

**Addendum to the “Proposed Monitoring Plan for
Indian Point Energy Center
Take of Atlantic and Shortnose Sturgeon by Impingement
at Cooling Water Intakes, Revision 2” 13 June 2014**

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Introduction: Feasibility Study- Basis of Approach

The primary objective of the Feasibility Study is to develop methods using sonar technologies to monitor the presence of shortnose and Atlantic sturgeon at the trash racks and forebays of IP2 and IP3. As with all feasibility-level studies, equipment selection and deployment, data collection and analysis, and overall performance will be evaluated, reviewed and refined throughout the course of the study as feasible adaptations or improvements are identified. In addition, because this is the first monitoring effort to utilize advanced acoustic technologies at the Indian Point Energy Center to examine potential incidental takes of sturgeon, site-specific constraints to certain monitoring approaches may be identified and require further evaluation. However, after careful consideration by the Entergy team, the use of sonar technologies to collect these data, in a tiered and layered approach (i.e., overlapping various sonars with different resolutions and ranges) as further discussed below, will support the goals of the NMFS's Biological Opinion.

Entergy has designated a crew of sonar and biological specialists for a minimum of 2 days per week on the following monitoring items, in addition to other areas for the duration of this Feasibility Study.

The one-year Feasibility Study is divided into quarters, with goals to be obtained/identified for each quarter. Separate considerations will be specific to areas of the intakes, such as the forebays and trash racks, and these will be addressed separately in the following sections.

The quarterly goals are as follows:

1. Quarter 1- Ending September 30, 2014: Focus on means and methods to monitor the trash racks with one or more of the proposed sonar systems to establish which system can collect the best information. Develop reliable methods of data collection, management and refinement. Commence preliminary inspection studies of a single trash rack per unit to start working through/gain greater understanding of the logistics involved with future trash rack monitoring, in anticipation of scaling up efforts over the course of the Feasibility Study. Initiate plant and engineering review of logistics involved with studies of the forebay areas. Installation of trial sonar in Unit 3 forebay.
2. Quarter 2- Ending December 31, 2014: Continue efforts that require additional preparation time, such as studies within the forebays due to plant safety and engineering review initiated in the first Quarter. Further refine and develop the study plan, which will include real-time data on plant operations and weather-related factors. Compare findings with available research to further refine the process. Determine the logistics of expanding the number of trash racks studied. By the end of the second quarter, select the optimal sonar system(s) evaluated with the goal of keeping that system in place for further studies and refinement for the remaining portion of the Feasibility Study.
3. Quarter 3- Ending March 31, 2015: Evaluate how sonar systems and methods need to be adjusted/refined at the trash racks and within the forebays to address winter weather conditions (e.g. freezing temperatures, ice formation, extended periods of foul weather). Initiate development of data collection and monitoring methods in anticipation of Pilot Study commencement.

4. Quarter 4-Ending June 30, 2015: Incorporate impingement experiments into the study which will entail securing fish to the trash racks to test capabilities of different sonars to recognize an impinged fish - assuming that a naturally occurring impinged fish event(s) has not already occurred in an earlier quarter(s). It should be noted that Entergy is awaiting guidance from NMFS on the most appropriate species and size of fish to use for these experiments. This will support the transition into the Pilot Study phase of the monitoring plan at the site. This quarter will additionally provide contingency time for any additional testing and refining that Entergy may deem necessary.

During each quarter, strategies may be revised as needed in response to findings or observations of that quarter. Results will be shared with NMFS through monthly letter report summaries.

The following provides additional information as it applies to the trash racks and the forebay areas of Units 2 and 3.

2.1 Trash Rack Feasibility Studies

Monitoring sturgeon at the trash racks is specified by RPM#1, and T&C#s 1.a, 1.b, and 1.c of the Opinion and will be performed as part of this Proposed Monitoring Plan's Feasibility Study component which has been initiated.

In preparation of the trash rack studies, we are adapting sonar imaging technologies with methods previously used successfully at this site and other sites for monitoring divers and related siltation issues. These technologies and methods will be used to verify the real time conditions including the potential impingement of sturgeon at the Indian Point plant site.

A list of proposed sonar imaging technologies to be evaluated during the Feasibility Study is provided in Table 1. These different technologies have associated strengths and weaknesses (e.g. the ARIS Explorer provides a high resolution, almost video-quality image, but has a limited range, in that it can only view an object less than 15-30 feet away with observable clarity). Most of the limitations of sonar are based on the physical limits of using sound in water and subsequent limits/trade-offs of resolution and range. That said, we intend to continuously review, revise, and improve our efforts, where possible, and address any significant limitations that are identified, by optimizing the most appropriate technology and methods at our disposal. To accomplish this, we intend to initiate studies and testing at the intakes with a minimum of 2 days per week of effort at one trash rack for IP2 and one trash rack at IP3. This effort will commence during the first quarter.

The studies will entail the inspection of the selected trash racks, to look for/verify any impinged sturgeon on the racks using a combination of imaging sonar technologies, the most appropriate of which will be determined over the course of the Feasibility Study. The trash rack studies will be accomplished by comparing successive images collected and recorded by using a sonar technology, at an interval that will be determined and optimized during the Feasibility Study. The studies will be conducted by field personnel trained in underwater inspections and sonar technologies, specifically in industrial and environmentally sensitive applications. The survey team will include supervision by a certified Hydrographer and a fisheries biologist familiar with the technology.

If changes are observed at the trash racks (i.e. the presence of an object such as an impinged fish, new detrital material or unusual debris coverage over a portion of the structure) between

successive imaging intervals, further verification of the changes will be conducted using a Remotely Operated Vehicle (“ROV”). The ROV will be outfitted with sonar positioning, a retrieval/ sampling arm, and video capabilities to document the observed object. These findings will be logged and documented through a standard procedure that will be developed during the Feasibility Study. Daily logs and data collection will include related information such as weather, tidal data, temperatures, etc. and plant related information in addition to specific location of observations, pump operational information and water velocities at the trash rack.

Should retrieval of sturgeon be required during the course of the Feasibility Study, these activities will follow the RPMs (2-5) that have been outlined in the Biological Opinion and addressed in detail in Section 2.4.

It is anticipated that over the course of the Feasibility Study, we will be able to further address the following essential components previously identified by NMFS:

- 1) Demonstrate the feasibility of the proposed technology to provide a view of the trash racks clear enough to document impinged fish.
- 2) Demonstrate the efficiency of the detection system (which will likely be a combined configuration of acoustic technologies) and provide detailed plans of verification for the Pilot Study as determined necessary. This will likely be accomplished by first showing the detection of fish at the trash racks, and then developing a plan to define the ability to detect species as previously discussed, with the goal of determining absence or presence of sturgeon impinged on the racks remotely (i.e. sonar(s) only) if possible and with the ROV as necessary, where validation of a fish identification cannot be done remotely and must be physically collected. As previously noted, we will also use the ROV to verify any new anomalies detected on the racks.
- 3) Demonstrate the range of conditions (weather, tides, lightning, turbidity) in which the system is reliable.

The previous section addressing goals for Quarter 4 notes the use of introduced fish for impingement detection experiments. It is anticipated that these studies (or impingement events should they occur earlier) will be key to addressing components 1 and 2 as identified by NMFS. It is further noted that NMFS will provide guidance on the appropriate species and sizes of fish to be used for these impingement experiments. Component 3 will be addressed based on the cumulative results collected over the course of the Feasibility Study.

2.1.1 Access to IP2 and IP3 Trash Racks

The following information is provided to further describe relevant details about how the specific structures (IP2 and IP3) will be inspected as currently planned in the Feasibility Study. Additional specifics will be developed as the Feasibility Study continues. Information provided below has been reviewed and developed during the preliminary equipment testing effort at the Indian Point site during the month of June 2014.

As previously stated, inspections of the IP2 and IP3 CWIS have been conducted by IPEC’s engineering staff to determine if there are feasible access points to perform acoustic data collection at the trash racks at IP2 or IP3. These inspections focused on access from the bulkheads and decks of the CWISs without significant civil or structural modifications, or the need to significantly modify the security system in these areas. The recent inspections revealed

potential deck-level access through narrow slots providing clearance to the water immediately upstream and downstream of the trash racks at IP2 and IP3.

However, due to security issues and added challenges from working at the deck elevations, it has been determined that the majority of trash rack field work during the Feasibility Study will be conducted from boats moored at the face of the intakes. This on-water approach will offer several benefits in verification of the data collected, and in the case that retrieval or verification of observed impinged objects is required, access is significantly enhanced by working at the water level. However, should significant weather-related issues (wind generated waves, floods, or ice) become a challenge, the evaluation and implementation of appropriate inspection sonar will be considered from the walkways adjacent to or above the trash racks during the Feasibility Study, for incorporation into the Pilot Study if necessary.

2.1.2 Trash Rack Studies at IP2 and IP3 (Feasibility Study)

The proposed trash rack studies are designed to observe and quantify the presence of sturgeon, particularly moribund or dead sturgeon, which could be impinged on the trash racks as they are carried by the river flow past the plant. Preliminary equipment trials performed in June 2014 successfully showed that sonar imaging technologies are likely the most appropriate methods to observe sturgeon impinged on the trash racks at IP2 and IP3. Access to the fixed trash racks at IP2 and IP3 was available from outside the Protected Area via boat. Mounted sonar technologies from the deck level walkways will also be evaluated as part of the Study.

Sonar technologies evaluated in the preliminary equipment trials included multiple system types that included side scan, scanning, and forward looking sonar systems (refer to **Table 1**). At this time, a combination of scanning sonar units, with forward looking sonar (multi-beam) systems, appears to hold the most promise. In addition, pan and tilt units will be included so that the field of view for a system will be enhanced for fixed location applications allowing the observer to “look around” when necessary. All data will be collected in a digital format. As the Feasibility Study continues, acoustic processing software packages will be evaluated to manage and post-process the data.

At this time, we have not selected a specific frequency or beam width of the anticipated sonars to be used. Since some of the different systems have multiple frequency and beam width options, and the benefits of utilizing multiple settings will allow greater reliability of inspection of the intake structures, the optimal settings will be determined over the course of the Feasibility Study.

As noted previously, during the first quarter of the Feasibility Study, we intend to select one trash rack at each unit, and completely image the rack several days each week. A minimum of 2 field days are planned each week, with time shared between each of the study stations both inside and outside the Protected Area (PA), and reviewing data. This will allow the field crew to flexibly manage their time between each of the study stations, and review data, in the most effective manner during this one year period adjusting as needed for weather, equipment, or changes in field conditions that warrant revisions in effort.

2.1.3 Trash Rack Studies at IP1

There are no trash racks at IP1 to monitor, as discussed in Section 1.2.1 above. The relevance of the missing trash racks to NMFS’s conclusion in the Opinion is discussed in Attachment 1.

2.1.4 Trash Rack Studies Implementation Schedule, Modifications, and Permits

A proposed schedule is presented in Attachment 2.

2.2 Forebay Feasibility Studies

The goal of forebay monitoring is to determine the presence or absence of fish, specifically sturgeon, and if sturgeon are present further determine if the fish are living, moribund or dead, and their residence time within the forebays. During the Feasibility Study, sonar devices will be placed in the forebays of IP2 and IP3 and studies will be conducted to evaluate the applicability and efficiency of various sonar technologies and methods in determining the presence/absence of sturgeon, their status (living, moribund, or dead), and the residence time of sturgeon within those areas. Forebay monitoring will not be performed at IP1, because the IP1 CWIS no longer has trash racks that might affect egress behavior of fish in the forebay area.

2.2.1 Access to the Forebays at IP2 and IP3

The forebays of IP2 and IP3 have additional challenges compared to the trash rack structures that will be addressed during the Feasibility Study. The forebays at IP2 and IP3 are located inside the Protected Area of each plant. Access adjacent to the waterline of each forebay is limited without major modifications of the intake structures. The ability to safely install sonar devices has been identified as a challenge, and significant consideration and planning must be given to ensuring the safety of personnel, plant equipment, and any sonar systems that are installed.

Special issues/considerations to be further addressed and reviewed during the Feasibility Study for forebay studies include:

- limited access through structural components of the plant,
- types, size and maintenance of sonar equipment to be placed through access point into the forebays,
- location and geometry (field of view) for various sonar systems and methods,
- bio-fouling of sonar equipment, and
- avoiding potential impacts to plant equipment.

These issues, and others, influence the technology and methods for the Feasibility Study recommended for forebay studies as described in Section 2.2.2 below.

2.2.2 Forebay Studies at IP2 and IP3

During the Feasibility Study, bracket mounting of sonar devices (**see Table 1**) will be tested and further developed as necessary. Due to limited access, no ROV use is currently anticipated for the forebays. We anticipate deploying and testing a potential combination of sonar technologies and alignment geometries with the goal of insonifying the entire forebay area when possible, so that any fish (specifically sturgeon species) entering or departing the area can be observed and those residing within the area of interest will be continuously observed. Once the appropriate configuration is determined, additional levels of imaging will be implemented and evaluated to attempt to verify species.

The Feasibility Study will continue using the selected technology, believed to be at this time a combination of forward looking sonar and scanning sonar systems with pan and tilt units to observe the presence or absence of sturgeon entering, exiting, and present within the forebays of IP2 and IP3. The Feasibility Study will be performed for up to one year to evaluate system performance over the range of conditions (weather, tides, ice flows, debris loading) experienced at IPEC to determine the conditions in which the system is reliable. Special attention will be given to documenting swimming patterns (e.g., general orientation, tail beats, water column location, and swimming direction) and size of the two sturgeon species using the best available acoustic technologies and software to collect and process such data

In addition to quantifying the presence or absence of fish, determining the ability to distinguish sturgeon from other fish then identify sturgeon to species, and determining sturgeon resident times will be evaluated based on comparing results of different sonar technologies. Site-specific conditions and their relationship to any observed sturgeon in the forebays of IP2 and IP3, including plant operations, structural issues, and the effects of weather and tides will also be observed and documented.

It should be noted that our preliminary work to date has determined that access to the single forebay at Unit 3 will require additional logistical efforts currently being evaluated and scheduled to begin by August using access from the deck area inside the PA, at the Unit 3 building. By using a combination of sonar technologies, we believe we will be able to monitor the entire bay from one or two access points. We currently intend to install a sonar system for evaluation on a temporary trial basis for the first quarter of the Feasibility Study, and depending upon those results, the system(s) may remain in place or be modified accordingly for daily/continuous monitoring. Further evaluation and optimization of the study configuration will take place over the course of the Feasibility Study.

For the forebay at Unit 2, monitoring options are limited. Access through the concrete deck is currently not possible and any changes would require significant planning and modification in order to avoid structural issues, potential structural failures, and mitigate safety concerns. Additionally, we have determined that the 3-5 inch gap between the trash bars and the concrete deck is not a viable point of entering sonar equipment into the Unit 2 forebay since the pole lengths, and geometry of the structures make this a difficult, and a low quality access point at best, based on this point in our early evaluation.

We are concurrently evaluating several other access options as the Feasibility Study continues. Since the distance from the face of the trash racks to the face of the Ristroph screen is approximately 7 ft, we are evaluating the possibility of sonar technologies having access through the trash racks from below the concrete wall at elevation -1.0 plant datum. We are also evaluating passing a smaller transducer through the space between the trash rack bars. Further evaluation and results will be summarized in the monthly letter reports.

2.2.3 Forebay Monitoring Implementation Schedule, Modifications, and Permits

As discussed above, additional access logistics planning and engineering evaluations are scheduled to evaluate potential points of access to the forebays. The Feasibility Study for forebay monitoring at IP2 and IP3 is expected to follow different schedules at the respective units due to the anticipated need for unit-specific plant modifications. During the ongoing Feasibility Study, the selected sonar technologies and methods will be deployed, and be

continually evaluated and optimized for longer term monitoring for the anticipated duration of one year. A proposed schedule is presented in Attachment 2.