after electric-generating activities stop, limited amounts of cooling and service water will still be withdrawn from the Hudson River for up to 5 years. During this period, effects to listed species will occur; however, they are expected to be the same type, but less intense on an annual basis, than those analyzed for the same years in the 2013 Opinion. Taken together, effects during electric-generating activities and during the 5 years (maximum) following permanent cessation of commercial operations, are anticipated to be the same type, the same or lower intensity, and of a shorter overall duration than the effects of the action analyzed in the 2013 Opinion.

As explained in the 2013 Opinion, we expect an average of 19 juvenile or adult shortnose sturgeon and 13 juvenile New York Bight DPS Atlantic sturgeon to be impinged at IP2 each year during the period of electric generating operations. Under the proposed relicensing scenario, IP2 may operate for as many as six full years (2018-2023) and the first four months of 2024. For the purposes of calculating the amount of impingement, we have assumed the worst case, that all impingement occurring in 2024 would occur in the four months IP2 remains operational. Therefore, to calculate the total amount of impingement anticipated at IP2 during electric generating operations, we have multiplied the annual average impingement by seven (the maximum number of years IP2 will continue to operate commercially, beginning in 2018). This results in a total of 133 shortnose sturgeon and 91 Atlantic sturgeon through April 2024, if electric-generating operations continue until then.

As explained in the 2013 Opinion, we expect an average of 7 juvenile or adult shortnose sturgeon and 6 juvenile New York Bight DPS Atlantic sturgeon to be impinged at IP3 each year during the period of electric generating operations. Under the proposed relicensing scenario, IP3 may operate for as many as seven full years (2018-2024) and the first four months of 2025. For the purposes of calculating the amount of impingement, we have assumed the worst case, that all impingement occurring in 2025 would occur in the four months IP3 remains operational. Therefore, to calculate the total amount of impingement anticipated at IP3 during electric

generating operations, we have multiplied the annual average impingement by seven (the maximum number of years IP3 will continue to operate commercially, beginning in 2018). This results in a total of 56 shortnose sturgeon and 48 Atlantic sturgeon through April 2025, if electric generating operations continue until then.

As explained in the 2013 Opinion, additional service water for IP2 is withdrawn through the IP1 intakes. This intake is located between the IP2 and IP3 intakes, also along the eastern shore of the Hudson River. In the 2013 Opinion, we determined that the continued withdrawal of water through the IP1 intake was likely to result in the impingement (and mortality) of two shortnose and two Atlantic sturgeon in the 23 years of commercial electric generating operations considered (rate of 0.17 sturgeon per year). Considering the maximum of seven years that IP2 may now operate, we expect that one sturgeon will be impinged at the IP1 intakes (either a shortnose or Atlantic sturgeon) through April 2024, if commercial electric generating operations continue until then. It is our understanding that use of the IP1 intakes for additional IP2 service water will cease when electric-generating activities cease.

The amount of take identified above will occur while IP2 and IP3 continue electric-generating operations, while both the cooling water and service water pumps are operated. According to information provided by Entergy, once electric-generation ceases, only service water pumps will be used, except when a single IP2 or IP3 cooling water pump is needed to supplement service water for nuclear operational or safety purposes. Entergy's expectation at this time is that a single Unit 2 or 3 CW pump with a design maximum of 140,000 gpm (and an operational capacity of 84,000 gpm) will continue to be available for use and may be employed for up to 30 days per year once electric-generation ceases. We have considered whether it is reasonable to expect that impingement of shortnose or Atlantic sturgeon will occur when a single cooling water pump is operational. Assuming that the number of sturgeon impinged is proportional to the amount of water withdrawn, we have calculated that in a year when only a single cooling water pump is operated for no more than 30 days, 0.05-0.10 Atlantic sturgeon and 0.06-0.15 shortnose sturgeon will be impinged¹. At this time, based on information provided by Entergy, we expect these cooling water pumps may be used on this intermittent basis for three to five years following the cessation of electric-generating activities (this is the same time period estimated for the continued use of service water pumps). Thus, we anticipate that the continued use of cooling water, for up to 30 days per year, for a period not to exceed five years following the end of electric-generating activities will result in the take of no more than one Atlantic sturgeon and no more than one shortnose sturgeon total.²

The IP2 and IP3 service water pumps each have a maximum design of 30,000 gallons-per-minute (gpm) (approximately 3% of the total water intake for each of IP2 and 4% for IP3). Information provided by Entergy indicates that after the cessation of electric-generating

¹ Calculated by multiplying the "sturgeon impinged/gallon" rate for IP2 and IP3 using the annual estimate of sturgeon impingement and the operational maximum gallons per minute per unit (870,000 for IP2 and 876,000 for IP3) and multiplying that rate by the number of gallons withdrawn by a single pump over 30 days to determine the number of sturgeon anticipated to be impinged over a 30 day period with a single cooling water pump operating. The range is due to the higher impingement rate for IP2 compared to IP3 and not knowing which pump(s) will operate over any given 30 day period.

² Calculated by multiplying the expected annual rate of impingement times five (the maximum number of years), and rounding up to the nearest whole number.

operations, only one or two service water pumps will be used per unit (i.e., 5,000-12,000 gpm). At design maximum flows, through-screen velocities are 0.35 fps for IP2 (i.e., 30,000 gpm and MLW) and 0.42 fps for IP3 (i.e., 36,000 gpm and MLW). Through-screen velocities would be linearly scaled at the lower flow rates expected post-cessation of electric generating activities; given that the amount of water being withdrawn will be only 14-33% of the design maximum flows, we expect through-screen velocities to be similarly reduced to approximately 0.05-0.12 fps at IP2 and 0.06 – 0.14 fps at IP3. When only the service water pumps are operating, through screen velocities will always be 0.42 fps or less. Given these conditions, we expect that all unimpaired sturgeon that swim through the trash bars and are present in the forebay would be able to avoid impingement on the traveling screens when only the service water pumps are operating (see section 7.1.2 of the 2013 Opinion for a summary of available information on sturgeon and impingement risk). However, as also outlined in the Opinion (see section 7.1.2), sturgeon that are impaired are more vulnerable to impingement as their swimming ability, and therefore their ability to escape, is likely to be compromised. Also, both healthy and impaired individuals may encounter the collection troughs and be captured via the traveling screens without truly being “stuck” on the screens. Given this, we expect that even with just service water being withdrawn, sturgeon will continue to be impinged (which we consider to include collection/capture by the rotating troughs). However, given that the amount of water withdrawn will be 3 and 4 % for IP2 and IP3, respectively, we assume that the risk of impingement is similarly reduced. Therefore, we expect that once electric-generation operations cease, in the up to 5 years when service water continues to be withdrawn, up to 3 shortnose sturgeon and 2 Atlantic sturgeon will be impinged at IP2 and up to 2 shortnose sturgeon and 2 Atlantic sturgeon will be impinged at IP3³.

In the 2013 Opinion, we considered effects of operations consistent with the State Pollutant Discharge Elimination System (SPDES) permit issued in 1987 and a Water Quality Certificate (WQC) issued in 1981. We noted in that Opinion that if in the future, New York State issued a revised SPDES permit or 401 WQC that modifies the operations of IP2 or IP3, reinitiation of the consultation may be necessary. That statement was based on an understanding that any new SPDES permit or WQC would require changes to the cooling water intake system or other changes that would result in effects of the action that were not considered in the Opinion. A new SPDES permit and WQC were issued on April 24, 2017. NRC and Entergy have confirmed that under the new SPDES permit and WQC, Entergy will continue to operate the IP2 and IP3 cooling water intake structures as analyzed in the 2013 Opinion. As such, we agree that the issuance of the new SPDES permit and new WQC do not modify the action in a manner that causes an effect to listed species that was not considered in the 2013 Opinion.

Designation of Critical Habitat for the New York Bight DPS of Atlantic sturgeon

On August 17, 2017, we published a final rule designating critical habitat for the New York Bight DPS of Atlantic sturgeon; the effective date of the final rule was September 18, 2017. The Indian Point action area overlaps with a portion of the Hudson River critical habitat unit. We

³ This is calculated for IP2 by determining 3% of the expected annual take of shortnose and Atlantic sturgeon at full cooling water and service water intake and multiplying that fraction of sturgeon by five to get a total estimate of impingement for the 5 year post-electric-generation period that the service water pumps are expected to operate at reduced capacity. The same calculations were made for IP3, using 4% of the expected annual take of shortnose and Atlantic sturgeon.

completed a conference on the effects of the continued operation of IP2 and IP3 on critical habitat designated for Atlantic sturgeon on August 31, 2017. In that letter, we concurred with your determination that the continued operation of IP2 and IP3 through the terms of the proposed extended licenses, will result in habitat alterations that may affect features 2, 3, and 4 in the Hudson River critical habitat unit. We have reviewed the minor changes to the critical habitat designation that occurred between the proposed and final rule and have determined that the analysis and conclusions in the August 17, 2017, conference report remain accurate. Therefore, we conclude for purposes of ESA Section 7(a)(2) that as all effects would be insignificant or discountable, the effects of the action are not likely to adversely affect critical habitat designated for the New York Bight DPS of Atlantic sturgeon.

New Information

In the 2013 Opinion, we considered the potential that Atlantic and shortnose sturgeon with body widths wider than 3" would become impinged on the IP1, IP2, and IP3 trashracks. On October 30, 2014, Entergy provided us with documentation confirming that the IP1 trash racks have deteriorated to a point where impingement of sturgeon is not possible. Entergy has stated that they have no plans to rebuild the trash racks. As such, future impingement of shortnose or Atlantic sturgeon at the IP1 trashracks is not possible. Therefore, we no longer anticipate that the IP1 trashracks will be a source of impingement.

Entergy carried out a study to determine the feasibility of monitoring the IP2 and IP3 trashracks with sonar technology over 136 field-days from June 2014 – May 2015. No shortnose or Atlantic sturgeon were observed. One moderately decomposed Atlantic sturgeon was detected during debris removal at the IP2 trash racks by divers in February 2015. Given the similarities between Atlantic sturgeon and shortnose sturgeon in body type, we conclude shortnose sturgeon are likely impinged on the trash racks just as Atlantic sturgeon are. Based on the currently available information, we expect impingement on the trash bars to consist only of rare, dead, or dying individuals. While a limited dataset, if we assume that the June 2014 – May 2015 period is representative of a typical year, we expect that one shortnose or Atlantic sturgeon will be impinged at the IP2 and IP3 trash racks each year while IP2 and IP3 continue electric-generating activities and for up to 5 years following cessation of commercial electric generating operations. This results in a total of up to 11 shortnose and/or New York Bight, Gulf of Maine, or Chesapeake Bay DPS Atlantic sturgeon impinged at the IP2 trash racks and up to 12 shortnose and/or New York Bight, Gulf of Maine, or Chesapeake Bay DPS Atlantic sturgeon impinged at the IP3 trash racks.

In the 2013 Opinion, we stated that we expected that some sturgeon will become injured or die from being in the intake embayment between the trash bars and screens. Entergy prepared a report documenting the results of a feasibility study designed to determine if sonar technology could be used to carry out monitoring for sturgeon in the forebays. While this study was not designed to assess the residency of sturgeon in the forebays, it provides additional information on velocities and fish behavior in the forebays that indicates that conditions are not such that sturgeon would be resident or "stuck" in the forebays. As such, based on the information contained in the report we are satisfied that additional monitoring of the forebays is not necessary as the information supports that conditions are not such that sturgeon would be "stuck" in the forebays. That is, we expect that sturgeon that swim into the intake embayment will be

able to swim out of the area. Based on the results of this study, which demonstrated low through-rack velocity and documented small fish and crabs freely swimming in and out of the intake embayment, we no longer anticipate that sturgeon will become injured or die merely from swimming through the trash bars and being present within the forebay. Rather, we expect that any sturgeon that swim into the forebay, if in a healthy, unimpaired condition, would be able to freely swim back out through the trashbars, unless they are scooped up by the collection troughs. Sturgeon that are impaired or otherwise are not free swimming would be collected on the traveling buckets of the Ristroph screens and impinged. We do not expect that the presence of the forebay would cause or contribute to any impingement, injury or mortality.

Revised Incidental Take Statement with modified RPMs and Terms and Conditions

Enclosed with this letter is a new Incidental Take Statement which reflects the best available information to identify the incidental take that is reasonably certain to occur and identifies the required reasonable and prudent measures and terms and conditions that are necessary and appropriate to minimize that take. It also identifies required monitoring and reporting requirements.

Based on the currently available information, take of shortnose and Atlantic sturgeon is likely to occur while IP2 and IP3 continue to generate electricity and for up to five years following the cessation of electric-generating activities when the cooling water and service water pumps remain in use as described to us by Entergy (i.e., one cooling water pump operating up to 30 days per year and a single service water pump operating at each unit). Take of live and dead sturgeon is likely to occur as a result of impingement at the IP1, IP2, and IP3 traveling screens (at an average rate of 19 shortnose and 13 Atlantic sturgeon per year at IP2 through April 2024 and 7 shortnose and 6 Atlantic sturgeon per year at IP3 through April 2025; and a total of no more than one shortnose or Atlantic sturgeon at the IP1 traveling screens as used for service water for IP2 operations through April 2024). In the five-year period following when electric-generation stops, and cooling water and service water continue to be withdrawn, impingement of no more than 4 shortnose and 3 Atlantic sturgeon at IP2 is anticipated and no more than 3 shortnose sturgeon and 3 Atlantic sturgeon at IP3. Additionally, during this five year period, we anticipate that one shortnose or Atlantic sturgeon will be impinged on the IP2 or IP3 trash racks; all of the sturgeon impinged on the trash racks are expected to be dead or dying, with a cause of death not likely to be attributable to the operations of Indian Point. The ITS has been modified to reflect these changes.

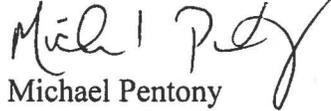
Conclusions

This completes the reinitiated consultation on the proposed relicensing of IP2 and IP3. Should any of the criteria for reinitiation be met again in the future, consultation must be reinitiated immediately. It is our understanding that once Entergy stops electric-generating operations at each of the units, it must submit a certification of Permanent Cessation of Power Operations to NRC. Within two years of submitting that certification, Entergy must submit a Post-Shutdown Decommissioning Activities Report. Entergy will also need to submit a license amendment request in a similar timeframe. It is our understanding that Entergy will submit the Post-Shutdown Decommissioning Activities Report and license amendment request no later than April 30, 2027 (i.e., two years following the cessation of electric-generation at IP3). NRC's resulting amendment of the IP2 and IP3 operating licenses may be a Federal action requiring

section 7 consultation; if that is the case, either reinitiation of this consultation or initiation of a new consultation may be appropriate depending on the circumstances surrounding the action.

Thank you for your continued cooperation throughout the consultation process. We look forward to continuing to work with you and your staff. Should you have any questions regarding this letter, or the revised ITS, please contact Julie Crocker in our Protected Resources Division (978-282-8480 or Julie.Crocker@Noaa.gov).

Sincerely,



Michael Pentony
Regional Administrator

Enclosure: Draft Revised ITS

CC: Grange, NRC
Gray, Entergy
Nieder, NYDEC

File Code: Sec 7 (formal), NRC – Indian Point 2017 Reinitiation

PCTS: NER-2017-14572

11.0 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA prohibits the take of endangered species of fish and wildlife. “Fish and wildlife” is defined in the ESA “as any member of the animal kingdom, including without limitation any mammal, fish, bird (including any migratory, nonmigratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof.” 16 U.S.C. 1532(8). “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include any act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. On December 21, 2016, NMFS issued *Interim Guidance on the Endangered Species Term “Harass”*³⁸. For use on an interim basis, we interpret “harass” to mean 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”. “Otherwise lawful activities” are those actions that meet all State and Federal legal requirements except for the prohibition against taking in ESA Section 9 (51 FR 19936, June 3, 1986), which would include any state endangered species laws or regulations. Section 9(g) makes it unlawful for any person “to attempt to commit, solicit another to commit, or cause to be committed, any offense defined [in the ESA.]” 16 U.S.C. 1538(g). A “person” is defined in part as any entity subject to the jurisdiction of the United States, including an individual, corporation, officer, employee, department or instrument of the Federal government (see 16 U.S.C. 1532(13)). Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by NRC and the applicant, Entergy, for the exemption in section 7(o)(2) to apply. NRC has a continuing duty to regulate the activity covered by this Incidental Take Statement. If NRC (1) fails to assume and implement the terms and conditions consistent with its authority or (2) fails to require the applicant, Entergy, to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms, the protective coverage of section 7(o)(2) may lapse. The effects analysis and conclusions reached in the 2013 Opinion, this 2017 amendment and, therefore, the incidental take levels, are based largely on shortnose and Atlantic sturgeon impingement data collected between 1974 and 1990. While there are uncertainties in this data, as acknowledged in the Opinion, it is the best available and relying on it for the development of this Opinion was reasonable. The monitoring and reporting required by this ITS will serve in part as a check on our reliance on this data. If NRC or Entergy fail to implement the required terms and conditions or are otherwise not in compliance with the terms and conditions at any point during the period when IP2 or IP3 are operating under the existing operating licenses or the proposed renewed operating licenses, reinitiation of consultation will be necessary. Reinitiation would be necessary in that case to determine why noncompliance was occurring and whether any changes to the terms and conditions would promote better compliance. In order to monitor the impact of

incidental take, NRC or the applicant must report the progress of the action and its impact on the species to NMFS as specified in the Incidental Take Statement [50 CFR §402.14(i)(3)] (See U.S. Fish and Wildlife Service and National Marine Fisheries Service's Joint Endangered Species Act Section 7 Consultation Handbook (1998) at 4-49).

11.1 Amount or Extent of Take

This ITS serves two important functions: (1) it provides an exemption from the Section 9 prohibitions for any taking incidental to the proposed action that is in compliance with the terms and conditions; and (2) it provides the means to insure the action as it is carried out is not jeopardizing the continued existence of affected species by monitoring and reporting the progress of the action and its impact on the species such that consultation can be reinitiated if any of the criteria in 50 CFR 402.16 are met. IP2 and IP3 currently operate under separate licenses and these licenses are proposed to be renewed as two separate licenses. Although IP1 shutdown in 1974, the IP1 service water system, which is located between the IP2 and IP3 intakes, provides screen wash water and supplemental service water to IP2 as described in the 2013 Opinion; references to IP1 in this take statement refer to the use of its intakes to support the operations of IP2. Because the licensings of IP2 and IP3 are two separate Federal actions, "take" will be apportioned to each of the two separate actions.

As explained in the "Effects of the Action" section of the 2013 Opinion, effects of the facilities on shortnose and Atlantic sturgeon also include effects of the thermal plume on distribution and prey. However, based on the available information on the thermal plume and the assumptions regarding sturgeon behavior and thermal tolerances outlined in the Opinion, we do not anticipate or exempt any take of shortnose or Atlantic sturgeon due to effects to prey items or due to exposure to the thermal plume.

The continued withdrawal of water associated with electric-generating operations and post-electric-generating operations of IP2 and IP3 will result in the impingement of shortnose sturgeon and New York Bight DPS origin Atlantic sturgeon¹ at the traveling Ristroph screens. We expect that some of the sturgeon impinged at the screens will be dead or suffering from injury or illness. Some sturgeon caught in the buckets of the Ristroph screen are likely to have been healthy and free swimming; some of those fish are likely to experience injury or mortality while being transported to the sluice while some are expected to be returned to the river with no apparent injuries. Other sturgeon that become impinged on the screens are likely to suffer injury or mortality due to their impingement. Based on the available information, we are not able to determine what portion of these shortnose sturgeon or New York Bight DPS Atlantic sturgeon impinged at the Ristroph screens will fall into each of the above categories. Because we know that there will be impingement mortality (available monitoring results suggest at least an 80% mortality rate for shortnose sturgeon and at least 60% for Atlantic sturgeon; see section 7.1.2 of the 2013 Opinion citing NRC BA 2010 and NRC BA 2012), but are not able to accurately predict the mortality rate, for the purposes of the jeopardy analysis, we made the conservative determination that all shortnose and Atlantic sturgeon impinged at the screens will be mortally injured or killed. However, we anticipate that the shortnose and Atlantic sturgeon impinged at

¹ While Atlantic sturgeon from multiple Distinct Population Segments occur in the Hudson River, the only Atlantic sturgeon small enough to pass through the trash bars and be vulnerable to impingement at the traveling Ristroph screens would be juvenile Hudson River origin New York Bight DPS Atlantic sturgeon.

the traveling Ristroph screens and transferred to the return sluices will fall into one of 4 categories: alive and uninjured; seriously injured or dead before impingement; injured (minor, recoverable, with no impacts to fitness) due to interactions with the fish return system; or, seriously injured or killed due to interactions with the fish return system.

The Section 9 prohibitions against take apply to live individuals as well as to dead specimens and their parts. The Section 9 prohibitions include “capture” and “collect” in the definition of take, as well as injury and mortality, among other things. We recognize that some shortnose and Atlantic sturgeon impinged on the intakes at IP2 and IP3 may have been killed prior to impingement at the IP facility. Given the impingement of these fish is a result of the operation of Indian Point and given the ESA’s definitions of “take” and “fish and wildlife,” we consider even the impingement of previously killed fish (or parts thereof) to be “incidental take.” Furthermore, we consider such capture or collection of previously killed animals (or parts) to be prohibited under Section 9, and we will exempt it through this ITS. Additionally, NMFS recognizes the potential for some shortnose and Atlantic sturgeon to pass through the trash bars, contact the Ristroph screens and travel down the sluice back to the River without significant injury or mortality. We consider the Section 9 prohibitions on take also apply to the capture or collection of live, uninjured animals even if these animals are released without injury. Thus, it is appropriate for this ITS to also address shortnose and Atlantic sturgeon that are captured or collected at the Ristroph screens and returned to the river unharmed. As no impingement monitoring has taken place at the intakes since 1990, we cannot accurately predict what percentage of sturgeon would be collected at the Ristroph screens without injury or mortality and, therefore, we are not able to refine this estimate of take to separate out the number of fish that will be collected but not killed or injured as a result of the operation of the facility. Due to the difficulty in determining the cause of death of sturgeon found dead at the intakes and the lack of past necropsy results that would allow us to better assess the likely cause of death of impinged sturgeon, the take exempted here includes shortnose and Atlantic sturgeon that are killed prior to impingement on the IP intakes. As explained in the 2013 Opinion, we do not have sufficient information to predict what percentage of impinged sturgeon were previously killed and merely captured or collected at the facility and sturgeon that died as a result of their impingement at the Indian Point intakes. Therefore, we are not able to further refine this estimate of take into a number of previously dead sturgeon captured or collected at the facility and a number of sturgeon whose death was caused by operation of the facility.

As explained in the 2013 Opinion, we expect 0-71 juvenile or adult shortnose sturgeon and 0-31 juvenile New York Bight DPS Atlantic sturgeon to be impinged at IP2 each year. Based on the available impingement monitoring data, we expect that years when the high end of the take estimate is reached will be infrequent and we do not expect take levels to be at the high end of these take estimates in consecutive years. Under the proposed relicensing scenario, IP2 may continue commercial electricity-generating operations for as many as six full years (2018-2023) and the first four months of 2024. For the purposes of calculating the amount of incidental take, we have assumed the worst case, that all take occurring in 2024 would occur in the four months IP2 remains operational. Therefore, to calculate the total amount of take anticipated at IP2 over the proposed relicensing period (i.e., through April 30, 2024), we have multiplied the annual average take calculated in the 2013 Opinion based on the available impingement monitoring data from 1974-1990 (19 shortnose sturgeon and 13 Atlantic sturgeon) by seven (the maximum

number of years IP2 will continue to operate, beginning in 2018). This results in a total of 133 shortnose sturgeon and 91 Atlantic sturgeon through April 2024, if commercial operations continue until then. This amount of take includes sturgeon that are injured or killed incidental to Indian Point operations as well as sturgeon that are alive or dead and are only captured/collected incidental to Indian Point operations.

As explained in the 2013 Opinion, additional service water for IP2 is withdrawn through the IP1 intakes. This intake is located between the IP2 and IP3 intakes, also along the eastern shore of the Hudson River. In the 2013 Opinion, we determined that the continued withdrawal of water through the IP1 intake was likely to result in the impingement (and mortality) of two shortnose and two Atlantic sturgeon in the 23 years of operations considered (rate of 0.17 sturgeon per year). Considering the maximum of seven years that IP2 may now operate, we expect that one sturgeon ($0.17 \times 7 = 1.19$, rounded to 1) will be impinged at the IP1 intakes (either a shortnose or Atlantic sturgeon) through April 2024, if commercial electricity-generating operations continue until then.

As explained in the 2013 Opinion, we expect 0-32 juvenile or adult shortnose sturgeon and 0-41 juvenile New York Bight DPS Atlantic sturgeon to be impinged at IP3 each year. Under the proposed relicensing scenario, IP3 may continue commercial electricity-generating operations for as many as seven full years (2018-2024) and the first four months of 2025. For the purposes of calculating the amount of incidental take, we have assumed the worst case, that all take occurring in 2025 would occur in the four months IP3 remains operational. Therefore, to calculate the total amount of take anticipated at IP3 over the proposed relicensing period (i.e., through April 30, 2025), we have multiplied the annual average take calculated in the 2013 Opinion (based on the available impingement monitoring data from 1974-1990; 7 shortnose sturgeon and 6 Atlantic sturgeon), we have multiplied the annual average take by eight (the maximum number of years IP3 will continue to operate, beginning in 2018). This results in a total of 56 shortnose sturgeon and 48 Atlantic sturgeon through April 2025, if commercial operations continue until then. This amount of take includes sturgeon that are injured or killed incidental to Indian Point operations as well as sturgeon that are alive or dead and are only captured/collected incidental to Indian Point operations.

If, as currently anticipated, electric-generating operations cease prior to the dates on which the licenses' authorizations end, there will be a period of time before the license is amended for decommissioning purposes when the only water being withdrawn will be service water and a limited amount of cooling water (expected to be no more than one pump operating for no more than 30 days per year). As explained in the February 9, 2018 letter accompanying this ITS, this period of time is not anticipated to exceed five years (i.e., will extend no further than April 30, 2029 for IP2 and April 30, 2030 for IP3). During that five-year post-electric generating period, at IP2 we anticipate the impingement of no more than 4 shortnose sturgeon and no more than 3 Atlantic sturgeon; at IP3 we anticipate the impingement of no more than 3 shortnose sturgeon and no more than 3 Atlantic sturgeon. This amount of take includes sturgeon that are injured or killed incidental to Indian Point operations as well as sturgeon that are alive or dead and are only captured/collected incidental to Indian Point operations.

Additionally, we anticipate the impingement of no more than one shortnose or New York Bight, Gulf of Maine or Chesapeake Bay DPS Atlantic sturgeon² at the IP2 trash bars each year during electric-generating operations and through the end of the five year post-electric generating period, for a total of no more than 11 sturgeon that will be a mix of shortnose and New York Bight, Gulf of Maine or Chesapeake Bay DPS Atlantic sturgeon, or up to 11 shortnose with zero Atlantics, or up to 11 Atlantics with zero shortnose. We anticipate the impingement of no more than one shortnose or New York Bight, Gulf of Maine or Chesapeake Bay DPS Atlantic sturgeon at the IP3 trash bars each year during electric-generating operations and through the end of the five year post-electric generating period for a total of no more than 12 sturgeon that will be a mix of shortnose and New York Bight, Gulf of Maine or Chesapeake Bay DPS Atlantic sturgeon, or up to 12 shortnose with no Atlantics, or up to 12 Atlantics with no shortnose. We expect these sturgeon to be dead or dying. The take at the trash bars is capture/collection.

This ITS exempts the following take (injure, kill, capture or collect, as described below):

- A total of 1 dead or alive shortnose sturgeon or 1 New York Bight DPS Atlantic sturgeon (injure, kill, capture or collect) impinged at the Unit 1³ intake screens from now until IP2's commercial electricity-generating operations under the proposed renewed operating license permanently cease on or before April 30, 2024.
- A total of 133 dead or alive shortnose sturgeon (injure, kill, capture or collect) and 91 New York Bight DPS Atlantic sturgeon (injure, kill, capture or collect) impinged at Unit 2 intakes (Ristroph screens).
- An annual (calendar year) amount of no more than 71 dead or alive shortnose sturgeon (injure, kill, capture or collect) and 31 New York Bight DPS Atlantic sturgeon (injure, kill, capture or collect) impinged at Unit 2 intakes (Ristroph screens) from now until IP2's commercial electricity-generating operations under the proposed renewed operating license permanently cease on or before April 30, 2024.
- A total of 56 dead or alive shortnose sturgeon (injure, kill, capture or collect) and 48 dead or alive New York Bight DPS Atlantic sturgeon (injure, kill, capture or collect) impinged at Unit 3 intakes (Ristroph screens).
- An annual (calendar year) amount of no more than 32 dead or alive shortnose sturgeon (injure, kill, capture or collect) and no more than 41 New York Bight DPS Atlantic sturgeon (injure, kill, capture or collect) impinged at the Unit 3 intakes (Ristroph screens) from now until IP3's commercial electricity-generating operations under the proposed renewed operating license permanently cease on or before April 30, 2025.
- A total of 4 shortnose sturgeon and 3 New York Bight Atlantic sturgeon (injure, kill, capture or collect) impinged at Unit 2 intakes (Ristroph screens) over the five-year period beginning when electric-generating operations permanently cease.
- A total of 3 shortnose sturgeon and 3 New York Bight DPS Atlantic sturgeon (injure, kill, capture or collect) impinged at the Unit 3 intakes (Ristroph screens) over the five-year period beginning when electric-generating operations permanently cease.

² To date, no Carolina or South Atlantic DPS origin Atlantic sturgeon have been documented in the freshwater reach of the Hudson River; therefore, take of Carolina or South Atlantic DPS origin Atlantic sturgeon is not reasonably certain to occur.

³ As explained in the Opinion, water withdrawn through the Unit 1 intakes is used for service water for the operation of IP2.

- A total of 1 shortnose or New York Bight, Gulf of Maine or Chesapeake Bay Atlantic sturgeon with a body width greater than 3 inches impinged at the Unit 2 trash racks each year through the five year period following permanent cessation of commercial electric generating operations, for a total of no more than 11 sturgeon (mix of shortnose and New York Bight, Gulf of Maine and Chesapeake Bay Atlantic sturgeon).
- A total of 1 shortnose or New York Bight, Gulf of Maine or Chesapeake Bay Atlantic sturgeon with a body width greater than 3 inches impinged at the Unit 3 trash racks each year through the five year period following permanent cessation of commercial electric generating operations at Unit 3 trash bars, for a total of no more than 12 sturgeon (mix of shortnose or New York Bight , Gulf of Maine and Chesapeake Bay DPS Atlantic sturgeon).

We do not anticipate the impingement of any Atlantic sturgeon originating from the South Atlantic or Carolina DPSs as we do not expect individuals originating from these DPSs to occur in the action area; therefore, we have not exempted any take of South Atlantic or Carolina DPS Atlantic sturgeon. The impingement of individuals originating from these DPSs at the trash bars or the intake screens is not anticipated. Given the size of any Chesapeake Bay DPS and Gulf of Maine DPS Atlantic sturgeon that may occur in the Hudson River, we do not anticipate the impingement of Chesapeake Bay or Gulf of Maine DPS Atlantic sturgeon at the traveling Ristroph screens. Because each DPS is a separate listed entity and therefore a separate species for the purposes of an ITS, the impingement of any South Atlantic or Carolina DPS Atlantic sturgeon at the trash bars or traveling Ristroph screens or the impingement of Chesapeake Bay or Gulf of Maine DPS Atlantic sturgeon at the traveling Ristroph screens, would represent new information revealing effects of the action that may affect listed species in a manner or to an extent not previously considered. If this occurred, reinitiation is expected to be necessary.

In the 2013 Opinion, we determined that the level of anticipated incidental take caused by the operation of IP2 is not likely to result in jeopardy to shortnose sturgeon or to any DPS of Atlantic sturgeon analyzed even if IP3 is operating at the same time. Similarly, we determined that the level of anticipated incidental take caused by the operation of IP3 is not likely to result in jeopardy to shortnose sturgeon or to any DPS of Atlantic sturgeon analyzed, even if IP2 is operating at the same time. The jeopardy analysis included with the 2013 Opinion anticipated a greater amount of take than is anticipated and exempted here as it considered a considerably longer time period for the IP2 and IP3 proposed renewed operating licenses. Because we expect the nature of operations described in the 2013 Opinion to remain the same, the type of take to be the same, and the amount of take considered here to be less than that analyzed and exempted in the 2013 no-jeopardy Opinion, we continue to rely on that jeopardy analysis for the modified action and conclude it is also not likely to jeopardize the continued existence of shortnose New York Bight, Gulf of Maine and Chesapeake Bay DPS Atlantic sturgeon.

11.2 Reasonable and Prudent Measures

While electric-generation continues to occur at IP2, take is anticipated to occur at the IP2 trash bars, the IP2 Ristroph screens, and the IP1 Ristroph screens; this take will continue to occur, but at a lower level, for up to a five-year period following the permanent cessation of electric-generating activities at IP2. While electric-generation continues to occur at IP3, take is

anticipated to occur at the IP3 trash bars and the IP3 Ristroph screens; this take will continue to occur, but at a lower level, for up to a five-year period following the permanent cessation of electric-generating activities at IP3.

In order to effectively monitor the effects of this action, it is necessary to monitor the intakes to document the amount of incidental take (i.e., the number of shortnose and Atlantic sturgeon captured, collected, injured or killed) and to examine the shortnose and Atlantic sturgeon that are impinged at the Ristroph screens. Monitoring minimizes take by providing information on the characteristics of the sturgeon encountered and factors related to interactions that is useful for judging the effectiveness of current measures and for developing more effective measures to avoid and/or minimize future interactions with listed species. Monitoring also serves to check the assumptions and conclusions in the Opinion's analysis, thereby enabling NRC and NMFS to know whether reinitiation of consultation is necessary. We do not anticipate any additional injury or mortality to be caused by removing impinged Atlantic or shortnose sturgeon from the fish return sluices and examining them as required in the RPMs. Even if there is, any such additional take is exempted as long as the terms and conditions of the ITS are complied with. Any live sturgeon are to be released back into the river in a manner that minimizes the likelihood of injury or mortality. These RPMs and their implementing terms and conditions apply to operations of IP2 and IP3 under their existing licenses as well as the license to be issued for the continued operation of IP2 and the license to be issued for the continued operation of IP3.

We have determined the following reasonable and prudent measures are necessary or appropriate to minimize the impacts of incidental take of endangered shortnose and Atlantic sturgeon and to monitor and report it:

1. The IP2 fish return sluice must be monitored for the presence of shortnose and Atlantic sturgeon in a manner that allows a reasonably accurate and precise estimate of the total number of shortnose and the total number of Atlantic sturgeon impinged on the Ristroph screens each year prior to permanent cessation of electric-generating operations. This monitoring is required until Entergy submits a certification of Permanent Cessation of Power Operations to NRC for IP2 stating that power generation has in fact stopped permanently.
2. The IP3 fish return sluice must be monitored for the presence of shortnose and Atlantic sturgeon in a manner that allows a reasonably accurate and precise estimate of the total number of shortnose and the total number of Atlantic sturgeon impinged on the Ristroph screens each year prior to permanent cessation of electric-generating operations. This monitoring is required until Entergy submits a certification of Permanent Cessation of Power Operations to NRC for IP3 stating that power generation has in fact stopped permanently.
3. Following submission of a certification of Permanent Cessation of Power Operations to NRC for IP2 stating that power generation has in fact stopped permanently, the intake of water for IP2 through the service water pumps and/or cooling water pumps must be monitored in order to generate a reasonably accurate and precise estimate of the total number of shortnose and the total number of Atlantic sturgeon impinged on the Ristroph screens each year following permanent cessation of electric-generating operations.
4. Following submission of a certification of Permanent Cessation of Power Operations to

NRC for IP3 stating that power generation has in fact stopped permanently, the intake of water for IP3 through the service water pumps and/or cooling water pumps must be monitored in order to generate a reasonably accurate and precise estimate of the total number of shortnose and the total number of Atlantic sturgeon impinged on the Ristroph screens each year following permanent cessation of electric-generating operations.

5. Any sturgeon observed during diver surveys of the IP2 and IP3 trash racks must be promptly reported to NMFS.
6. All live, captured/collected shortnose and Atlantic sturgeon must be released back into the Hudson River at an appropriate location away from the intakes and thermal plume that does not pose additional risk of take, including death, injury, harassment, collection/capture.
7. Any dead, captured/collected shortnose or Atlantic sturgeon must be retained in cold storage until disposal procedures are provided by NMFS. If requested by NMFS, sturgeon must be transferred to an appropriately permitted research facility NMFS will identify so that a necropsy can be undertaken to attempt to determine the cause of death or other relevant information.
8. A genetic sample must be taken of all captured/collected Atlantic and shortnose sturgeon. Genetic samples from Atlantic sturgeon must be processed for identification of the DPS and river of origin on at least a quarterly basis.
9. All captured/collected Atlantic and shortnose sturgeon must be checked for a PIT tag with an appropriate PIT tag reader. All live shortnose and Atlantic sturgeon of appropriate size that have not been previously PIT tagged, must be PIT tagged.
10. Information on all captured/collected shortnose and Atlantic sturgeon must be promptly reported to NMFS.

11.3 Terms and Conditions

In order to be exempt from prohibitions of section 9 of the ESA, Entergy must comply with, and NRC, consistent with its authorities, must ensure through enforceable terms of the existing and renewed licenses that Entergy does comply with, the following terms and conditions of the Incidental Take Statement, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary. Any taking that is in compliance with the terms and conditions specified in this ITS shall not be considered a prohibited taking of the species concerned (ESA Section 7(o)(2)). With regard to the existing licenses for IP2 and IP3: upon issuance of this Opinion, NRC shall take prompt and effective action to require Entergy to adhere to the terms and conditions of this ITS. With regard to the proposed renewed licenses for IP2 and IP3, NRC shall ensure that each renewed license contains a condition that requires Entergy to adhere to the terms and conditions of this ITS upon issuance of the renewed license(s).

1. To implement RPM #1 and 2, Entergy must implement the following monitoring measures:
 - 3 days per week (24-hours of sampling per day) of tank-based impingement monitoring of sturgeon to provide at least 12 non-consecutive 24-hour periods in April, May, September and October, for a total of a minimum of 50 days for the IP2 fish return system, for each year that IP2 remains in commercial operations.
 - 3 days per week (24-hours of sampling per day) of tank-based impingement

monitoring of sturgeon to provide at least 12 non-consecutive 24-hour periods in April, May, September and October, for a total of a minimum of 50 days for the IP3 fish return system, for each year that IP3 remains in commercial operations.

- This impingement sampling must begin as soon as possible following the installation of necessary equipment but no later than April 1, 2019 for both IP2 and IP3. If equipment is in place at IP2 before September 1, 2018, sampling must occur during September and October 2018.
 - In any year that an outage is scheduled or occurs in April, May, September or October and the missed sampling days can not be rescheduled for those months, those missed sampling days must be rescheduled for alternate months in that calendar year.
 - A schedule of planned sampling days for 2019 must be provided to NMFS (via e-mail to Julie.Crocker@noaa.gov), NRC and NYSDEC no later than October 1, 2018. We recognize that emergency situations related to unexpected plant outages or extreme weather conditions may interfere with the planned sampling schedule. If at any time, Entergy anticipates that a sampling day will be missed, they must report to NMFS, NRC and NYSDEC within 24 hours and, within 24 hours of the end of the emergency, provide an updated sampling schedule. Any missed days are to be scheduled in the same month, unless the month has ended in which case they are to be scheduled in the following month (e.g., if sampling was scheduled for April 30 and a Nor'easter created unsafe conditions for sampling to occur, that sampling must be rescheduled for the earliest possible date in May).
 - For each subsequent year, a schedule of planned sampling days must be provided no later than December 1 of the previous year (e.g., a schedule for 2020 would need to be provided by December 1, 2019). The NMFS staff contact for receipt of these schedules will be provided to Entergy at the beginning of each calendar year.
 - Sampling schedules are required at IP2 until NRC receives Entergy's certification of Permanent Cessation of Power Operations for IP2 indicating commercial operations have in fact ended. Sampling schedules are likewise required at IP3 until NRC receives Entergy's certification of Permanent Cessation of Power Operations for IP3 indicating commercial operations have in fact ended.
2. To implement RPM #3 and #4, NRC must notify NMFS by e-mail (Julie.Crocker@noaa.gov and incidental.take@noaa.gov) within 14 days of receiving Entergy's certification of Permanent Cessation of Power Operations for IP2. NRC must also notify NMFS by e-mail (Julie.Crocker@noaa.gov and incidental.take@noaa.gov) within 14 days of receiving Entergy's certification of Permanent Cessation of Power Operations for IP3.
 3. To implement RPM #3, in each calendar year after Entergy submits the certification of Permanent Cessation of Power Operations for IP2 (inclusive of the year that the certification is submitted), Entergy must report to NMFS and NRC on: the amount of time service water and cooling water pumps are used for IP2 (number of pumps, dates each pump was operated, and if less than 24-hour usage, the hours operated during that

day) and the amount of water withdrawn during that year (millions of gallons). Entergy will use the sturgeon impingement data collected during the electric-generating period for IP2, to calculate a rate of shortnose impingement and a separate rate of Atlantic sturgeon impingement per million gallons of water withdrawn for IP2. This rate will then be applied to the annual amount of water used per year during the up to five-year post-generation period to calculate the number of shortnose and Atlantic sturgeon impinged. This report, including all data and calculations, is due to NMFS and NRC by February 15 of each year to provide information on the preceding year. This report must be submitted to NMFS via email (Incidental.Take@noaa.gov).

4. To implement RPM #4, in each calendar year after Entergy submits the certification of Permanent Cessation of Power Operations for IP3 (inclusive of the year that the certification is submitted), Entergy must report to NMFS and NRC on: the amount of time service water and cooling water pumps are used for IP3 (number of pumps, dates each pump was operated, and if less than 24-hour usage, the hours operated during that day) and the amount of water withdrawn during that year (millions of gallons). Entergy will use the sturgeon impingement data collected during the electric-generating period for IP3, to calculate a rate of shortnose impingement and a separate rate of Atlantic sturgeon impingement per million gallons of water withdrawn for IP3. This rate will then be applied to the annual amount of water used per year during the up to five-year post-generation period to calculate the number of shortnose impinged and the number of Atlantic sturgeon impinged. This report, including all data and calculations, is due to NMFS and NRC by February 15 of each year to provide information on the preceding year. This report must be submitted to NMFS via email (Incidental.Take@noaa.gov).
5. To implement RPM #5, Entergy must:
 - a. Continue to retain professional divers to perform semi-annual inspections of the Unit 2 and semi-annual inspections of the Unit 3 trash racks. During these inspections, divers must monitor for the presence of sturgeon.
 - b. Divers must be provided with clear training on identifying shortnose and Atlantic sturgeon and their parts. Divers must be provided clear instructions to thoroughly inspect all trash racks undergoing inspection for sturgeon or their parts. The divers must complete the appropriate reporting form (Appendix A) to record all necessary information associated with each dive, i.e., the inspection date, time, water temperature, tidal state, debris load (high, medium, low), operating status of service water and cooling water pumps, trash racks reviewed, the presence and condition of any sturgeon or sturgeon parts observed.
 - c. Divers must collect any sturgeon or portions thereof for handling and reporting per this ITS .
 - d. Within one week of the completion of each diver inspection, Entergy or its contractor must submit to NMFS and NRC a written report of all observations of sturgeon during the diver inspections, attaching the relevant completed diver form(s). This report must be submitted to NMFS via email (Incidental.Take@noaa.gov).
6. To implement RPM #6, Entergy must ensure that all live shortnose and Atlantic sturgeon

removed from the trash racks or fish return systems are returned to the river in a manner that minimizes the potential for further effects, following complete documentation pursuant to the forms provided with this ITS and as required by this ITS. We anticipate that live sturgeon collected during the tank based monitoring will be returned to the river via the fish return sluice.

7. To implement RPM #7, Entergy must ensure that all dead specimens or body parts of shortnose and Atlantic sturgeon or fish that might be sturgeon retrieved from the Indian Point trash racks or fish return systems are photographed, measured, and preserved (refrigerate or freeze). No dead shortnose or Atlantic sturgeon or body parts of shortnose or Atlantic sturgeon may be disposed without discussing disposal procedures with NMFS for each fish or part thereof. If requested by NMFS, Entergy must transfer the specimen to NMFS or to an appropriately permitted researcher so that a necropsy can be conducted; we anticipate that a necropsy would only be required where the carcass is in good condition (i.e., fresh dead, with minimal signs of decomposition) and where the cause of death is not determinable from an external examination. If requested by NMFS, Entergy must transfer the specimen to an appropriately permitted researcher to facilitate permitted research on that specimen. Chain of custody for all sturgeon or sturgeon parts must be documented (according to the procedure outlined in Appendix A).
8. To implement RPM #8, Entergy must take fin clips (according to the procedure outlined in Appendix B) from all sturgeon collected. In the case of dead animals, fin clips must be taken prior to preservation of other fish parts or whole bodies. All fin clips must be preserved (see Appendix B). A subsample of each Atlantic sturgeon fin clip must be transferred to a NMFS-approved lab. NRC and/or Entergy must coordinate with the qualified lab to process the sample in order to determine DPS (for Atlantic sturgeon) of origin. The DPS or river of origin must be reported to NMFS once the sample has been processed. NRC and/or Entergy must make arrangements with an appropriate individual/facility within 30 days of receiving this ITS. The arrangement must be memorialized via letter to NMFS from NRC and/or Entergy that includes information on arrangements for the frequency of transfer of samples to the facility and timelines for processing of samples (no less frequent than once per quarter). All shortnose sturgeon finclips and a subsample of all Atlantic sturgeon fin clips must be sent to the sturgeon genetics archive currently housed at the USGS facility in Leetown, West Virginia (see Appendix B).
9. To implement RPM #9, a PIT tag reader capable of detecting 134.2 kHz PIT tags must be used to inspect all shortnose and Atlantic sturgeon collected. Any live sturgeon greater than 300 mm length that do not have an existing tag, must be tagged with a 134.2 kHz tag (see Appendix C).
10. To implement RPM #10, in any month of the year, any sturgeon observed in the fish return system on a day that is not a tank based impingement monitoring sampling day, must be reported to NMFS and NRC within 24-hours, with information provided on the species, size, and condition (i.e., fresh dead, injured, state of decomposition). NMFS will provide any necessary instructions for fish handling and disposition following reports received. Any dead sturgeon observed in the fish return system on a day that is not a tank based impingement monitoring sampling day must be removed and held in cold storage until further instructions are received from NMFS. Reports must be submitted to NMFS

via email (Incidental.Take@noaa.gov).

11. To implement RPM #10, during the months that impingement sampling occurs, Entergy must submit a weekly report to NMFS and NRC that includes the time and dates of all impingement sampling, the number of shortnose and Atlantic sturgeon observed, and the condition of those sturgeon (i.e., alive, dead, injured). At least one photograph of each sturgeon must be included. This report must be submitted by e-mail (incidental.take@noaa.gov) no later than 5:00pm on the Monday following the previous week's sampling (e.g., a report due on Monday would include information on sampling that occurred through the previous Friday).
12. To implement RPM #10, during the months that impingement sampling occurs, Entergy must submit a monthly report to NMFS and NRC that includes the following information: a take reporting form for each fish (see Appendix A), photograph(s) of it, and a summary of the monthly monitoring events (i.e., number of cooling water and service water pumps operating and the operating capacity of those pumps (i.e., gallons per minute) (by unit) on the days that monitoring occurred). This report must be submitted to NMFS by e-mail (incidental.take@noaa.gov) by the 15th of the month following the month that sampling occurred (i.e., if sampling occurred in April, the report would be due by May 15).
13. To implement RPM #10, at any time of year, if any live or dead shortnose or Atlantic sturgeon are taken (e.g., captured, collected, killed, injured) at IP1, IP2 or IP3, Entergy must notify NMFS (978-281-9328 and incidental.take@noaa.gov) and NRC (endangeredspecies@nrc.gov) within 24 hours. An incident report (Appendix A) must also be completed by plant personnel and sent to NMFS via e-mail (incidental.take@noaa.gov) within 24 hours of the take. The form included in Appendix A must be filled out for any dead sturgeon and submitted via e-mail (incidental.take@noaa.gov) within 24 hours of the take. Every shortnose and Atlantic sturgeon collected, must be photographed and photographs must be submitted to NMFS within 24 hours (incidental.take@noaa.gov). Information in Appendix A will assist in identification of shortnose and Atlantic sturgeon.
14. To implement RPM #10, in each year that sampling occurs, Entergy must produce an annual report. This report must include: any necropsy reports of specimens, all incidental take incident forms including for any sturgeon documented outside of the tank-based impingement monitoring, photographs, and conditions at the time of the take (operations as well as environmental conditions including water velocity and water temperature). This report must also include an estimate of the total amount of take of shortnose and of each Atlantic sturgeon DPS impinged at IP2 calculated from the number of each sturgeon species observed during monitoring at the IP2 fish return sluice and an estimate of the total amount of take of shortnose and of each Atlantic sturgeon DPS impinged at IP3 calculated from the number of each sturgeon species observed during monitoring at the IP3 fish return sluice. All calculations supporting the estimates of the total number of shortnose and the total number of each Atlantic sturgeon DPS must be provided. The calculations must include a 1% increase to account for the expected 1% of fish impinged at the Ristroph screens that are returned to the debris sluice rather than the fish return sluice. This percentage is based on previous monitoring at the IP2 and IP3 fish and debris return systems. This report is due no later than January 30 of the year

following monitoring (i.e., the report for 2019 monitoring is due no later than January 30, 2020). The annual report must also identify any potential measures to reduce shortnose or Atlantic sturgeon impingement, injury, and mortality at the intake structures along with any plans to implement those measures. At the time the report is submitted, NMFS will supply NRC and Entergy with any information on changes to reporting requirements (i.e., staff changes, phone or fax numbers, e-mail addresses) for the coming year. This report must be submitted to NMFS via e-mail (incidental.take@noaa.gov) or U.S. mail (Attn: Section 7 Coordinator, NMFS GARFO Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930).

15. To implement RPM#9, at least two weeks after the annual report is received, but before March 15 of each year that either IP2 or IP3 remains in commercial operations, a conference call or in person meeting between Entergy, NMFS and NRC must be held during which the take information for the previous year will be discussed. NRC and NMFS will use the information presented in the monthly reports, in addition to other sources of information, to determine if there is any new information on effects of the action that were not anticipated in this Opinion. At this time, we anticipate this type of new information could include a higher than anticipated impingement of any species of sturgeon, different size classes of fish impinged than anticipated, different condition of fish impinged than anticipated, or different percent of Atlantic sturgeon from the different DPSs than anticipated. This annual meeting or conference call will also be used to review the standard operating procedures and to discuss any changes that NMFS, NRC or Entergy believe are necessary; however, NMFS must approve any proposed changes.
16. To implement RPMs #1-10, Entergy must submit copies of all required notifications and reports to NRC either by e-mail at endangeredspecies@nrc.gov or by U.S. mail at ATTN: Document Control Desk, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

Appendix A

TO BE PROVIDED

APPENDIX B

Procedure for obtaining fin clips from sturgeon for genetic analysis

1. Wash hands and use disposable gloves. Ensure that any knife, scalpel or scissors used for sampling has been thoroughly cleaned and wiped with alcohol to minimize the risk of contamination.
2. For any sturgeon, after the specimen has been measured and photographed, take a one-cm square clip from the pelvic fin.
3. Place fin clips in small screw top vials (2 ml screw top plastic vials are preferred) with preservative. Avoid using glass vials.
4. Label each vial with fish's unique ID number that matches the ID number you record on the metadata sheet. This is critical for accurate tracking and record keeping .
5. RNAlater™ is the preferred preservative and is not hazardous. Ninety-five percent absolute ETOH (un-denatured) is an accepted alternative. Note that ETOH is a Class 3 Hazardous Material due to its flammable nature.
6. If non-screw top vials are used, seal individual vials with leak proof positive measure (e.g., tape).
7. Package vials together (e.g., in one box) with an absorbent material within a double-sealed container (e.g., zip lock baggie).
8. If using excepted quantities of ETOH, follow DOT and IATA packaging regulations, including affixing ETOH warning label to air package. Accepted quantities of ETOH is 30 mL per inner package and 1 L for the total package.
9. A sub-sample of the fin clip must be sent to the sturgeon genetics archive at the USGS facility in Leetown, WV.
 - a. Submit sample metadata to rjohnson1@usgs.gov with a cc to incidental.take@noaa.gov. Electronic metadata must be provided in order to properly identify and archive samples. A copy of the electronic metadata was emailed to the Federal agency point of contact for this Opinion and a list of the metadata fields is included below. Retain a copy of metadata sheets for your records.
 - b. Mail samples to:

Robin Johnson
U.S. Geological Survey
Leetown Science Center
Aquatic Ecology Branch
11649 Leetown Road
Kearneysville, WV 25430
10. Send a subsample and associated metadata to the NMFS-approved lab for processing to determine DPS or river of origin per the agreement you have with that facility.

Metadata to be recorded for each genetic sample submitted to USGS and other NMFS-approved lab:

- Collection Date
- Species (ATS/SNS)
- Collector
- Collector Email
- Collector Phone Number
- Permit/Biological Opinion Number
- Permit Holder, Responsible Party (RP), or Principal Investigator (PI)
- Holder, RP, or PI Email
- Holder, RP, or PI Phone Number
- Unique Fish ID
- PIT Tag Number
- Location Collected
- Latitude
- Longitude
- Fork Length (mm)
- Total Length (mm)
- Weight (g) (if available)
- Sex (if known)
- Preservative
- Tag Info Available (Y/N)
- Tag Info
- Mortality (Y/N)
- Mortality Type
- Recapture (Y/N)
- Comments

APPENDIX C

PIT Tagging Procedures for Shortnose and Atlantic sturgeon (adapted from Damon-Randall *et al.* 2010)

Passive integrated transponder (PIT) tags provide long term marks. These tags are injected into the musculature below the base of the dorsal fin and above the row of lateral scutes on the left side of the Atlantic sturgeon (Eyler *et al.* 2009), where sturgeon are believed to experience the least new muscle growth. Sturgeon should not be tagged in the cranial location. Until safe dorsal PIT tagging techniques are developed for sturgeon smaller than 300 mm, only sturgeon larger than 300 mm should receive PIT tags.

It is recommended that the needles and PIT tags be disinfected in isopropyl alcohol or equivalent rapid acting disinfectant. After any alcohol sterilization, we recommend that the instruments be air dried or rinsed in a sterile saline solution, as alcohol can irritate and dehydrate tissue (Joel Van Eenennam, University of California, pers. comm.). Tags should be inserted antennae first in the injection needle after being checked for operation with a PIT tag reader.

Sturgeon should be examined on the dorsal surface posterior to the desired PIT tag site to identify a location free of dermal scutes at the injection site. The needle should be pushed through the skin and into the dorsal musculature at approximately a 60 degree angle (Figure 5). After insertion into the musculature, the needle angle should be adjusted to close to parallel and pushed through to the target PIT tag site while injecting the tag. After withdrawing the needle, the tag should be scanned to check operation again and tag number recorded.

Some researchers check tags in advance and place them in individual 1.5 ml microcentrifuge tubes with the PIT number labeled to save time in the field.

Because of the previous lack of standardization in placement of PIT tags, we recommend that the entire dorsal surface of each fish be scanned with a PIT tag reader to ensure detection of fish tagged in other studies. Because of the long life span and large size attained, Atlantic sturgeon may grow around the PIT tag, making it difficult to get close enough to read the tag in later years. For this reason, full length (highest power) PIT tags should be used.

Fuller *et al.* (2008) provide guidance on the quality of currently available PIT tags and readers and offer recommendations on the most flexible systems that can be integrated into existing research efforts while providing a platform for standardizing PIT tagging programs for Atlantic sturgeon on the east coast. The results of this study were consulted to assess which PIT tags/readers should be recommended for distribution. To increase compatibility across the range of these species, the authors currently recommend the Destron TX1411 SST 134.2 kHz PIT tag and the AVID PT VIII, Destron FS 2001, and Destron PR EX tag readers. However, any commercially available 134.2 KHz PIT tag and reader capable of reading these tags is appropriate for use. These readers can read multiple tags, but software must be used to convert the tag ID number read by the Destron PR EX. The FWS/Maryland Fishery Resources Office (MFRO) will collect data in the coastal tagging database.

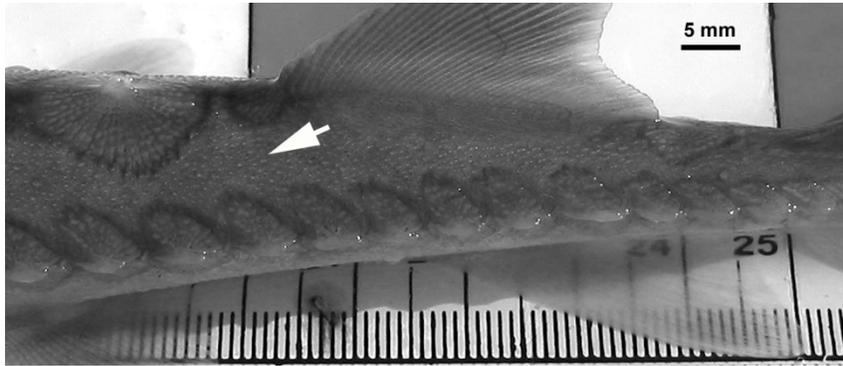


Figure 5. (from Damon-Randall *et al.* 2010). Illustration of PIT tag location (indicated by white arrow; top), and photo of a juvenile Atlantic sturgeon being injected with a PIT tag (bottom).
Photos courtesy of James Henne, US FWS.