Relicensing Study 3.3.15

ASSESSMENT OF ADULT SEA LAMPREY SPAWNING WITHIN THE TURNERS FALLS PROJECT AND NORTHFIELD MOUNTAIN PROJECT AREA

Updated Study Report Summary

Northfield Mountain Pumped Storage Project (No. 2485)
and Turners Falls Hydroelectric Project (No. 1889)

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1.1 Study Summary

The purpose of this study was to determine the impacts, if any, that operations of the Turners Falls Project and Northfield Mountain Project may have on sea lamprey spawning activity. Study objectives include:

- Identify areas within the Project area where suitable spawning habitat may exist for adult sea lamprey.
- Conduct spawning surveys to confirm use of areas identified as containing suitable spawning habitat
- Describe spawning mound characteristics, including location, size, substrate, water depth, and velocity
- Collect the information to assess whether operations of the Turners Falls Project and Northfield Mountain Project are adversely affecting spawning areas (*i.e.,* if flow alterations are causing dewatering or scouring of lamprey spawning area).

1.2 Study Progress Summary

Task 1: Field Data Collection

In order to assess sea lamprey spawning activity and habitat, a total of 40 adult sea lamprey were collected from the Holyoke fish lift and transported to two locations (Rt.116 Bridge in Sunderland and the Turners Falls Impoundment) where they were radio-tagged and released. Half the lampreys (20) were tagged and released during the early portion of their run (5/21/15); ten of the 20 were released at the Rt. 116 Bridge and ten were released upstream of Turners Falls Gatehouse. The other half was released during the mid-portion of their run (5/28/15) at the same two release locations. The tagging information is summarized in Table 1.

Table 1: Sea Lamprey Collection, Tagging and Release Summary Table.

Date of Collection/Release	Collection Location	Number of lamprey tagged and release location	Number of lamprey tagged and release location	Total Tagged and Released
5/21/2015	Holyoke	10 – Rt. 116 Bridge	10 – Turners Falls Gatehouse	20
5/28/2015	Holyoke	10 – Rt. 116 Bridge	10 – Turners Falls Gatehouse	20

All sea lamprey were anesthetized, measured for weight, total length and girth (directly anterior of the exposed gill slits), and sexed, then a radio tag was surgically implanted. Radio tags were inserted into the peritoneal cavity through a small incision on the ventral side, approximately 3 inches anterior of the cloacal aperture. The incisions were sutured using a catgut suture and Bactrim was applied to the wound to prevent infection. Tagged lamprey were allowed to recover for 4 to 5 hours in a flow through water bath before being released. All 40 lamprey recovered successfully and swam away vigorously at the time of release. The frequency and codes transmitted by all the radio tags implanted was compatible with tags used for the adult shad study to ensure detection by stationary receivers deployed for the shad study.

Sea lamprey were mobile-tracked twice weekly; tracking was conducted by boat using a Lotek receiver and a 3-element yagi antenna. Weekly tracking was first conducted from Holyoke Dam to the Mount Herman School and second from the Hatfield S curve to Cabot Station. A total of 17 days of mobile tracking

occurred between 6/3/15 and 7/7/15. All radio frequencies were shared with TransCanada so that fish moving from the Turners Falls Project into the Vernon Project vicinity would continue to be monitored.

Potential spawning areas of sea lamprey within the Project affected areas were inspected in detail to determine if habitat was suitable for spawning grounds. Areas were characterized for substrate, depth and the presence or absence of actively spawning sea lamprey in the area. A total of 30 redds were GPS located in five (5) distinct regions of the Project area as summarized in Table 2.

Table 2: Number of GPS located Redds and Locations in Project Areas.

Project area	Number of GPS located redds	Number of Capped redds
Above Turners Falls Dam, Connecticut River mainstem within close proximity of Vernon Dam (both sides of Stebbins Island)	7	1
Above Turners Falls Dam, Ashuelot River confluence with the Connecticut River	11	1
Above Turners Falls Dam, Millers River confluence with the Connecticut River	5	1
Below Turners Falls Dam in bypass, Fall River confluence with the Connecticut River	2	1
Below Turners Falls Dam and Cabot Station, Hatfield S curve below Rt. 116 Bridge	5	1
Totals	**30**	**5**

Each of the GPS located redds was monitored every third day for several parameters including substrate, depth, water velocity and water quality (temperature, dissolved oxygen (DO), turbidity, pH, conductivity). Five of the 30 redds were capped using a 4x4ft, weighted PVC framed collection net (1mm mesh) funneling into a collection jar on the downstream end in order to capture emerging larvae as illustrated in Figure 1. Caps were deployed only after sea lamprey spawning was initially observed and revisited for multiple days to ensure lamprey were no longer actively spawning on the site. Caps remained in place for 14 to 21 days, at which point samples were collected in jars, fixed with formaldehyde and transported to the lab to be further analyzed. Spawning grounds within the Project area were monitored from the time of lamprey arrival until water temperatures exceeded 22°C. All 30 redds were monitored over a range of existing and operational conditions and observed changes to the habitat or redd quality were recorded.

Figure 1: A photo of the apparatus used to cap sea lamprey redds. Shown here is the cap of the redd located in the Fall River confluence with the Connecticut River.

Task 2: Data Analysis

All radio telemetry and redd data were compiled, entered into a database, assured for quality, and archived. Data analysis and reporting are in process.

Task 3: Report

A final report will be completed by June 1, 2016. Extra time is needed to process the telemetry data.

1.3 Variances from Study Plan and Schedule

To date, there are no variances from the study plan or schedule.

1.4 Remaining Activities

- Data analysis and reporting.