ATLANTIC STURGEON PRE- AND POST-ENERGIZING STANDARD OPERATING PROCEDURE

1. Introduction

This Atlantic sturgeon (*Acipenser oxyrinchus) Pre-and Post-Energizing Standard Operating Procedure* ("SOP") is developed pursuant to Certificate Condition 163 ("CC 163") (NYSPSC 2013). CC 163 states: Within six (6) months after issuance of this Certificate, the Certificate Holders shall submit to the Department of Public Service (DPS) Staff for review, comment, and approval in consultation with New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of State (NYSDOS), detailed Standard Operating Procedures ("SOP") for compliance monitoring studies to be conducted in the Hudson River. The SOPs shall be consistent with the Scopes of Study attached to this Certificate:

- Benthic and Sediment Monitoring Scope of Study (Attachment 2 to this Certificate)
- Bathymetry, Sediment Temperature and Magnetic Field Scope of Study (Attachment 3 this Certificate)
- Atlantic Sturgeon Pre-Installation and Post-Energizing Hydrophone Scope of Study (Attachment 4 to this Certificate)

In order to comply with CC 163, the Certificate Holders will conduct, as a part of the proposed mitigation for the project, a *Pre- and Post-Energizing Hydrophone Study* of adult Atlantic sturgeon in the Hudson River Estuary.

The study will evaluate the movement patterns of spawning Atlantic sturgeon from the effects of the installation of the high voltage line and the subsequent magnetic field emitted by the operation of the cables. The study will determine if the fish tend to avoid or are attracted to the area(s) where the cables are installed. As part of the requirements of CC 163, the pre-energizing monitoring event will occur no sooner than 3 years before the anticipated post-energizing monitoring.

In order to monitor the movements of the sturgeon, it is the Certificate Holders expectation based on previous conversations with the NYSDEC that its staff will tag up to 50 adult Atlantic sturgeon (>100 centimeters [cm]) to provide target fish for this study. Tagging will occur in the lower estuary (e.g., Haverstraw Bay) or in the spawning area (near Hyde Park). All tagging activities will be conducted in coordination with the NYSDEC. Sturgeon capture and tagging methods that the Certificate Holders would employ, in the event NYSDEC declines to tag the sturgeon, are presented in Subchapters 3 and 4.

2. Sturgeon Acoustic Monitoring Program

The Certificate Holders, as part of the mitigation for habitat disturbance, will conduct a fine scale mapping of sturgeon use in the segments of the Hyde Park spawning area. The study area is approximately 8 miles in length and is bounded by two distinctive physical features: Crum Elbow to the south and the confluence of the Hudson River and Rondout Creek to the North (the spawning reach). The following sections provide the proposed SOPs for the anticipated work.

2.1 Acoustic Monitoring

The Certificate Holders will position an array of acoustic receivers/submersible data loggers (SDLs) at intervals throughout the spawning reach of the Atlantic sturgeon and will track tagged fish for both lateral and vertical movement.

2.1.1 Range Testing

As part of study mobilization, an initial subset of receivers will be range tested prior to deployment of the full SDL array to allow for optimization of the placement and proper equipment calibration. Range testing will consist of deploying 10 to 12 SDLs in the study reach. Three to five acoustic tags will be anchored within the study reach for up to 5 days to evaluate the spacing of the SDLs for the survey. During this time frame the deployed SDLs will be moved into different configurations to evaluate coverage performance. In addition, tags will be dragged through the study area at various depths to assess the design of the receiver array to track fish movement at various depths. Range testing will be conducted in either April of the anticipated study year(s) or during the preceding summer/fall.

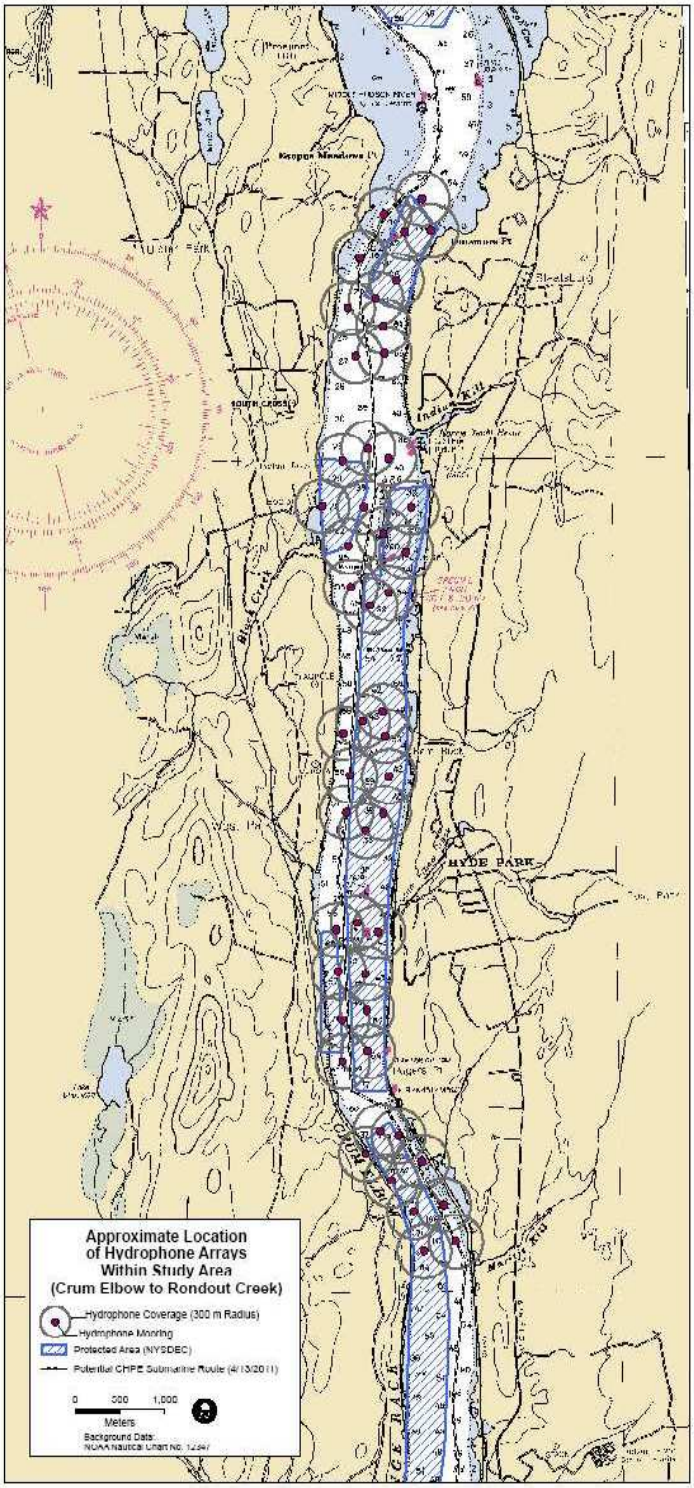
2.1.2 Pre- and Post-Energizing Monitoring

Five tracking areas will be utilized (Figure 1). The locations are as follows:

- Crum Elbow;
- North of Crum Elbow;
- Esopus Meadows;
- Vicinity of Dinsmore Point; and,
- South of Indian Kill.

This will divide the estuary width at each transect into several north-south segments and will divide the longitudinal reach into five segments. SDL arrays will be installed in April and removed in October to prevent ice damage to the equipment and allow for safe installation. The timing of the deployment of receivers will be coordinated with NYSDEC, NOAA Fisheries, and NYSDOS.

Figure 1
Proposed Location of Hydrophone Transects within the Designated Study Area
(Crum Elbow Creek to Esopus Meadows)



1. Deployment of Receiver Array

It is anticipated that up to 50 SDLs will be required for the Pre- and Post-energizing monitoring program depending on the results of the range testing. The deployment of the receiver array will be performed as follows:

- Clock-synchronize the SDL receivers (using the SDL host software).
- Configure the SDLs for local conditions (echo filter settings, symbol definition files assigned, duty cycles set, and tested for reception in real time).

2. Data Recovery

Data recovery and equipment maintenance will be based on manufacturer specifications on the lifespan of the batteries and the data storage capacity of the SDL. The data will be downloaded from the initial array within 3 weeks of deployment to check on data recovery. However, after the initial 3-week check, data from the receivers will be downloaded on a monthly basis as part of an overall check on equipment function and loss due to either natural or manmade causes. If receivers are lost or damaged, replacements will be deployed in the same location.

Retrieval of SDLs:

- Retrieve the SDL from the surface or through the use of a SCUBA diver.
- Inspect SDL for any damage. All damaged SDLs will be replaced.
- Download the SDL data to an on-board computer.
- Ensure SDL is configured correctly.
- Re-set the SDL on the river bottom and chart the GPS coordinates.to ensure accurate mapping of the location.

Upon completion of the post-energizing study, the Certificate Holders will turn the equipment over to NYSDEC and they will assume ownership and maintenance of the acoustic equipment.

3. Capture Methods for Tagging Atlantic Sturgeon

In order to capture up to 50 Atlantic sturgeons, and if the Certificate Holders will be completing the tagging of the Atlantic sturgeon, the following sub-sections present the SOP for each proposed sampling method.

The Certificate Holders currently anticipate the need to potentially use two sampling methods: gill nets and otter trawls, every day over a 2 month time period (mid-April to mid-June in order to

capture and tag up to 50 Atlantic sturgeon. For this study, gill nets are the preferred method of capture.

3.1 Gill Net

At each sample station, gill nets will be set perpendicular to the river flow. Gill nets will consist of stretched mesh sizes, ranging between 4 and 6 inches. The gill nets would be set along the bottom with anchors and a lead line. The top of the gill net would be equipped with a float line and buoys to ensure the net remains upright in the water column.

Although sturgeon captured in a gill net may be subject to stress and slight injury, they are a very hardy species and use of gill nets is considered the recommended method for capture (Moser et. al, 2000). In order to lessen potential stress on the sturgeon, the duration of gill net deployment will be based on water temperature. When water temperatures > 15^{o}C, gill nets will be set for no more than 2 hours. When the water temperatures are < 15^{o}C the gill net set times will not exceed 4 hours. The SOPs for captured sturgeons are as follows:

- Don smooth rubber gloves when handling sturgeon to reduce abrasion of the skin and removal of mucus.
- Hold sturgeon in floating live pens during processing. When on-board, the fish are to be placed in a flow-through tank that will provide water replacement every 15 to 20 minutes with the dissolved oxygen not falling below 5 ppm.
- Measure and weigh (in grams) the captured sturgeon. Lengths (TL) to the nearest millimeter (mm) and weights recorded using a sling or net to support the fish.
- Do not exceed a total holding time of 2 hours for any one fish after removal from the net.

Should a sturgeon become entangled in the net, the scientists will cut the net to remove the sturgeon as quickly as possible to avoid additional stress.

Any bycatch trapped in the meshes of the net will be extracted and placed back in the water. Any shortnose sturgeon captured as bycatch will be quickly scanned for pit tags, measured and weighed, and returned to the river.

3.2 Otter Trawl

If gill netting proves difficult to capture the 50 fish in one season, the Certificate Holders may also collect fish by an otter trawl. An otter trawl is a large net dragged along the bottom. The term otter refers to the wooden doors affixed to the net that hold the net open during trawling. Trawling will be targeted to occur in areas where bottom substrate, debris, etc. would not be subject to snagging; however, if a trawl did become snagged, it would be untangled immediately to reduce stress on the fish.

The SOPs for otter trawling are as follows:

- Check trawl to determine the equipment is in good condition and attached securely to the towing warp.
- Check the net or mesh is clean and there is no catch left in it from previous sampling.
- Tie cod-end securely.
- Lower gear over the stern and pay-out the cable to a distance approximately equivalent to 3 times the depth of water. When nearly all the cable has been paid out, the vessel will slow down to the nominal towing speed (1-2 knots).
- Monitor bottom characteristics using a depth sounder/global positioning system to limit disturbance of substrate while trawling.
- Record the time, position and water depth at the start and end of the tow. If the positional data provides the position of the vessel, the length of cable that has been deployed will be recorded so that the actual position of the trawl can be calculated by 'layback', The start of the tow is defined as the time (or position) when the net is paid-out. The end of the tow is defined as the time (or position) when hauling begins.
- Tow trawls at a maximum speed of 2.6 to 4 knots against the tide and for no more than 5 to 10 minutes per trawl.
- Record the duration of the tow and/or the distance covered.
- Clean all gear which has collected a moderate amount of mud or sand, by gently towing the gear behind the vessel prior to bringing on board.
- Don smooth rubber gloves when handling sturgeon to reduce abrasion of the skin and removal of mucus.
- Empty the gear and any sturgeon caught.
- Transfer sturgeon to the floating live pen. If an on-board tank is used, provide water replacement every 15 to 20 minutes with the dissolved oxygen not falling below 5 ppm.
- Measure and record captured sturgeon length (TL to the nearest mm) and weight (in grams) using a sling or net to support the fish.
- Do not exceed a total holding time of 2 hours for any one fish after removal from the net.

Any bycatch organisms trapped in the meshes of the net will be extracted and placed back in the water.

Any shortnose sturgeon captured as bycatch will be quickly scanned for pit tags, measured and weighed and returned to the river. If required, the gear should be washed with a deck-hose or by towing behind the vessel to remove dirt or trash including parts of small organisms.

4. Tagging of Atlantic Sturgeon

If the Certificate Holders will be completing the tagging of the Atlantic sturgeon, the following sub-sections present the SOP for implanting the acoustic tags.

Tagging of Atlantic sturgeon will occur as quickly as possible. Atlantic sturgeon selected for transmitter implantation, would not be netted at air temperatures > 27^{o}C or < 7^{o}C. The surgical procedure would require approximately 10 minutes to complete, with a total holding time (i.e., anesthesia induction, surgery, and recovery) of 20 minutes or less. Internal tags would not be implanted in unhealthy or stressed fish.

4.1 Anesthesia for Implanting Acoustic Tags

Each sturgeon prepared for surgery would be sedated in a bath solution of up to 50 mg/L of tricaine methane sulfonate (MS-222), buffered to neutral pH with sodium bicarbonate. Upon reaching a sedated anesthesia (i.e., slow movement and breathing reduced) animals would be removed from the solution and placed on a surgery rack to surgically implant the tag. The anesthetic's induction and recovery time could vary between 3 and 5 minutes.

4.2 Surgery for Implanting Acoustic Tags

The methods for surgically implanting the transmitter into an Atlantic sturgeon under anesthesia are the following.

- Remove the sturgeon from anesthetic bath and place in a specially constructed “V”-shaped surgical trough, which will be lined with a plastic tarp. This trough will be slightly slanted in one direction to afford water drainage during tag implantation.
- Place a tube supplying fresh water over the gills in the mouth of the fish to maintain respiration.
- The incision site for implanting the tag will be 40 to 60 mm anterior to the pelvic fins; although, the specific location would vary with fish size.
- Disinfect the incision site with povidone iodine (10 percent solution).
- Make a 10 to 16 mm long incision at the incision site using sterile surgical instruments.

- Insert a sterilized sonic transmitter, coated with an inert polymer compound, into the surgical opening of sturgeon.
- Close the incision with interrupted sutures of 3-0 polydioxanone (PDS) and treat with povidone iodine to prevent infection.
- Place fish in the holding pen until the anesthetic wears off prior to releasing them into the Hudson River.

5. Equipment

Pending discussions with NYSDEC, the Certificate Holders plan to employ the hydrophone system and acoustic transmitters. This will allow for the required micro-habitat utilization evaluation while collecting 2D and 3D positioning data.

6 . Data Analysis

The primary output from each element of the program will be 2D or 3D plots of sturgeon movements to determine if there is a discernible response to the presence of the cable. The available software will have the ability to process of presence/absence, 2D and 3D data for acoustic data, present animal locations in different coordinate systems (e.g., Projected or Geographical Coordinate Systems) and provide quantification of the precision and accuracy of fish positions.

7. Reporting

A draft report of the pre- and post-energizing monitoring events will be submitted within 3 months of the completion of both field seasons and after consultation with the NYSDEC, NYSDOS, and New York State Department of Public Service ("NYSDPS"). The report will include a description of procedures followed during the program and field data results. The report will also provide recommendations as appropriate for improving the design and implementation of the study. Once comments on the draft report are received, the report will be finalized. Each report will be submitted to the New York State Public Service Commission Secretary, NYSDEC, NYSDOS, NOAA Fisheries, and NYSDPS.

8. References

Moser, M.L., M. Bain, M.R. Collins, N. Haley, B. Kynard, J.C. O'Herron, G. Rogers, T.S. Squiers. 2000. A Protocol for Use of Shortnose and Atlantic Sturgeons. Prepared by Moser M.L. et. al. NOAA Technical Memorandum NMFS-OPR-18.

NYS Public Service Commission (NYSPSC) (2013b). Revised Appendix C. Champlain Hudson Power Express, Inc. Proposed Certificate Conditions. January 18, 2013.