

**Roanoke Rapids/Gaston Hydropower Project
American Eel Working Group Meeting**

March 8, 2017

Final Minutes

Participants: Jeremy McCargo (NCWRC), Fritz Rohde (NMFS), John Ellis (USFWS), Kirk Rundle (NCWRC), Tom Kwak (NC Coop Fish and Wildlife Unit), Jesse Fischer (NC State), Corey Chamberlain (Dominion), Pete Sturke (Dominion), Bob Graham (Dominion), Todd Mathes (NCDMF), Karen Canody (Dominion, phone), Scott Smith (VDGIF, phone), Daniel Deng (PNNL, phone).

Pete opened the meeting with a round of introductions and safety points.

Dominion Sampling

Roanoke Rapids Eelways - Pete presented the results of 2016 trap and transport efforts at Roanoke Rapids Dam. For the second year, the North Eelway catch exceeded the South Eelway, for no apparent reason. Jeremy noted the North Eelway catches have remained fairly stable, but there has been a big drop off on South Eelway. In all, a total of 44,368 eels were collected at the North Eelway, 5,810 eels at the South Eelway, and 631 at the Tailrace Trap.

The peak catches came with a fall run in October that coincided with Hurricane Mathew – approximately 14,000 eels. Catches remained high with subsequent flood releases before tapering off. The water temperature threshold of 15 C held in 2016 for spring, but high flow apparently overrode temperature in the fall, when temps were about 20 C during the fall peak run.

Gaston Dam Traps – 2016 was a record year. A total of 572 eels from the South Trap and 14 from the North were caught. The total to date for Gaston Dam catches is 845 eels from the South Trap, and 27 from the North (872 total from Gaston Dam combined). There was some discussion about the eel movements within Roanoke Rapids Lake.

Eel Estimation Comparison – A total of 1432 eels was used for volumetric and biomass methods of subsampling. For the Volumetric method, the estimate was 1472 and was obtained in 25 minutes utilizing a total of 14 dips. For the Biomass method, the total estimate was 1464 and took 24 minutes, with an average mass of 3.232 g/eel, utilizing 8 dips. Dominion recommendation is the Biomass method is less sample biased, possibly easier on the eels, and consistent with the current accepted methods in the industry. Tom Kwak added that you get the added benefit of having a biomass estimate for the catches and population estimations going forward. You also get biomass measures on individual fish. The group agreed to go with the Biomass method henceforth.

Gaston Dam Electrofishing – During spring and fall electrofishing surveys were conducted at Gaston Dam. The usual summer sample was missed due to time restrictions and equipment failures. For spring, average CPUE was 2.2 fish/hour, for fall 12.4. Most of the eels caught at Gaston were in the spring survey. Kirk noted he sees 3-4 eels in Lake Gaston while sampling in most years.

Action Item: Pete to check on size range of eels collected by EF versus caught in the traps. *Complete and sent out to the AEWG via email on 9 March 2017*

Action Item: Kirk to save any big eels collected in future. Kirk noted most of the eels he has seen in Roanoke Rapids Lake were relatively small. But in Gaston, they see very large eels occasionally.

Deep Creek Electrofishing – A silver eel was caught at the mouth of Deep Creek near the old railroad trestle, where the creek enters Roanoke Rapids Lake during the fall survey of 2016. Overall CPUE for 2016 was 10.7/hour. CPUE progressively increased from spring (1.8) to fall (23.8).

Tag recaptures – A total of 9 tag recaptures came from the North eelway.

Action Item: Completed 3/22/2017 by Pete, These tag recaptures were processed and all came from the batch tagging effort on 29 April 2013. The remains of the Eels will be sent to Jesse Fischer at NCSU.

2017 Eelway and Trap Upgrades – Have switched from plastic to metal screen mesh on outlets. Also modified spray bars to reduce biofouling. Currently working on design and cost estimates to get larger holding tank for the North Eelway.

EPRI Downstream Passage Literature Review – the gist of the report is the morphology of eels makes them more susceptible to turbine mortality than many other fishes. It has been very difficult to guide eels, and physical exclusion may be infeasible due to costs and operational constraints. Light guidance shows the most promise for behavioral guidance of downstream migrating eels. With regards to turbine type, the review provided information on the Alden fish friendly turbine. However, there are no plans for turbine upgrade at Roanoke Rapids. Kirk has concern with light guidance that stripers would also be guided out of the reservoir. Jeremy noted with QRR at Kerr, increased flow may provide better opportunity to move eels out.

Action Item: Complete and sent along with final minutes to AEWG on 3/27/2017

NC State Studies

Otolith Ageing - Jesse provided a review of their work with eels provided by NCWRC and Dominion. Interested in age and growth, sex and gonadal development, and *A. crassus*. Todd brought up the Swim Bladder Degenerative Index. Jesse noted he is not comfortable with applying it, due to overall relatively thin swim bladder walls.

Histology – No intersex condition observed. Thirty yellow eels were examined. 50% were undifferentiated, 9 females with normal ovaries, 4 males with normal testis. Two individuals with no gonads. Overall range of sizes was 167-390 mm TL.

Length-frequency - Jesse presented the length-frequency plot, with modes around 150 and 260 mm, that may represent Age 1 and 2 cohorts, respectively. Largest fish were about 575 mm. Deep Creek had a lot of fish in the 350 – 360 mm range. At Gaston, mostly small fish < 220 mm collected from electrofishing and traps. When combined with electrofishing data with Gaston trap data, it provides an odd size structure.

Length-weight - Length-weight relationships from the lake versus the river did not show a lot of differences for females or males, aside from males being smaller. The eels rarely reached 120 g and all were less than 400 mm. However, there may be some lake/river separation in L/W relationships for larger males. What is odd is seeing undifferentiated individuals in the lake at sizes that are differentiated in the river. This is contrary to the faster growth/early development scenario.

A. crassus – About 1/3 – ½ have the nematode at the time the eels were examined. May have been infested in past, can't tell. A graduate student at VIMS (Zoemma Warshafsky) should have a publication soon related to effect of nematode on swim bladder (Thesis: Impact of the parasitic nematode *Anguillicolides crassus* on Chesapeake Bay American eels). There were up to 14 nematodes per fish. Jesse found fish with over 7% of their body weight composed of nematode. Twenty of 24 eels that had >1% nematode load were from the Gaston Traps. Peak percent body weight infestation occurs in the 100-200 mm range. The silver eel (410 mm) had 10 nematodes.

Ageing – Jesse provided some example photos to explain the ageing process. A major focus of Jesse's work is to look at means to standardize eel ageing protocol, as a wide range of approaches have been taken by different researchers. There was considerable discussion related to transition checks and differences between Sound and river fish.

Action Item: Dominion to provide Anthony Overton paper on glass eel entry to the Roanoke River. *Complete and sent to AEWG via email 9 March 2017*

The silver eel was female, Age 4, 410 mm TL. Three annuli following elver/transition check. In 2017 NC State has started sectioning a subsample to compare between-reader precision. Preliminary results: Eels are age 1 or 2 when trapped. Riverine eels are similar in terms of sex at length, and length at age, from Georgia and South Carolina. This is faster growth than in northern populations. Eels in RR Lake appear to grow faster and have lower length at sexual maturity than those in the Roanoke River. This may be an indicator that maturity may be more related to age than the size distribution considering the alteration of habitat from a riverine system to a lake. Seems similar to the "petite" adults observed in the Ontario Power Generation trap and transport program on the St. Lawrence River.

Plans for 2017 - Would be good to get more large eels, and those that are closer to outmigration. Otherwise continue with program as in 2016.

Action Item: Dominion to send AEWG American Eel food habits study. *Complete and sent to AEWG via email 9 March 2017*

Action Item: Jesse to provide Pete with version of the presentation he provided that has minor edits. *Complete and sent to AEWG via email 9 March 2017*

University of Tennessee Study

Joel Corush provided a description of the work he is doing on the gut microbiome of the American Eel. The specific research question is "Are changes in gut microbiomes driven more by intrinsic developmental changes in the host or by extrinsic influences of the environment experienced by the host?" Joel plans to maintain some Roanoke River eels in the bypass for about two weeks. Gut microbiome will be examined to identify the type of bacterial DNA sequences within each sample. Another treatment will occur for eels from Albemarle Sound. So, there will be a freshwater and saltwater comparison. The study is focused on American Eels as results have application to eel farming. As the NMFS representative for the AEWG, Fritz approved Dominion providing the eels from the eelway to Joel.

FERC Recommendation

The AEWG representing the DFRTAC agreed that they would no longer provide annual notifications to the FERC regarding delay of design for upstream passage of American Eels at Gaston Dam. Instead the DFRTAC will notify the FERC when a decision to move forward with design is made, per the FERC recommendation of 2016.

Pacific Northwest National Laboratory Studies

Pete introduced the PNNL study planned for 2017. There are two study approaches. The first involves tagging American Eels obtained from the eelways with newly developed acoustic transmitters designed for Pacific lampreys and eels. The second objective of the study is how eels approach and interact with the Roanoke Rapids Dam. Approximately 100 juvenile eels will be tagged with an injectable acoustic microtransmitter (1.2 cm, 0.08 g) with an expected battery life of 30-45 days for the creek study. Receivers were recommended to be put near the Gaston and Roanoke Rapids dams as part of this study, to see when eels left Deep Creek which way they turned. Daniel explained how the tags were designed for high frequency signals to make them more applicable around dams, where turbulence and low frequency vibrations have complicated tracking efforts in the past. Originally, the design was for salmon fry. The receivers have about a 100 m detection range.

Upon further discussion with Daniel Deng from PNNL and the AEWG it was found that we could conduct the study in the month of June with up to 20 receivers and 120 tags at our disposal. As part of the DOE funding for PNNL they need to have the fine tracking study of eels adjacent to the dam itself. Considering that requirement, the AEWG collectively discussed options and decided that the study should utilize three release locations for the study and an array of receivers to capture any fine and large scale movements of eels within the 30-45 day window of operations. The three release locations will be: Directly upstream of the powerhouse in Roanoke Rapids Lake, the current 5th street boat ramp eel stocking location, and at the Rt. 158 bridge on Deep Creek. For the tailrace, there are concerns with the turbulence during peaking and if a receiver would be able to sustain those conditions. A more formal study plan will be submitted to PNNL along with the AEWG so we can gather comprehensive eel tracking data on Roanoke Rapids Lake.

NCDMF – There is now an aquaculture facility in the state near Trenton. They have collected some glass eels and are raising them up (Rick Allen, American Eel Farm). The farm has been successful so far keeping them alive. NC State has been working with Dick Stone, an associate of the facility, evaluating habitats for harvesting glass eels. The thought is modified habitats may not be productive habitats for glass eels, so may be good areas from which to harvest them.

NMFS – Some money may be available for silver eel tagging studies using VEMCO tags, if Dominion can demonstrate it can collect silver or maturing eels.