

**Dominion Energy, Diadromous Fish Restoration and Technical Advisory Committee (DFRTAC)**  
**American Shad and Eel Working Groups**  
**21 January 2021**  
Conference Call Scheduled from 0900-1200

FINAL Meeting Minutes

**Present (Conference Call Attendees):**

Dominion Energy - Peter Sturke, Corey Chamberlain, Paul Vidonic, Taylor Allen, Caleb Gaston, John Swenarton

NMFS - Fritz Rohde, Twyla Cheatwood, Kevin Mack, Bjorn Lake

USFWS - John Ellis, Doug Newcomb

NCWRC - Jeremy McCargo, Katy Potoka, Heather Evans

NCDMF – Holly White, Todd Mathes

VDWR - Dan Michaelson

Alumnus – Bob Graham, Wilson Laney (NCSU)

AKRF – Justin Krebs, Carlos Lozano

**Agenda – rearranged in minutes below due to participant conflicts**

American Shad and Atlantic Sturgeon

- Introductions and scribe
- *Atlantic Sturgeon Update – VCU (Garman and Balazik – timing dependent upon availability)*
- License Article 407 – Roanoke River Bypassed Reach Flows
  - **Decision needed on bypass flows for 2021 and beyond**
- Updates on Shad in the Roanoke
  - Dominion Update on Bypass Sampling 2020
  - *Shad genetics – Heather, NCWRC*
  - *Shad Stocking 2022 and beyond – Jeremy/Katy, NCWRC*
  - *Shad tagging and telemetry – Holly, NCDMF*
- American Shad Passage future

American Eel

- Eel Passage Update
  - Rapids/Gaston 2020 season wrap
  - CWT recaptures
  - Gaston construction update
  - Plans for 2021 – effectiveness and distribution studies, O&M Manual
- *NMFS update on Upstream Eel Passage triggers manuscript – Kevin/Twyla, NMFS*
- *ASMFC Stock Assessment update – Todd, NCDMF*
- *American Eel Habitat Mapping Roanoke Rapids Lake – Doug, USFWS*
- Downstream Passage Update
  - *RRL Eel Population and telemetry update – Justin, AKRF*
  - Fish Friendly Turbine update – Dominion

2021 Plans and other member updates

- Upcoming meetings
- Field work 2021
- Recent publications of note

## **Introductions and scribe**

Peter convened the meeting at 9:08 a.m. He noted that we have a full DFRTAC meeting today, for all species. Peter reviewed the agenda and hoped that we can finish by noon. He noted that Wilson had volunteered to be the scribe, so thanks.

Peter reviewed the agenda. Matt and Greg may join us to give an update, although they didn't do a whole lot last year. Peter noted decision points were in bold on the agenda. He noted that we need to make the decision about bypass flows to be used in 2021. He noted that several members have to join another call and will get off at 10:00 a.m. This will involve several of them for about an hour. Peter took note of those individuals.

Fritz noted that there are names on the screen he doesn't recognize and asked that we do introductions. Peter introduced everyone. Justin and Carlos are from AKRF, helping with the population studies. Bjorn Lake is a fishway engineer for NMFS. Caleb is from Dominion, a biologist who works mostly in SC. Dan is from VA Department of Wildlife Resources. Doug Newcomb is from USFWS. Heather Evans is NCWRC, a conservation geneticist. Holly is from NCDMF. Jeremy is from NCWRC. John Ellis is USFWS. John Swenarton is stationed in CT and is their Dominion Energy Biology Manager. Kevin Mack is from NMFS. Twyla is also from NMFS. Todd Mathes is from NCDMF. Paul Vidonic and Taylor Allen are both in Richmond and from Dominion. Bob is a former Dominion Biology employee.

Peter noted that was a full group, so that is good.

## **Shad and Atlantic Sturgeon**

### **Atlantic Sturgeon Update**

The Atlantic Sturgeon update was deferred until such time as Drs. Balazik and Garman could join the call [NOTE: see below for update].

Peter noted that we do kind of need to get our brains thinking again about the American Shad passage future. We need to consider what is coming up. Similar to the Alosa Task Force in VA, we need to consider restoration.

Wilson mentioned Joe Zydlewski's presentation on American Shad to the ASMFC Habitat Committee and recommended that we obtain it.

Peter noted that we will move on to American Eel once we are finished with shad. He reviewed the rest of the agenda. He noted that Kevin and Twyla have put together some figures from their eel manuscript and will share those. He noted that he is also prepared for Todd to share anything from the ASMFC current stock assessment. Doug Newcomb will give us an update on his American Eel habitat mapping as well.

Justin will give us an update on the downstream passage. Fish friendly turbine update is on as well and they will just give us some insight on this

Wilson noted to the group that the South Atlantic Fishery Management Council's Ecopath with Ecosim (EwE) model was done and ready to take questions. He noted that while the model does not cover the inland portions of South Atlantic rivers, it does cover all of the offshore marine aspects of the life history of the species with which we are working, so if we think of questions, such as predator-prey

interactions, that we might want to ask the Model Team to address, Wilson would be pleased to take them to the team on our behalf.

Bob asked if the model could be used to explore American Shad questions.

Wilson suggested that if we could come up with some questions, we could submit them to the Council's Science and Statistical Committee and Lauren Gentry (with Florida Fish and Wildlife Conservation Committee, a key member of the team that has assembled the model), and see if they thought that they could shed any light. He thought that mostly it would be useful on the marine end of the American Shad life cycle.

Peter noted that we might coordinate with the folks in Virginia on any questions.

### **License Article 407**

Peter reviewed the License Article 407 provisions. The next study period, if we go to it, would be to go to 1,000 cfs. Peter noted that they submitted their report to FERC in June of last year, and that coincided with NCWRC not collecting brood stock. The NCWRC will decide this year whether to continue stocking. The decision we have to make on the flows is whether to stay at 750 or go with 1,000 cfs. He suggested that we review the data then have a group discussion to decide. He noted that he and Corey were talking yesterday and noted that they have to go to 1,000 at some point, since that is a provision of the license. He noted that there are a lot of pros and cons. If they have to eventually do it, they could just do it now. He asked Corey to comment.

John Ellis asked if Gaston was offline right now.

Corey said that there was an outage, earlier in the year. Corey agreed with Peter, they just want to have a discussion. There is a 1,067 flow that goes in for about 7 days each year, with 750 on either side. Do we want to bump the whole flow up to 1,000 for the Anadromous spawning season?

Wilson asked how many years we have done 750. It has been five years. Wilson noted that a lot of experimental designs use three years, so that might argue for going to 1,000. Maybe we look at the data first.

Peter noted that the data have been fairly variable. He noted if we continue with 750, we will have three years with no brood stock collection or stocking from NCWRC. So, that is something to consider. If we step up to 1,000, we could have a direct comparison, nearly, with the other years.

Peter reviewed the Bypass stations and what is collected at each. The reach is really heavily-braided, so it is hard to say exactly where the American Shad are spawning. Jeremy had noted that we don't necessarily want all of the American Shad to spawn in the Bypass Reach.

Peter showed last year's hydrograph. It shows the range of flows and what flows lead into the spawning season. In February, we got back to normal flows. March and April were some peak flows in the total river. He noted that we can come back to that figure if needed. He noted that he will send the presentation out for us so we can review. He noted that our target today is American Shad. The CPUE (fish/hour) was over 100 in some samples. That was in late March and early April. Last year was a weird one for sample collection due to Covid. The NCWRC wasn't able to complete their sampling. Usually we pair the data with NCWRC's, but that wasn't possible for 2020.

Corey noted that what Peter has in his table, are the scheduled flows, not the actual flows. Corey noted that he has been working on a spreadsheet to pull all of that out.

Kevin asked Corey how he is determining what flows are going where.

Corey explained. He uses what NCWRC (Jeremy) specifies they use. When flows are high, anything that doesn't go through the turbines (limited to 20,000 cfs) goes down the Bypass Reach. Also, when there is an outage, all of the water goes down the Bypass Reach.

Kevin confirmed they are approaching it the same way. He thanked Corey for the explanation.

Peter noted that the station was in full outage until March 1.

### **Updates on Shad in the Roanoke; Dominion update on bypass sampling 2020**

Bob Graham noted that a fairly large number of American Shad were collected at 232 fish. He asked if there were other years when a similar number were collected.

Peter said that last year was a banner year, compared to other years. They didn't see many Hickory Shad last year. Striped Bass CPUE was also high last year.

Corey said he was still working on the data for Bypass flows this year, because they have to be pulled out of the logs. The flows last year were high, through the middle of June. That ties to the electrofishing. If the flows are too high, it isn't safe for them to sample in the Bypass Reach. So that poses the question about when the fish are there, and also Bob noted, the catchability.

Peter noted that is why collections were stopped, when the flows are high.

Bob noted that the CPUE slide is very similar to 2005, when the IFIM studies were being done, and we looked at HSI for American Shad. They never saw an endpoint for increasing suitability, i.e., habitat continued to increase with increasing flows up to the upper bound they examined, but of course habitat availability doesn't necessarily equate to numbers of fish.

Peter thought that study had gone up to 1,000 cfs. That was originally the minimum flow to rewater the Bypass. He will see if he can find that again.

Peter noted that Wilson had asked several years ago, if there was a difference between average CPUE, and maximum CPUE. They tend to trend pretty well together. Peter noted that there are other successful management strategies going on at the same time. The brood stock, and/or the flows, both could be influencing what we are seeing.

The Bypass Reach (BR) ichthyoplankton sampling was pretty fruitful in 2020. There were American Shad captured, in March and April. That was kind of interesting, especially when you pair it with flows and abundance. Those larvae were aged based on a length key. All three of them were the same TL. Jeremy thought that they were about four days old. The fish are now in Heather's possession.

Heather said that she had tried to get sequence from them but has been unsuccessful. She has been successful in the past. Jeremy had told her they might have been preserved in denatured ethanol, which would have affected preservation and DNA extraction. Peter agreed.

Dr. Heather Evans said that she had gotten some DNA from the larvae, but the PCR (amplification) reactions are not working, likely due to inhibition from chemicals in the denatured ethanol.

Peter agreed it was a pretty small amount of material to work with. Those were the first American Shad larvae they got, so they will try to preserve any they catch in the future, in non-denatured ethanol.

Peter showed the IP results from the past few years. They used to collect at Sites A by the dam, B which was in the middle of the reach. The latter was not very productive. The year 2019 was by far the highest level of abundance, for Hickory Shad. They did collect American Shad in 2020. The C stations had more larval and eggs, and also spawners.

Peter showed us the graph of ichthyoplankton collections with Bypass flows. The flows jumped up at the end of May, but the peak of larval abundance occurred earlier. If the y-axis is corrected for American Shad, they are evident earlier in April. If you back-calculate the age, he showed where the spawn was likely to occur.

Peter showed us the annual CPUE graph for IP. Hickory Shad eggs and larvae were down for 2020. The AS CPUE was very low. If you change the axis to 20, from 50, you can see more about what is going on by species. Good years for AS were 2017, with 2019 and 2020 were moderate.

Peter noted (9:52) that we are at the point where we can have further discussion. He noted that Jeremy and Katy can provide a NCWRC update on stocking. He noted that we made a decision in 2019 to set flows at 750 cfs for 2020. Now we need to decide what level to use in 2021. The next anadromous fish Bypass Report is due June 30, 2025, for study years 2020-2024.

### **Shad genetics**

Heather noted that she can provide her update on the genetics for American Shad. They are running the data now. The last year they ran analysis (2018), the hatchery contribution was around 70 percent for returning adult Shad. They have 700 fin clips they are processing now, and those results should be out in the next few months. For 2020, she doesn't have anything from the Roanoke and about 100 clips from the Neuse.

Wilson asked if Heather et al. had looked at the genetics of the Chowan fish, versus the Roanoke fish.

She indicated that they have looked at the Neuse, Chowan, and Roanoke and they all appear the same. Though it maybe that they aren't looking at the right spots.

Carlos noted that in the Hudson River, high temperatures and lower flows cause earlier spawning. Karin Limburg was the author. Carlos will dig it up and pass it along.

Peter asked if anyone wants to jump on it, or we want to hear from Jeremy and Katy. He asked about the 2020 population estimate for the Roanoke.

Jeremy said for 2019 there will not be a population estimate, since they didn't stock. There are no juvenile contribution population data, so can't run Julie Harris's model. For 2020, there were not data at all. They do plan to do full sampling in 2021, but they aren't stocking, so they will have to have a different method other than the Harris model. He noted that Heather does have the 2019 fin clips, so we will have an adult contribution.

## **Stocking 2022 and beyond**

Peter asked Jeremy whether for 2022, there would be any stocking again. Would that occur after data collection in 2021. What's next?

Jeremy said it would be best to wait until we have survey data for 2021. We lost the sample year in 2020, so we don't have a full handle on what is going on. We may not wait until later for processing the genetic samples, since Heather is now a NCWRC employee. They can talk about how quickly to process the 2020 samples. It can be a group decision. The reason stocking was halted was because of the high hatchery contribution, the thinking being that taking so many brood stock from the river might have affected the hatchery contribution. There were some issues with the population genetics, the effective population size estimates were trending down, indicating some potential bottlenecks. We won't know the effects of three years of non-stocking, until at least three years after stocking was ceased, so it will take a while to know the impact. All of those factors go into the decision regarding restocking. He noted it will be interesting to hear other points of view.

Dan had a thought. He noted that given we are trying to investigate stocking, but flows are another variable we can control, so not changing it might be a good thing.

Jeremy agreed that we can control that variable, except when we have over 20,000.

Dan noted that we never know when we are going to get a lot of rain. The 2020 year was a bust.

Jeremy agreed that it is hard to tell why there were more American Shad there. He noted that Dominion wants to have at least 20,000 going through the turbines. Jeremy noted that he would advocate moving to 1,000 cfs, and then evaluate for at least 3-5 years. Any flood control variability would have to be taken into account.

Bob Graham noted that it may be good to do that flow now, before we have any change due to changes in stocking. He asked if that made sense. Jeremy said that it did make sense.

## **American Shad Passage future**

Wilson noted that he had a thought about how we might compare the run strength of the Chowan, versus the Roanoke, and that could give us some insight into whether we might have set our run strength too high initially. He asked where the Greenfield Fishery was located and wondered if we might be able to find another day-book, from another haul seine fishery on the Roanoke.

John Ellis and Holly White shared that the Greenfield Fishery was near the where the current US17 bridge is located, and Holly noted that the location probably intercepted both Chowan and Roanoke fish.

Wilson noted his apology for having introduced another topic. He felt that it would at least be worth it to explore whether other day-books existed which might yield some more insight. He suggested we return back to the flow topic.

Peter asked, if we go to 1,000, then should we continue no stocking, so that we have a three-year window in which we could better assess the impact of no stocking.

Wilson said that sounded good to him, but he would like to hear from the NCWRC and VA folks.

Jeremy said that they would take all of this into account. They will look at all the factors and take them into account.

Bob had some questions for Jeremy. He asked if there had been an attempt is to determine what the minimum number of American Shad is to sustain the population, and what the number is that is needed for recovery.

Jeremy stated that they don't have those numbers need for a self-sustaining population.

Bob noted that he should have asked the question before Heather departed.

Jeremy noted that they get the numbers of fish for effective population size, but that is just the minimum needed for reproduction. The numbers are pretty low, in the hundreds to a thousand. Just because the numbers are high enough to sustain genetic health, that doesn't mean we have enough to support a fishery. We do have a population in the sound, which appears to be largely supported by the Chowan population. If the Roanoke population is rebuilt, that would certainly contribute to any fishery.

Bob asked if the data are there to shed any insight on that question.

Jeremy noted that there wasn't sufficient data from the Roanoke to run a population model. They did run a CAA model for the whole sound, but that is a mixed-stock analysis, so mostly the Chowan.

Wilson noted again that some insight could be gained by trying to find some more data from any Roanoke haul seine fishery.

Holly agreed that would be useful and she said she would do some digging.

Jeremy noted that the original estimates we used, were derived from the St. Pierre methodology. He noted that Joe Hightower had done a good bit of digging and hadn't found much.

Wilson noted that Jeremy was correct. He noted that he could pose a question to Joe, who is retired but still around. Wilson noted that he keeps sending Joe any new AS literature. He appreciated Holly's willingness to look for any more historical data.

#### **Decision needed on bypass flows for 2021**

Peter noted that Dominion had been maintaining American Shad funds to NCWRC for use in American Shad studies with the exception of the portion used for hatchery operations which the DFRTAC agreed to use for downstream American Eel studies. He noted that if stocking was still halted, those funds could be continued for AE work or elsewhere. He asked if everyone was okay with moving to 1,000, regardless of the decision that NCWRC makes on stocking.

Holly, John Ellis and Wilson were all okay with going to 1,000. Wilson asked when the NCWRC may make their stocking decision.

Jeremy indicated that they would probably make the decision in summer or fall of 2021.

Both VA and NMFS were okay with going to 1,000, as was NCWRC.

So, Dominion will make plans accordingly.

Corey noted that he needs an updated flow sheet from Jeremy.

Jeremy will provide that. He asked if we wanted to keep the one week of a freshet flow.

Corey noted that 2016 was the last year we didn't have some sort of flood flow going through the BR, so we may get the higher flows naturally and not need to create a freshet, unless you want to have one at a specific time during the spawning season.

Jeremy agreed that recently we certainly have had natural freshets. The original logic was that we wanted to give some pulse of attractant flow to the fish downstream. That was when the flows were much lower. He leaned toward not providing a freshet, given the recent history. The only drawback is that would be one more variable. Looking at the data, for the chronological time series, sometimes there seemed to be a response to the freshet, but other times there isn't.

Corey noted that this could be the year when we have a drought in the spring, so we may not have any water.

Peter noted that for electrofishing below the dam, the 1,000 cfs flow makes sampling difficult.

Wilson asked Jeremy if it would make sense to just prepare the recommendations, with the freshet, then if we have flood flows again, we could ignore it. That would perhaps accommodate Corey's comment about drought.

Jeremy asked how the operators would view us putting it in but not implementing it.

Corey stated that the operators like certainty. If we have flood flows, that is on top of any scheduled flow.

Todd asked if they could drop the flows to 750, then bump it back up again, to mimic a freshet flow.

Corey noted that the operators bump the flows up and down anyway, so the BR sampling can be safely conducted.

Corey stated that the operators can make it safe for the samplers for a short period of time, then bring it back up again. There is a step-up and step-down process, to avoid any fish stranding.

Jeremy asked if they close off the north gate any time sampling is occurring.

Peter noted that right now, with the skimmer broken, the bulk of the flow was going through the north gate. He will check and make sure that is the case.

Jeremy noted it isn't a big deal. It sounds like they can accommodate the electrofishing anyway, except when flood flows are going.

Peter noted it sounds like we are okay with 1,000, with the understanding that Jeremy will go ahead and put in a peak week. He will talk to the station operators and ask them to schedule any outage during that week, just on the off-chance that we have low-flow conditions, and we are short of water.

Peter noted that we have a plan. We will plan to stay at 1,000 for the next several years. We can revisit the decision after the 2021 field season. That just summarizes.



**FERC DECISION – DFRTAC agreed to increase Bypass Flows during the Anadromous Spawning season to 1000cfs. Dominion to submit Article 407 – Bypass Flow Report and Plan to FERC with distribution to DFRTAC members.**

Peter noted that we had checked off a lot of the other updates on the agenda. Holly said the telemetry is done for now, but the receivers are still out there, to meet the ACT Network purposes, and is being maintained by the multi-species tagging program for other species, including Atlantic Sturgeon.

Fritz noted that Kevin, Holly and he had published the paper with the data. As soon as Wilson can do so, he will pull the paper from the AFS web site, but he speculated that the authors would get it first.

Kevin indicated that the AFS contractors have been dragging their feet.

Peter noted that he hoped that the field season would not be as affected by Covid this year, as last year. He noted that we do want to at some point have a session on American Shad restoration. He asked if anyone had any thoughts on data gaps, or history. Is there some place that we need to investigate more, and any research?

Wilson indicated that he thought that Joe Zydlewski's model might be useful to us. He will follow up with Joe.

Bjorn noted that he was familiar with the model, and they have been using it on some NE rivers. They have used it on the Merrimack, and Penobscot. Dan Stich is the coder and does most of the computer work. It does provide useful information. Bjorn will send the paper out and Wilson can follow up.

Wilson thanked Bjorn for his affirming comments.

Fritz asked about the other species in the Roanoke and how they are doing.

Jeremy noted that the current Striped Bass assessment shows that species if overfished, with overfishing, and mortality has been high (F) and recruitment has been low due to high spring flows, they think. They are making reductions in harvest and total landings. The Hickory Shad population appears to be doing fine. Roger Rulifson looked at all of the available data, and there aren't a lot of data there, but the numbers in the Roanoke appear to be rather okay. He did look at the numbers over the last few years, and they don't think that the HS population is in any trouble. He noted for river herring, Holly can say. There was an uptick, but again for the last several years recruitment dropped again. The adult population did show a slight uptick but is still low. It is a sad state.

Wilson noted that he was working on securing authorization to use the W.W. Hassler fish survey data from the Neuse. He explained that data set and noted that it would be interesting to perhaps compare that time series, to the Roanoke.

Peter suggested that we take a break and asked if we wanted to meet again in the spring or wait until after the data had been collected this year. He asked if there would be any utility to having a spring meeting.

10:58 a.m. Several members (Jeremy, Fritz) wanted to take a break, and Peter asked us to return at 11:05, at which point we would take up American Eel.

## **American Eel**

11:05 a.m. Peter reconvened the group to do the American Eel updates.

### **Sidebar River Herring Discussion**

First, Fritz asked Holly if we know why river herring haven't recovered. Holly said we don't really have a pinpointed reason. She noted that some bycatch is still ongoing.

Peter asked Fritz about the litigation that was ongoing on river herring.

Fritz said that he didn't have any update, but Bjorn was married to one of the litigants, so he may know.

Bjorn noted that they are being sued again, but he doesn't know the present status.

Wilson noted his agreement with Holly that bycatch offshore was still ongoing, and despite the efforts of the MAFMC and NEFMS to put caps on the bycatch of shad and river herrings, bycatch was still ongoing and there are some indications that the impact is disproportionately greater on the river herring stocks from the South Atlantic portion of their range. Wilson also noted that NMFS in their response to the latest listing petition for river herring, had missed even noting that there are Alewife populations in NC, specifically a spawning run into Lake Mattamuskeet. Ben Ricks (NCWRC) has documented Alewife runs further south as well. [this paragraph was clarified and documented via email correspondence between Wilson Laney, Holly White, and Pete Sturke 18 Feb 2021].

Peter noted that it may be a timing issue with water temperatures, and our ability to sample the river herring.

Jeremy noted that some of the New England recoveries that have occurred were with Alewife, in Maine, and they have been doing a lot of restoration activities up there. Also, those papers that have looked at the genetics of the bycaught fish, show that the northern stocks are less affected than the mid-Atlantic stocks. So, the recovery may be related to both factors, habitat restoration and less bycatch, with the mid-Atlantic stocks more affected by the bycatch.

Todd asked if Ben Ricks hadn't caught a bunch of Bluebacks in Contentnea Creek. Also, Todd noted that they have a seine survey now on the Tar-Pamlico and the Neuse. They are catching all of the anadromous species.

Jeremy confirmed that Ben has done a lot of sampling in the Neuse and has documented Alewife in some of the Neuse tributaries. In 2018, he saw a high spike in one of the creeks on the Neuse, and it was related to low water conditions which makes it more effective to catch them using electrofishing. Any kind of flood event makes it harder to sample them, so it is hard to say whether the increase was due to sampling, or any actual increase. That increase did coincide with a NCDMF-observed increase. It was just a one-year occurrence. Herring remain an enigma, with recovery not having happened the way we hoped it would, on the time scale we wanted.

### **American Eel Resumption**

Peter asked if we are ready to move on with American Eel. He noted that several folks have to jump off at noon. These are just updates, no decisions have to be made.

Fritz suggested that we ask Doug Newcomb and Justin to go first, then we can continue.

### **RRL Eel Mapping Update**

Doug noted that he would be making a presentation on this to the NC GIS Conference in February. Peter shared his screen. Doug indicated that he is now using the 512 eel pot samples, and Sentinel 2 data. If he has a clear day, and clear water, he has found two really good scenes that he can use. He has a few holes due either to turbidity, or to bottom reflectance. He shared the assessment of accuracy. He noted that he may be able to go through and do a multiple regression from useable scenes he can find. For right now, he's just using the two scenes. There are some uncertainties, but the issue isn't going to be that huge. He showed us the topobathy he has now, and explained how he could generate habitat bands, at the different water levels. He could produce depth map for each 0.1 of a foot and pull out depth bands. He asked how we would configure those. He needs some guidance. The topobathy he showed us was for the elevations of 90-133. The map he is showing was for five-foot resolution. He noted that he would do the depth calculations using our guidance. He has a product but can tweak it more, but if the accuracy range is suitable, he can start producing products, and create those data sets and give us some acreage for the lake.

Justin noted that for the trap sampling depth strata, they are using shallow, and deep.

Doug Newcomb asked Justin to send him an e-mail with the preferred depths.

Justin asked Doug what the resolution was, from cell-to-cell.

Doug indicated it was five feet. He can generalize now out to ten meters. He can use the lake levels and provide the change in deep and shallow habitats. He needs the e-mail from Justin to document the depths. Doug noted that he has gotten very excited about this project and he and his wife are now taking measurements from kayaks. His wife thought it was very geeky.

Fritz noted that Doug is among a bunch of geeks.

Bob noted that originally, we had thought that we could use the habitat data, and eel density data from the literature, to estimate how many American Eels the lake may support, and gain insight for upstream passage. Bob noted that we were also going to look at oxygen constraints and noted that we had set a depth level at which the oxygen levels were suboptimal.

Peter noted that he and Justin had been discussing that. We can use that approach to generate a theoretical carrying capacity. Peter noted that they have collected eels in every habitat type, so they don't seem to be too picky. They are just about everywhere.

Wilson noted that what Bob had articulated jives with his recollection. He noted it would be very interesting to hear from the trap folks, if they are seeing areas where low or no eel catches correspond with very low oxygen concentration. Wilson thought that he recalled that we had guessed that a two-meter limit would be most useful for eel.

Bob noted that he had determined from an old report that in one year when the hypolimnetic discharge from Gaston continued for a long time, and that is when we discussed the two-meter limitation. The assumption was suitable habitat required a minimum of 2 mg/L dissolved oxygen.

Doug shared a different map which showed us the bottom contours better.

Justin noted that they will definitely look at oxygen and how that may enter into the American Eel catches.

Doug noted that he had presented the data to the USFWS GIS group yesterday and one of the other members had a map that showed turbidity as well. He will see if he can pull that map up for us. He noted that the area of the old river channels actually have lower turbidity. He indicated that he would try to pull it up quickly. She had sent him a screen shot, which he showed to us. The mean turbidity is high in the NW portion of the reservoir. That makes sense. She sent him a link to a dataset, and he will download that. She does a lot of her work in the MS River Delta. He will let us know the publication status. Doug noted that was all he had for today. He had to leave the call. Wilson noted that he and Wilson and Doug will chat offline, and Wilson thought that a collaboration with Justin and the trapping group could at least result in a report, if not a publication.

### **Downstream Populations and telemetry update**

Justin gave his report on the downstream eel passage studies, noting that this is a three-year effort. Justin noted that they are about halfway through a three-year study. They have tagged 168 American Eels and PIT-tagged them. They have had three recaptures. They continued monthly trap sampling through September 2022. They hope to get a lot more recaptures.

Justin turned to acoustic telemetry tagging and tracking. They have 14 acoustic receivers, 8 in the reservoir, and 6 downstream. The NCDMF also records the eels. They had seven of 13 eels outmigrate. They tagged 27 more in 2020, and as far as they know, they should be outmigrating right now. There are 33 at large and those transmitters should be active for the rest of the study.

Justin showed the map with trap site distribution. They deployed 677 traps in 2020. They have collected 168 eels since October 2019. They have collected few in Johnson Pond. Justin reviewed the numbers of eels captured in each zone. There are fewer traps in the SAV zone, so Justin asked that we take them with a grain of salt. They have also captured other creatures, turtles and crayfish, and 19 other fish taxa. Most of the eel collections were in offshore shallow, and offshore deep, habitats. Not as many were collected along the shoreline.

Trapping began slowly in 2020 but captures increase as temperatures increased. They caught few eels in 2019 while temperatures were lower. The catches decreased as water temperatures decreased. When catches dropped below 15, catches dropped off correspondingly. Justin noted that they did see what might be movement into the shallower SAV area, during the fall as the water begins to cool off. It could be a seasonal habitat shift.

They have talked about discontinuing monthly sampling, if the catches are very low. He asked if they want to pause during February and resume in March.

Peter noted that the question is whether the effort is worth the value. Last February, when the water warmed up briefly, they caught some eels. Peter noted that the fish will always prove us wrong. They

had decided in September that if the temperature dropped, and they got no eels, they would cease sampling until March.

Bob noted that a number of species during the winter may move into shallower, warmer waters to feed, so that may be a behavioral effect. Also, the low numbers in the vegetation may be due to low dispersal of the bait scent, as opposed to some density effect.

Justin noted that the number of traps in the SAV area was lower than the other zones, and once it is corrected, the catches might actually be higher. He thought that Bob's point was good.

Todd noted that you do see the same pattern with Spotted Seatrout in NC, with the species moving into shallower creeks, when the temperatures increase.

Bob noted that often in the SE reservoirs there may be a warmer boundary layer, which is something the LMB fishermen key in on.

John Ellis asked what bait they decided to use. They used Blue Crabs. Peter noted that they had a good source and were using fresh frozen ones. They do seem to like the Blue Crabs.

Bob noted that they are really going to mess up the future archaeologists.

Todd noted that often the NCDMF has breaks in the sampling programs. So, if they already have a good correlation with the temperature, he doesn't have a problem with delaying the sampling.

Justin noted that Carl and the team would agree, so they don't have to freeze. He did note that they caught more recaps in the cooler period.

Jeremy asked if the data or sample size was large enough to say whether the eels moving out were all caught in one season. Are you catching different eels when the water is cooler, versus warmer?

Justin said that they hadn't looked at that yet, but that is something to think about. He noted that the eels detected all were detected after the tagging event in Johnson Pond. He wasn't sure that answered the question.

Jeremy noted that he was thinking of any reason to keep on sampling. He noted that we had begun sampling every month. He suggested that more traps in the summer to get the numbers up might be good. If there isn't any behavioral issue with those fish, he was okay with tweaking the sampling protocol.

Todd noted that it could be a function of bait attractiveness during cold water, or some behavior change like a reduction in feeding.

Peter noted that the point was to determine where the fish were, at each time of year, but there was also an objective for estimating population size.

Justin noted that they have three different methods to estimate the population size. Justin suggested that we can discuss using more traps during the summer, is something that we can discuss later.

Peter noted that they are still sampling Johnson Pond as well, but they haven't captured many eels there.

Justin said that they could also shift traps from Deep Creek, since they haven't captured many eels there either.

Justin showed us the length-frequency of all the eels captured. There is a peak around 350 and another around 550. These could be age classes, or male/female differences. The largest one was just over 700. Bob noted that if most of the larger eels are female, that would indicate a predominate female sex ratio.

Peter and Justin indicated that they would move to another topic.

Wilson asked if Bob was saying that if the larger eels were mostly female, the sex ratio would be skewed.

Bob deferred to Justin.

Justin said he thought that the sex ratio for inland FW was 2:1 female:male.

Bob stated that Jessie Fisher's work supported that ratio.

Peter noted that the recent work by Tom Kwak found that most of the American Eels in PR were females, but also there could be a latitudinal difference.

Wilson noted that the ASMFC Habitat Committee is considering whether to designate inland FW as a FHOC.

Justin and Carlos will pass along some of the papers that have information on the sex ratios.

Twyla posted a link that indicated that gender for American Eels is influenced by eel density and temperatures. The higher density, and higher temperatures, tend to produce more males.

Justin indicated that if they are seeing more females, that may suggest that we are seeing more females due to lower densities.

Wilson noted that is rather a chicken/egg sort of discussion. Justin agreed.

Peter noted an earlier Alden turbine-mortality study, as the eel length goes up, survival goes down. They wanted to home in on the actual lengths observed at the station. If they can eliminate the eels over 1,000 mm, they actually get a big jump in survival. Project survival really increases within the operating range, once you eliminate the eels at 1,000 mm. He asked us to keep that in mind.

He also showed us a figure which showed survival by unit.

Corey noted that there are no data on actual mortality from the turbines, because there was an outage last year. But they also have no reports on dead eels, or pieces of eels, from the downstream area.

Peter noted that it is approaching 12:15 p.m. He will defer to the group on powering through.

Fritz noted that he, Kevin and Twyla have another meeting at 1:30 p.m. so he would like to keep going.

Wilson wanted to keep going as well, since he is trying to leave for the beach.

Fritz asked how far downstream the eels moved, based on the data from the NCDMF receivers.

Peter pulled up the data. The eels "Tom" and "Sarah" were detected way downstream.

Twyla asked how long it took the eels to get down the river.

Peter said Sarah was detected first in December, then further downstream in February. The eels “Bob” and “Tom” both left on January 14 and were out in the sound in about ten days.

Todd noted it appeared to be really directed movement.

Peter noted that it was pretty exciting to see.

Twyla asked if the time stamps showed nocturnal movement.

Justin didn’t remember.

Twyla asked if they had seen any preference in time of day for the movements.

Peter indicated that would be interesting. They will have to go back and look. Some of the eels went up the Chowan but turned around and came back out.

Todd noted that there are receivers at Oregon Inlet.

Someone asked if there are any receivers in the Sargasso Sea. Not yet.

Todd asked for a reminder of what constitutes a detection.

Justin noted they consider multiple detections of the same tag within a short time span, they consider that valid, but they haven’t set that criterion yet. That is something they will do.

Peter noted that the ping rate of the tag is three minutes.

Justin noted also that detections at multiple stations moving downriver was highly suggestive of directed movement.

Pete showed the map of receiver coverage and noted it is really good.

Todd noted that the data are downloaded quarterly.

Justin asked for the spring download plan.

Todd noted that he will check and see when the EC staff has it scheduled.

Justin noted that the last month for tags would be April/May so they would really like to have those data.

Holly said that they try to check the receivers monthly, to make sure all the receivers are there. They check at least every other month. She said if Justin can get the request to her or Todd, they will try to check so Justin can run his report.

Peter noted that some of the eels had taken a left turn and then been detected downstream, so the coverage is good. It was really cool to see.

Peter thought that was it for downstream. They will have that report drafted in May, so will try to meet between now and then.

### **Fish Friendly Turbines Update**

Peter noted that use of this turbine did appear feasible, and the business folks are working on it. They have heard from some folks that the USDOE may be interested in installing an Alden Turbine, so they (Dominion) are looking into it.

Peter indicated that he would roll through the upstream updates.

Jeremy asked for a reminder as to whether the fish-friendly turbine was being evaluated for just American Eel, or for shad as well.

Peter noted that their environmental folks had asked them to look at other fish species as well. He and Corey thought that the turbine would perform as well for other species as for eels.

Jeremy asked if that meant passage for American Shad would be as good as was projected for eels.

Corey indicated it was close, but not as high as for eels.

Jeremy noted that we have said all along, there is lots of habitat available upstream, but outmigration for both adults and juveniles, while constrained by Kerr, any improvements at RRD would enter into our decision regarding upstream passage. If we cease stocking, and get little contribution from the wild stocks, perhaps available spawning habitat is the limiting factor and we need to continue evaluating upstream passage. He suggested that it is beneficial to include American Shad in the analysis of the fish friendly turbine at RRD.

Peter agreed that was a useful perspective and something that Dominion was concerned about. While Eels are the primary goal for increasing survival but they wanted to be aware of any other fish that may migrate through the station as well.

Corey noted that they are looking at another turbine as well, the minimum gap runner, which can handle lower volume flows and generate efficiently.

Fritz noted that he totally agreed with Jeremy's point.

Bjorn noted that the way the fish get injured is not always the same. Eels have a higher probability of blade strike or grinding mortality while American Shad are more susceptible to shear or barotrauma injuries. The dam also may be tall enough that barotrauma could occur. He noted that there are tools that allow engineers to look at mortality. For eels, it is blade strike and grinding. Shad are very different, but juveniles have a higher probability of getting through without being stuck. Bjorn indicated that he could provide references.

Peter noted that it is bigger than just eels, but eels started the project, and they are looking at the whole picture. He noted that recent study by PNNL did suggest that barotrauma was not an issue for eels.

### **Eel passage update**

Peter noted that 2020 catches at the eelways started slow but increased in the fall. Not a lot changed between weeks 39 and 42. They had some mortalities during only one event likely due to crowding during transport but they can't be sure. The total for the year was 55,620, with 135 mortalities. Most of the eels were caught in the North Eelway. The South Eelway catch was 10,118, and the tailrace trap was 586. Peter noted that the lack of South Eelway catches could be due to the inoperable status of the



skimmer gate. Peter asked about the repairs to the skimmer gate. Corey will check and report on the progress. The gears were the issue.

Peter noted that they hope it will be repaired. The catch numbers did increase to more normal numbers regardless.

Peter showed the graph of catch versus flow, which again shows a peak catch between 15-20 degrees.

Peter reported for the Gaston traps. For 2020 they had 2,923 tagged and released in Gaston with one mortality due to an unfortunate tag placement.

### **CTW recaptures**

They had two CWT recaptures. There was one mortality, from tagging when they just hit the wrong spot and it couldn't swim correctly.

The 2020 year at the Gaston trap was a record for March, but the bulk month was May for most years. They don't really see a fall run. The South Gaston trap went out of operation in October due to flood control and wasn't able to be repaired before the end of the year.

### **Gaston Construction update**

Peter showed us the photos of road construction at Gaston, which will enable access to the Gaston North Upstream Eel Passage Facilities. The photos were taken last Tuesday so they are making progress. Peter also showed the construction of the concrete pad at the South Gaston facility. All of the construction measures are in place. They are going as fast as they can to get the South Eelway ready for March.

Peter showed the satellite imagery and indicated where the releases are occurring. He noted that distribution upstream as well as trap effectiveness are to be studied, once the traps are completed. Two of the recaptures occurred in May, and June. Tags were pulled from both of those. One if them was at large for 350 days, and the other only three days.

They were able to sample in Lee Creek, and in Summit Creek to look for eels. They found no eels. They also found no Blacknose Dace but did find lots of Mountain Redbelly Dace.

The reports for these are due in June so the DFRTAC will see them in spring for review.

### **Plans for 2021**

Peter noted that new signs have gone up, soliciting American Eels from anglers. Kirk Rundle will post them on the NC side. Dan was going to post them on the VA side, but he hasn't seen them yet. Peter indicated that he would get the signs to him, noting that they can't change their logo again.

Peter noted that was all they had for Dominion. He asked Kevin and Twyla if they wanted him to project their figures.

### **NMFS update on Upstream Eel Passage triggers manuscript**

Kevin Mack worked through the figures. Peter gave him control of the screen. The first figure shows the cumulative percentage of eels capture, so they can compare across years. It overlays, water

temperature, discharge and lunar phase. Those factors appear associated with eel passage. But the figure is a mess and there is really no clear message. From our prior discussions, the majority of the eels are captured in the BR as opposed to the tailrace. He noted that a question is whether to look at the BR flows, versus the tailrace. So, they took another look just using the BR flows and traps. This figure really gets more at the trigger for passage, which is high flows going into the BR. Kevin highlighted the 2015 figure, which had only a fall peak, and corresponds nicely with higher discharge into the BR. He noted that those flows are 15-30,000 cfs. Such flows correspond with high capture events. Such events may include more than five percent of the total number of eels captured in a given year. They think that upstream juvenile migrants reach the base of the dam, reside in the BR, and then receive some sort of signal that additional habitat is available upstream. They think that may trigger upstream migration, more so than lunar illumination. The latter factor doesn't factor in things like cloud cover, or turbidity. Temperature does play a role. The eels hanging out in the BR are waiting for high flows.

Bjorn asked if they think the eels hang out in the BR, due to habitat complexity.

Kevin noted that is a good question. He thinks that habitat certainly plays a role. Kevin noted that he thinks that flows play a role. He noted that Overton and Rulifson's study downriver showed a relationship with flows. It is probably a combination of the two factors.

Todd asked, if there were no flows in a given year that provided a signal, could that create a build-up of juveniles below the dam.

Kevin stated that is in fact the key question. In 2019, passage in that year wasn't associated with a high-flow event. Eels may not have a clue that there is more habitat upstream, until a high flow occurs, but 2019 certainly shows that you can have high passage, without such an event.

Todd noted to Pete, that when they were trapping prior to putting the eelways in, there were huge numbers of eels seen in the first years of the eelways, so maybe there was a backlog of elvers.

Kevin noted that could have been an explanation. He noted that in one year, close to a million eels were passed. From 2014 onward, there was a lower, almost consistent number. Kevin noted that males take ten years, and females up to 30, to mature, so they could be hanging out in the bypass reach. It seems strange to him that it changed.

Twyla noted that she and Kevin can neither support, nor refute, the backlog effect now.

Todd asked what happened to the larger numbers of eels captured in the pre-eelway days.

Peter thought that some of those eels had been tagged with CWTs and put back in the river.

Bob noted that passage upstream began in 2009, and only for a number of eels in the fall.

Todd asked if prior to that year, the eels were just released back into the BR.

Kevin indicated that was correct.

Todd noted that could support the backlog theory.

Bob noted that with the traps across the dam, they weren't catching anywhere near the same numbers.

Kevin noted that is the best hypothesis now, but it is unusual that there is no breakoff year.

Bob noted that the eels have not changed in size from year-to-year; the median has pretty much stayed the same. If there was a backlog, you would have expected a variety of sizes.

Kevin agreed that he and Twyla were considering that. They are also looking at other hydropower projects and have that anecdotally from Conowingo. The numbers don't really change. The electrofishing surveys show maybe two to three size classes. Thirty percent are larger 200-300 mm which don't seem to be moving in the traps.

Todd noted that during those years where the numbers were really high, prey availability could be affected as well as growth, and so the eels of the same size may be different ages.

Bob noted that oceanic conditions could affect the numbers.

Peter noted that numbers could lag by a year or two.

Wilson noted that ASMFC does have a glass eel sampling program, but it hasn't been conducted systematically. There are three other long-term time series, in NJ, NC (Beaufort Bridge Net survey). Wilson noted if those are correlated at all, then we might have a higher level of confidence that we might learn something.

Todd noted that they do have other data. But there is little consistency among those data.

Wilson agreed and noted that what would be ideal would be a coordinated, coastwide survey at coastal inlets.

Kevin noted that is all very interesting. He noted that there is lot of variability below the dam. He agreed with Wilson that if glass eel recruitment was higher, you would expect to see some correlation upstream.

Bob noted that he agreed, you would expect some sort of correlation.

Kevin showed us another figure from three other hydropower projects, and noted that you see interesting latitudinal patterns, comparing the Roanoke, to the St. Lawrence and Conowingo. He thought that was an interesting regional comparison. It is very interesting to put RRD in context. Another idea was to look at the position on the river. Roanoke Rapids and Holyoke are more inland than Conowingo. Moses Saunders is on one of the largest watersheds in the world.

Bob noted that Roanoke Rapids is also much closer to the Sargasso.

Kevin agreed that was a factor. He stopped sharing his screen.

Peter put his screen back up at 1:15 p.m.

Peter noted that he was really excited about the paper and asked what we can do to help.

Kevin noted that he would covet review of the manuscript, when they are ready. Peter noted that he was in for sure.

### **Atlantic Sturgeon Update**

Peter noted that he had received a text from Matt Balazik. VCU received their permit from NC and plan to sample beginning in mid-February and did get permission to keep their boat at Edenton NFH.

## **ASMFC Stock Assessment Update**

We didn't discuss the assessment update; however, it is ongoing, and Todd Mathes and John Ellis are both serving on the ASMFC American Eel Technical Committee.

## **2021 Plans and Other Member Updates**

### **Upcoming meetings**

Peter shared upcoming meetings: NCAFS February 16-17; Southern Division AFS April 6-9; and National AFS November 6-10, in Baltimore, possibly in-person, at least the option is open.

### **Field Work 2021**

Peter reviewed the plans for field work in 2021 and noted that they welcomed any members who wished to participate.

### **BR resident fish and mussel, Summer 2021**

### **Gaston Eelway Effectiveness studies, first report due June 30, 2021**

### **Gaston Distribution spring, summer and fall**

Peter thanked everyone for their patience and hanging in there. He reviewed the action items. He will keep us in the loop. Maybe we can actually meet outdoors at the new Gaston Eelway. They will pass that idea around.

Corey noted that Peter needs to change the VA agency logo.

Peter asked if anyone had anything else.

Wilson asked if Peter would send out all the presentation materials. He will do so. He asked Kevin and Twyla about theirs. They wanted those materials held back.

Peter thanked Wilson for taking notes.

Corey confirmed the Bypass Flow letter is due at the end of the month.

### **Recent publications of note**

No recent publications were discussed.

Adjourned: 1:23 p.m.