141st Meeting of the South Carolina Aquatic Plant Management Council

Attendance:
Council Members: Julie Holling, Willie Simmons, Chad Altman, Bill Marshall, Casey Moorer, Stacy Scherman (WebEx), Chris Stout (WebEx), Adam Leaphart (WebEx), Tammy Lognion (WebEx)
Guests: Matthew Puckhaber, Jay Tenney, Levi Kaczka, Chad Holbrook, Carl Bussells, Allan Stack, Ernie Guerry, Judson Riser, Julie Davis (WebEx)

Location: SC DNR Wateree Range Classroom, 14068 Garners Ferry Rd. Eastover, SC 29044 & WebEx

Call to Order: 10:00 am 1/10/2023.

Minutes:

Chairman Holling called the 141st meeting of the Aquatic Plant Management Council (Council) to order. She noted that notice of this meeting has been provided to all persons, organizations and news media which have requested notification as required by 30-4-80(e) of the South Carolina (SC) Code of Laws. She thanked everyone for coming out either in person or via WebEx. She asked everyone in the room and on WebEx to introduce themselves.

Ms. Holling moved to the review of the minutes of the November 15th, 140th Council meeting. She asked if anybody had any corrections for the minutes. Ms. Holling asked if anybody online had any corrections. Ms. Scherman stated that she did not have any corrections. Ms. Moorer stated that she did not have any corrections and made a motion to accept the 140th minutes as they are written. Mr. Marshall seconded the motion. Ms. Holling asked if any additional discussion was needed. There was no discussion and she called it to a vote. The motion to approve the 140th meeting minutes as written passed unanimously.

Ms. Holling stated that she did not have any requests for anyone to speak. She asked if anybody had any comments in the room or online. There were none, so she moved on to the Santee Cooper (S-C) grass carp health update from Mr. Kaczka and gave him the floor.

Ms. Holling said there were some issues with Mr. Kaczka's presentation, so we are going move on to the S-C water quality and drone survey from this fall from Mr. Bussells. She gave the floor to Mr. Bussells.

Mr. Bussells said he was going to show a little bit of drone footage. It is hard to get everybody arranged for a tour on the lakes to see it in person, but there is drone technology and we can show you some good videos. The first location is near Sandy Beach WMA, Angels Landing, and Stony Bay WMA where that red polygon is.

Ms. Holling asked if people on the WebEx could see the video. Mr. Leaphart responded he could not see the video and was still seeing the agenda slide. The screen was shared so the WebEx participants could see the presentation.

Mr. Bussells said these are pretty big videos. He did not know how they are going to stream, but hopefully they stream well. After the first video started, he asked if anybody recognized this plant. Someone responded that it might be *Hydrilla*. He responded that it was *Hydrilla* and a lot of it. This area is about 4 to 7 feet deep with super clear water. All that kind of blotchy vegetation around there is *Hydrilla*. There were very few other plants mixed in. This sort of purplish plant that is along the left shore, before the sort of snot green giant salvinia, was *Vallisneria* (eelgrass or val). The little plant that is kind of pockmarked along the shoreline is crested floating heart.

Mr. Bussells stated we got some good news on our *Vallisneria* recently. We sent some samples down to the Florida Fish and Wildlife Commission and we have the native species of *Vallisneria* on our system. That is a big relief for us. He noted that Dr. Siobhan Gorham said there is a genetic distinction between *Vallisneria* to the north, above Maryland, and *Vallisneria* to the South. It will probably be split back into two species, with ours being *Vallisneria neotropicalis* and theirs being *V. americana*. Dr. Gorham feels she has strong genetic evidence to show a good difference there.

Mr. Bussells went back to the video. He pointed out the old Santee canal from the 1700s, the S-C WMA, and some pretty stands of eelgrass there.

Ms. Moorer noted that this is part of the area that we had planned on visiting after the last meeting. We collected some drone footage for everybody instead. Mr. Bussells said Ms. Scherman, Mr. Tenney, Mr. Puckhaber went out with him. He was not sure we will have this clear water for much longer. We were driving over the Congaree River on the way here and it was super muddy, so he thinks we have a big high turbidity event coming soon. He pointed out the blue catfish in the top right corner of the image.

Mr. Bussells noted that what really speaks volumes is our satellite images from that same area. He pointed out the area northwest of Stony Bay where that drone footage was taken. He also pointed out the old Santee canal. Our multispectral satellite imagery does not show any *Hydrilla* there. This footage was taken in mid-August and the multispectral footage was not taken until mid-November. (Editor's note: Mr. Bussells misspoke. The multispectral imagery was done in mid-August and the drone footage was done in Mid-November.) The *Hydrilla* had a good while to grow and spread out. The lake level was a little bit higher when our multispectral imagery was taken. When we are saying that we do not feel like our multispectral data really shows all that is out there, this is what we are referring to. It is just not quite capturing the amount of vegetation that is out there. In the same area, giant salvinia is in pink all over the place in Stony Bay. There is some crested floating heart out here, but the imagery did not capture those big rafts of giant salvinia that were along the shoreline.

Mr. Bussells said the next location is what locals call Refrigerator Hole, on the south point of Sandy Beach WMA. This is a little more common for what we see around the system. You can see there is a lot of *Hydrilla* mixed in with the vegetation, which includes some sort of senesced American lotus, some hybrid crested floating heart, *Hydrilla*, lemon bacopa and a little bit of bladderwort. It is a big mix of a lot of different species and that gets kind of tough to capture. One thing we could do is estimate this mix is roughly 20% *Hydrilla* and then extrapolate from that the acreage, but it is just tough to get the true acreage of *Hydrilla* on our system when it looks like this. He let it zoom out for a little bit just to show the vast amount of *Salvinia* they are dealing with. Hopefully that last big freeze helped us out a little bit and knocked out a lot of that. Either way, we will be in there to check it out and do some spraying soon. That is an important bass spawning area, so we want to make sure that is cleaned up nicely for all the fishermen that want to get in there and target bass.

Ms. Moorer noted that the majority of all the backwater areas on Marion and Moultrie look like that with *Salvinia*. That is just a snippet of the areas on Lake Moultrie. Mr. Bussells said as we look back at our multispectral imagery, you can see there is no *Hydrilla* popping up in Refrigerator Hole. There is a good amount of eelgrass that did pop up, so that is good, some native submersed vegetation and a fair amount of giant salvinia, but definitely not chock full like we were seeing in our drone footage.

Mr. Bussells moved to the video of the next site, which is between Church Island and Spires Landing on the south end of Lake Marion. This has less *Hydrilla* mixed in and a lot more eelgrass. It is a little more what we like to see, except for the giant salvinia. That entire area, between the Diversion Canal and up to Eutaw Creek, has vegetation that looks like this. There is a lot of eelgrass, a few other pondweeds, naiads, filamentous algae, a little bit of *Lyngbya* mixed in, but some nice native submersed aquatic vegetation (SAV). It was what we would consider a strong year for SAV, without a doubt.

Mr. Bussells wanted to talk about turbidity in the lakes and kind of how that relates to the growth of aquatic vegetation. Turbidity is just the measurement of the clarity of the liquid. We use nephelometric turbidity units (NTUs) and we are certified in this method by the SC Department of Health and Environmental Control under the Safe Drinking Water Act. This machine is calibrated monthly, and we do quality control checks before and after sampling. The state standards for turbidity are 25 NTUs for lakes and 50 NTUs for rivers and streams. This is about as extreme of the high turbidity event that can happen on our system. He asked if anybody remembered what happened in October 2015, which everyone did. The 1000-year flood was a good example of how turbidity enters our system. It is not locally sourced turbidity. It comes in through the upper Santee River from the Congaree and Wateree Rivers, and spreads through our system like a blanket over all the submersed vegetation. When we get these turbidity events, they just smother all those plants. In contrast to that, this imagery was taken from NASA's world view archives. This imagery was taken June 25th of this year, so the water was super clear. The result of that is we have gotten a lot of spray requests this year. A spray request is when someone calls or emails our office. They either have some vegetation around their dock, or they cannot get into their fishing hole or their hunting spot. It is just a request for us to go and treat with herbicide. On average, we have about 140 spray requests and this year we were at 300% of that. We had 416 spray requests. In orange is the portion of spray requests that involved giant salvinia. When they call, they are specifically complaining about *Salvinia*. Usually when we get phone calls about giant salvinia, people have a flyer in their hand, or they have looked it up and are pretty accurate. When we get a call about *Hydrilla*, it could be *Chara*, pondweeds, cut grass, or maybe even sand. We do not know until we get out there. He has not been able to graph that out.

Mr. Bussells said we collect water quality data from 35 sites through the system, ranging from the upper Santee River down to the Cooper River Tailrace Canal. He picked 23 sites from January 2010 to December 2022, and it ended up being about 2800 turbidity data points. When you plot those out, the first thing you will notice is those big type of high turbidity events like this big tower. The blue specs on this graph are high turbidity events. If you look at 2015, you see one clearly, the 1000-year flood. There was one data point he had to exclude from here and it was 273 NTUs. It crunched his entire graph. That was from October of 2018, which would be Hurricane Florence. The 273 NTUs is definitely above that 25 limit for DHEC.

Mr. Bussells noted the next thing you will observe is back in 2012, really 2011 through 2013. There is a huge spike in *Hydrilla*. That was when we had very low and consistently low turbidity. There was not a lot of variances in the data, and at that time we did not have as many grass carp in the system. Once *Hydrilla* started growing aggressively, we started stocking grass carp, but could not really catch up with it until those massive stockings happened. We cleaned that data up a little bit. These are the mean turbidities in blue and the *Hydrilla* in orange. You can see the 2022 mean turbidity is pretty close with 2017, where there was a small spike in *Hydrilla* growth, and pretty close with 2011 through 2013, which had that really big *Hydrilla* spike.

Mr. Bussells said if we want to take an even closer look and consider variance in sample size, you can run a T test. With a T test, the lower this P value is, the more different the data sets are. He compared 2022 with each prior year. If you look at 2022, which had an average turbidity of 5.9, and compare that to 2020, that had an average turbidity of 9.8, the variance was 69.7. You have a really low P value, so these data sets are very different. If you look back at 2013, 2012 and 2011, you can see 2013 was very similar. This P value was 0.05. The differences in the data sets were not statistically significant. Basically, we are having a year that is a replica of 2013. If you go back to 2012, it dips the other way and the variance in that data set was only 6.25. These data sets are very different. That is all to say that if you have low turbidity and low variance, then you have the potential for rapid *Hydrilla* growth. Maintaining a consistent grass carp population creates a buffer for those low turbidity years and prevents the need for mass stocking events. He asked if there were any questions.

Mr. Marshall was curious if any of the technical people have explanations for why we are not seeing *Hydrilla* on the multispectral. Is it water depth? He knows the turbidity factor is out there. Mr. Bussells said he thinks it had to do with water depth and time of year. He thinks there just was not as much *Hydrilla* out there. Maybe we could move that multispectral timing toward October, but then you miss out on plants like water willow and water lotus. You kind of lose one species to gain another and that is what we are always trying to weigh out.

Ms. Moorer said you can have a lot of different species there and that mix can cause issues there like teasing out those different signals. The resolution of the survey is 30 centimeters by 30 centimeters. If you do not have a dense stand of *Hydrilla* there, you are not able to tease that signature out. When you have mixed populations, it makes it harder to tease out the different types. You are going to default to the main species. If it is more val, it is going to show up as val. It is not going to pick up those small patches of *Hydrilla* that are there if it is not topped out. If we were to collect data in November, you would probably see more *Hydrilla* on the multispectral than you did in August. It is just a timing thing in the mix of species. At least, that is what our vendor explained to us as the difference between hyperspectral and multispectral in that regard.

Mr. Bussells noted that with the fixed wing imagery, we were having issues with trying to fly in October because there would be hurricanes, mass turbidity events or floods. We always kind of wanted to move it earlier in the season but that has its issues as well. Mr. Marshall commented that in the first area that was shown, it seemed like it showed fairly solid stands of *Hydrilla* in there. Ms. Moorer said that could be due to turbidity. If it is clear water, they can penetrate up to right at a foot depth. If the plant is not within a foot from the surface, you are not going to pick it up. Mr. Bussells remarked that the lake had dropped quite a bit before the drone was taken in there.

Ms. Moorer said when they did the multispectral in August, the water level was higher. They might not have been able to pick it up because of the water depth. There are a lot of variables in there. That is why it is important for us to do boat surveys. We are not adding those boat survey acreages to what we present to the Council to avoid the bias of that. She added to what Mr. Bussells was saying. You could look at a stand and say it is 20% *Hydrilla* but, we do not have the manpower to go out and throw foot by foot squares and process the sample and say it is a true 20%. We will share what our opinion is and what we are seeing on the system. She thinks this drone footage helps because it is hard to get everybody out on the system. Mr. Guerry and Mr. Bussells are both licensed to fly the drone, which provides a snippet. When seen it in person, you can apply it to what we are trying to explain and are presenting.

Mr. Kaczka noted that on the graph, the turbidity each year is one point. He asked if that was the average of all the sampling sites in all twelve months. Mr. Bussells said that was right. It included 23 sampling sites out of the 30 consistent sampling sites for our ambient monitoring program. He took 23 sites that were consistent, were not brand-new sites and nothing changed about them. They were not sites that were not part of the main body of water. He wanted sites that would be affected by those big turbidity swings.

Mr. Marshall stated the drone footage was helpful and that it was good to see. Ms. Holling asked if anybody on WebEx had any questions. Mr. Bussells noted that it probably would be beneficial to concentrate those dates down to the growing season and make it very similar, maybe have three periods.

Mr. Kaczka said that having a consistency of available water quality data could be beneficial to explaining some of the variation in grass carp condition. He asked if S-C was doing monthly samples. Mr. Bussells said they were. Mr. Kaczka asked if they were getting all the sites on the same day, or not. Mr. Bussells said they are split into five different runs. Mr. Kaczka asked if you were getting them all in one week. Mr. Bussells said that was right. Mr. Kaczka appreciated Mr. Bussells sending him all that data to help look at the grass carp health. He was digging into it, especially the temperature, and realized that he needed daily readings rather than once a month. He thinks there is a solution for that, which would be beneficial. Ms. Moorer made him aware of a USGS station that had been recently upgraded. Mr. Kaczka said that before starting with DNR in grad school, everyone knew USGS stations were notoriously unreliable. He was glad to hear that there is something out there with more consistent data.

Mr. Simmons asked about who paid for the stations around S-C and the cost. Ms. Moorer provided that information. There was additional discussion about what the stations could do, where they were located and if more could be deployed in conjunction with other agencies. Some of this discussion was done while Mr. Kaczka's presentation was being loaded.

Ms. Holling gave Mr. Kaczka the floor. Mr. Kaczka said we have an ongoing collection, which includes bow fishing and incidental captures with our gill nets and during electrofishing. For the last few years, it has just been sort of a continual collection. Formerly, before the pandemic, would hire someone. Chris Page provided some funding to get a guide to take us out bow fishing on the lakes. We got away from that for a couple reasons. One, it was expensive, and the guy's boat was always breaking down even though he was a boat mechanic. Two, we were very limited in the sites we collected fish from, with three or four sites on either side of the Diversion Canal and in a very limited time window. We were curious about grass carp health throughout the year, not just August through October. For those reasons, we started collecting them ourselves. We also have an employee in our Upstate office in Region 1 who recreationally comes to Santee-Cooper three times a year and bow fishes. When he is down here, he collects for us as well. That sort of makes up for some of the numbers that we were getting with that professional guide.

Mr. Kaczka noted the downside is it is hard to collect grass carp in big numbers in a system as big as S-C. He likes to pull data together to make up for the lack of numbers each year, but he also looks at individual years to see whether they are telling the same story on a smaller timescale. Not a lot has changed when it comes to grass carp health over the years he has been on the project.

Mr. Kaczka talked about the last three years. We have 11 collection sites that these fish are from. Formerly, that was like 3-4, maybe 5 sites. We are getting fish from around the lakes and from new sites, which was one of our goals. There is a big age range in these fish, from two to twenty-plus. We age these fish using their otoliths, which are notoriously hard to age. It is unlike the method used on the other fish species we age. On occasion, we can get a precise reading on a 20-, 22-, or 24-year-old fish. For the most part, it is not easy to tell if a fish is 20-, 21-years-old or older. Rather than report an inaccurate age by a couple years and we know that it is 20-years-old or older, we put all 20 plus fish together. You can see a pretty big size range of fish that we have collected. Here are our collection sites over the last few years. Formerly, we were looking at Blacks Camp, Angels, Harry's, and Spiers, but now we are starting to get fish from all around the lakes, which is a good thing.

Mr. Kaczka moved to the next slide, which was a plot of length versus weight for all the fish. On occasion, we collected fish where our scales were malfunctioning and produced some clear outliers, which were removed from our analysis. The next slide showed the age distribution from the last three years. One thing you will note is this big bar over here at 25. You could move that bar to 20 or 27. Those are the fish that he was talking about where we know they are 20-years-old or older, but we do not have the exact age. Realistically, this bar would be much shorter, and you would have a few more, shorter bars. That just shows the number of older fish in our analysis versus our younger fish, say 10 and younger.

Mr. Kaczka noted this slide is similar to a figure he has shown in the past, showing the difference in fish condition based on age. We have looked at specific age and grouping fish together by classifying them as young, middle-aged and old. Our young fish are 1- to 7-years-old, which he based on the stocking of the last six years. We had a break in stocking prior to that, where there was no fish stocked for three or four years. These fish get stocked at 1-year-old. He thought that that was a nice way to break that up: 1- to 7-years-old for young, 8 to 14 for middle age, and then, technically, older fish would have been 15 and up. It just so happened that we did not age any fish 15, 16 or 17-years-old. All the fish classified as old are 18 or older. What you can see is the average fish condition declines with age. The values were 0.85 for our young fish, 0.81 for middle-aged fish, and 0.68 for the older fish. We are using a condition factor that was developed in the early 1990's. A fish condition of one is considered a healthy fish. The population above one is a fat, healthy fish, and below one is poor condition. We will get into that a little bit more later.

Mr. Kaczka remarked that you have heard him talk here before and it is for the most part staying the same, but we do have a new analysis for this presentation. He wanted to try to model grass carp condition because we use the health of the grass carp population somewhat as a surrogate for another piece of the puzzle, how much vegetation is out there. If you have a big population and they are all super fat and healthy, the thought is they have a lot to eat. If they are skinny and unhealthy, they may not have a lot to eat. Because this is one piece of the puzzle, he wanted to try to get some variables in a model and see what is affecting grass carp condition. They are going to be affected by the amount of forage that is available to them, but that does not mean that that is the only thing affecting them. He showed all the variables that he put into an initial model, using the past three years of data. He used year based on the idea that the vegetation levels may vary on our lakes from year to year. Year itself may not be the ideal variable. The ideal variable may be X numbers of acres of *Hydrilla* or X number of all SAV that grass carp feed on. He used year as a class variable for the initial model.

Mr. Kaczka used lake as a variable with the idea that perhaps there is varying amounts of forage between Marion and Moultrie and that there may be an effect. Fish may be healthier or less healthy in one lake compared to the other.

Mr. Kaczka noted that the age group was a variable, with young, middle-aged, and older aged fish. We have talked in the past that there is a suspected difference in the foraging efficiency related to age and that seems kind of obvious based on what we have seen.

Mr. Kackza said the temperature is a variable he was working on with Mr. Bussells using some of his data. Since we are now collecting fish throughout the year, it is conceivable that a fish collected in September should be in better condition than a fish collected at the end of February, based on the growing season. He needed something to use as a metric for what time of year was this fish collected and does that affect its condition. He looked at Mr. Bussells' temperature data and recalled from our December meeting that maybe Ms. Moorer mentioned that when temperatures get to the low 60’s is when they start switching to contact only herbicides, when plants are not photosynthesizing as much. He also looked at our peak water temperatures and for the most part they seemed to be around early September. These are one per month snapshots, not a daily reading. It is probably not perfect, but that is what he used for this analysis. If a fish was collected on September 31st, in this model, it was counted as 30 days from peak. If they were collected on August 1st, they were also counted as 30 days from peak. The maximum from peak vegetation production a fish could be, was 182 (365 divided by 2).

Mr. Kaczka noted the metric of hours since collection. When we collect fish via bowfishing, they have a big hole in their side. Then they sit in the bottom of the tub and lose a bunch of water weight. We are using weight to look at condition. Conceivably, if you shoot a fish at 8:00 o'clock at night and it sits on ice or in a tub, it could lose a couple pounds by the time you work it up the next morning. It is going to be in less ideal condition than if you worked it up right then and there, or if you did not stick it with an arrow, but just scooped it up.

Mr. Kaczka then looked at any interactions between these main effect variables and then ran the model. Some of them were significant and some were not. He sequentially removed the insignificant factors. He also used the transformed R condition to normalize the data. Our final model showed year, age group, days from peak and an interaction between days from peak and year. He looked at each of those individually.

Mr. Kaczka said year had a significant effect. Whenever he was generating these models with class variables, it needs something to use as a baseline. In this situation, his stats program just used the information from 2022 as a baseline. Relative to 2022 fish, the fish collected in 2020 were in significantly poorer condition than in 2022. Fish collected in 2021 were in a significantly better condition. We do see a difference in fish health year to year over the last three years.

Mr. Kaczka noted age group also had a significant effect, which was not surprising. The best conditioned fish were young. The worst conditioned were old. Middle-aged fish were in the middle. If you recall from those average conditions that he reported, there was a much bigger decline in health going from middle-aged fish to old fish versus young fish to middle-aged fish. He also ran this model using the individual fish ages. There was a higher amount of variation explained whenever he grouped those fish together by age group versus using individual ages. That just told him that it matters more for your condition if you are grass carp if you are a “young fish”, 1- to 7-year-old versus an older age group fish, rather than a 6-year-old fish compared to an 8-year-old fish. There were just higher amounts of variation explained using those age groups.

Mr. Kaczka said the days from peak (DFP) collection was not significant, but there was a significant interaction between that DFP and the year. Because there was a significance in the interaction, he retained the main effect of DFP in the model, so you would see that interaction. This is also one of those things where the stats program has to have something as a baseline, so he used 2022 as a baseline. The farther from September 1st a fish was collected, the more negatively it influenced condition. That makes sense, as we are saying September 1st is the peak amount of vegetation growth, but that effect was far more pronounced in 2021. Just looking at year on its own, with 2022 as a baseline, overall fish in 2021 were healthier than 2022 and 2020. When you got farther away from that peak amount of vegetation, their health really dropped off in 2021 and that is what that interaction is showing right there.

Mr. Kaczka pointed out some surprises, considerations, and recommendations. It surprised him that hours from collection did not show up as being significantly influential. Even seeing that, he kind of refused to believe it. He has seen a fish that is deflated with a bunch of water weight. He thinks the problem is a couple things: how accurate is this measure, and do we have enough control fish. Control fish means, do we have enough fish that are not stuck with arrows and not leaking water weight. He does not think we have enough. Of the 200 fish analyzed, there are only a half a dozen or so that we got by gillnet or electrofishing. Most of our fish have been stuck with arrows and leak water.

Mr. Kaczka went back to how accurate is this measure. The bulk of the fish we are getting are still being collected by our coworker in the Upstate when he and his brother come down to collect for us and they bow fish all night. They get started at sunset, which in the summer is at 8:00-9:00 o'clock, and they get back to Harry's Fish Camp at about 5:00 in the morning. They may stick a fish at 8:00 or 9:00 o'clock or at 5:00 in the morning. We meet them there at 6:00 to pick the fish up and go straight to the lab to work them up. We do not know which of those fish we are working up was stuck at 8:00 at night or an hour ago. That is a big ask, knowing that these guys were kind of going out of their way for us, to try and mark the fish to let us know what time of night that fish was collected. That would be a really hard thing to do. He thinks that is why hours from the collection did not show up as being significant.

Mr. Kaczka said the lake was not significantly influential. When we or Mr. Roper go out to collect grass carp, the goal is to collect grass carp. We are targeting habitat where we expect grass carp to be. Even if there is, year to year, significantly more forage on Marion or Moultrie, the areas we are going to are likely similar. He was thinking that is probably why lake did not show as being significant.

Mr. Kaczka noted days from peak of production was also not significant on its own. He thinks that September 1st is probably a good date to use, but if we had daily readings of water temperature, could include daily readings of water clarity and take averages, he thinks we could get a much better peak date year to year than just saying September 1st across the board. There is the thought that fish are in their worst condition, when they are furthest away from plant life photosynthesizing. The expectation is at some point in the middle of winter, they are at their poorest condition. As the growing season progresses, they get in better and better condition. They peak at some point, and then as plants start to senesce, they decline in condition. In terms of his analysis, August 1st and September 31st were treated the same, basically a nice uniform curve of when the fish was collected from that peak vegetation. Do fish progress in their condition throughout the year at the same rate and have the same pattern of declining as plant life starts to senesce in the winter? He does not know. They might have a slow increase in health and condition as the growing season progresses and as it gets cold, they might drop off completely or vice versa. Plants are growing, they might start munching on stuff out there, get real nice fat and healthy, and then it may take them a long time in the fall to lose that condition. He does not have that answer. He had to treat it as a uniform bell-shaped curve from that September 1st date and how far away from that date they were collected.

Mr. Kaczka said another big consideration here is stats. It was a significant model and we found some significant factors, but the R square of the model is only 0.4. It is only explaining 40% of the variation in the data set, as far as grass carp health goes. There is a lot more variation there to be explained outside of the factors that he included. That is just something we need to continue working on. He thinks it will help to have those daily water temperatures and trying to tie in turbidity, which speaks to the amount of forage out there. He thinks those will help, but this served as a good baseline model to add to and take from moving forward.

Mr. Kaczka reminded everyone about two important points. Consider the fish that we are comparing our current sample from the last three years to. These condition factors were developed using a baseline of fish. The baseline of fish in this situation were the fish that were collected in the early ‘90s. A fish that is showing up as a .75 condition in our current data set, that is compared to a fish that was a baseline one back in the ‘90s. Do we really want to see a healthier fish? Well, no, because that would mean that compared to those fish back in the early ‘90s, we would probably have a *Hydrilla* problem. Mr. Kaczka said that is something to always consider when we are talking about this.

Mr. Kaczka questioned the accuracy of our mortality estimate. It is one of those numbers that we are using from the early ‘90s and was developed 10 or 11 years after the first stockings of grass carp. We know that fish are living much longer than originally thought. Does 32% apply across the board? Probably not. He expects that the mortality estimate is kind of high for our older fish. They are persisting in the system a lot longer than we originally thought. Does it matter? It matters to know what the mortality estimate is, but maybe not quite as much, based on the apparent influence of age, related to condition. We may have a lot more 20-year-old fish out there than we think, based on the 32% mortality, but they may just be eating just enough to survive. They may not actually be doing much in terms of vegetation control. His personal opinion is that 32% is probably a little high. It is probably a little lower than that across the board. We are more worried about the number of younger, 2- to 7-year-old fish in the system than how many 20 plus year old fish are out there. He asked if there were any questions.

Ms. Moorer thanked Mr. Kaczka for his presentation and asked him if he thought there was a way to determine how effective those 2- to 7-year-old fish are, compared to the older population. We talk about younger fish eating to grow and put on weight and length, and you are not likely having that in your older fish. Is there a way for us to look at that? Mr. Kaczka replied that quantifying that would be hard. There have been some studies. One of the problems is there is very limited data on grass carp surveys out there, and what is out there is from small systems of 10,000-12,000 acres. There is nothing in the literature that references grass carp studies on systems as large as ours, other than those couple studies from ours. He has read those couple studies but cannot speak to numbers right off the top of his head. There is some published literature out there that shows the amount of growth that a young fish can put on in its first couple years versus later in life, but those are on smaller, different systems. As far as quantifying it, he was not sure it would be worthwhile. We can maybe take a handful of fish and look at them, but he did not know if that would be worthwhile. There is probably something out there, but he could not speak to it.

Mr. Simmons asked Mr. Kaczka if that was something we can get at with a research project at a university. Mr. Kaczka said he thought so but was hesitant to bring it up because he did not know what would be involved or where the money comes from. He would love to see someone dedicate a project towards better defining mortality as it pertains to our system and our fish. Mr. Simmons suggested that we talk to Lynn Quattro and Ross Self. He thinks that might be easier than what you think. Mr. Kaczka said it is just that we are looking at an issue with numbers of fish available to us from year to year. With all our other projects out of Region 4, we just do not have the time and manpower to get it. Grass carp are not conducive to our traditional fisheries sampling, which is why we are bowfishing them. Mr. Simmons said the universities are constantly hitting us up for projects. This sounds like it might be something good for them. We will talk and see what we can figure out.

Ms. Moorer said there are a lot of questions. She would like to see a telemetry study of grass carp moving through the system. She does not know how much we can dedicate to something that really is not going to change our management strategies in the long run. When putting the time, money, effort, and resources into things, she wants us to choose something that is going to have an impact on the way that we are using grass carp to manage *Hydrilla*, not only for the S-C system, but other reservoirs that can use or learn from the data.

Mr. Altman asked Mr. Kaczka if it would be helpful when we are on the system if we see some grass carp to pick them up for you. We can handle the logistics later, but we do see them, and we are out there throughout the year. Mr. Kaczka said any way we can boost our dataset would be great. There are a lot of guys out there that if we said, “Hey go get us some grass carp,” they would be so happy, but we cannot set the public loose to go do that. Mr. Altman stated when we are electrofishing, we are hunting certain species, so we may see more than you might with your electrofishing. Mr. Kaczka replied they do go out on dedicated grass carp trips now throughout the year with our electrofishing boats, more so in the cooler months because they are such big fish that you cannot really slow them down in the summer. We also have a couple bow fishing setups. We will talk about it more after this meeting. Mr. Altman said we will work out the logistics of getting them to you, because we do see them.

Mr. Riser asked if you see more large fish because they are easier to hit them with a bow. He did not know if he had seen grass carp that are smaller or a little bit bigger than after we let them out of the stocking truck. He asked if they see those sizes at all. Mr. Kaczka replied we do. They make up a small part of our dataset. He thought a 459-millimeter fish was our smallest in the dataset. Region 4 folks do not shoot those fish because they are too hard a target, but Mr. Roper and the professional guide we were using would get an occasion 2- to 3-year-old fish, which is a 15- to 18-inch fish. Mr. Riser asked if you see them in the same spots as the larger fish. He always had this theory that the big fish just kind of cruised around the open water and the young fish were way back in there and you just do not ever see them. Mr. Kaczka said there may be something to that. They might be in areas that we cannot access, or it might be that they are harder to collect with the accuracy of shooting an arrow at them. We do get them on occasion. The Council thanked Mr. Kaczka for his presentation.

There was a brief intermission while Mr. Holbrook set up his presentation. Mr. Holbrook said the Council got the email from Ms. Holling with these slides included. He did not want to provide these slides without an explanation or an opportunity to ask questions. He would be going through and talking through each graph. If you have questions, feel free to ask.

Mr. Holbrook said the first graph is pretty self-explanatory. On your left axis, you have the number of grass carp stocked and your horizontal axis there is year. This is the grass carp stocking in the S-C system from 1989 to present. As mentioned earlier, there have been three distinct time frames of grass carp stocking in the system. The first stockings occurred from 1989 to 1996 and in total, that was in the ballpark of 700,000 grass carp. That was the first time grass carp were ever stocked in SC. We had 40,000 acres of *Hydrilla* on the system at the time, and we were just trying to get ahead of a major problem. We did. We crashed *Hydrilla*. We had a lot of grass carp in the system. We completely crashed *Hydrilla*, but there was a tuber bank that was out there, so we did not eradicate *Hydrilla*. We went through a fairly long period of not stocking grass carp. Those tubers that were in there, they started to grow. You had a few grass carp still in the system and they were kind of keeping it mowed down. As time went on and as more and more of those fish died, we had *Hydrilla* bouncing back a little bit. Then we had a kind of reactionary stocking in the second set of stockings. We started out with some moderate numbers. We saw *Hydrilla* jump up really high. We reacted to that with two years of aggressive grass carp stockings of over 100,000 each of those years. We did not stock again for another three or four years. Now we are in our present time where we are taking a different approach. We are trying not to be reactionary and chase *Hydrilla* numbers. We are trying to keep a moderate number of grass carp in the system. Trying to find the exact number of grass carp in the system is something that people have been chasing for as long as there has been *Hydrilla* in the system, and it has been a problem since the '80s. It is difficult to do, especially on a system this large. What we are doing right now is trying something new. We are trying to keep stocking at a low number of fish in the system each year. We are evaluating that every year to see how we are doing. We hope it is the right thing. We think we are going down the right road, but it is still all in the evaluation process.

Mr. Holbrook noted that Mr. Bussells was showing you some slides where you were looking at that multispectral survey. This is the data that we get back from the contractor to try to determine how much vegetation is on the system, how much submerged vegetation, how much emergent, how much floating vegetation, and sometimes they can break that down and speciated it out based off the wavelength of light that species is reflecting. *Hydrilla* is one of those species that we try to break out separately. The surveys that have been done in the system have not been the same every year. From 2005 until 2018, we were using a fixed wing hyperspectral survey. That was an aircraft flying over the system and collecting data. We were also going out with boats and throwing rakes and trying to determine vegetation. The graph shows estimated acreage of vegetation over time. We have had two different survey methods during that timeframe. From 2005 to 2018, was the fixed wing aircraft multispectral survey. Boat survey numbers were lumped in and added on to that. In 2019 to the present, we are getting that data using a satellite, which is multispectral. We are not going out and adding acreage in with a boat survey. If you had a large crew of people that was dedicated to just doing that, it would be fantastic, but we do not have that and it opens you up to some subjectivity. If you want numbers that you can compare from year to year, at some point you have to make the decision and say we are going to go with this type of survey and we are not going to add in all these other acreages out there. That is where we are right now. It may look like in this graph that in the last four years, vegetation has really dropped off. That may not completely be accurate. It is just our methods have changed a little bit. Moving forward, we have got a different baseline to compare to. Ms. Moorer noted those gaps are from weather events, such as Hurricane Florence and the flood in 2015.

Mr. Holbrook moved to the next graph to take a closer look at the last four years. The *Hydrilla* is in the blue and the other native submerged vegetation is in the orange, which would include *Bacopa* and eelgrass. Things like that were what Mr. Bussells was showing in the drone footage. *Hydrilla* numbers have been fairly consistent, with a slight increase in 2022 after a little decrease after 2019. The native submerged decreased some and now are bouncing back.

Mr. Holbrook brought the grass carp stockings together with the *Hydrilla* and native submerged vegetation acreage into one graph. On the left axis in blue, those numbers match up to the vertical bars of grass carp stocked. The orange solid line and the orange broken line match up to the axis on the right of estimated acreage of vegetation. You can see what we were talking about earlier with the three different stocking events and how those stocking events have kind of mirrored where we are with *Hydrilla*, with that first stocking event being really high *Hydrilla*. During the second stocking event, we had *Hydrilla* in numbers that were higher. They are not necessarily showing up on this graph, because some of those years are where data was not collected with a fixed wing aircraft. It was estimated with some boat surveys and a grease board, by drawing and saying we think there are this many acres. That gets into a lot of subjectivity, so those numbers were not included in this graph. We are trying to use what our actual surveys are telling us. All the data from 1982 until 2005 are estimated from somebody flying over or being in a boat and visually looking at it. We were not using satellite and we were not using an airplane with a hyperspectral survey. Those numbers are good to look up back on from a historical perspective, but the accuracy of those numbers may be a little off.

Mr. Holbrook moved on to look a little deeper at the last four years where we have been consistently stocking 10,000 grass carp each year. You see how the native submerged vegetation and *Hydrilla* responded to that. We have not seen any spikes in *Hydrilla* in those four years. We are seeing slight increases in *Hydrilla* and from Mr. Bussells' drone footage you are seeing that *Hydrilla* is out there, especially in really clear water years. It does give us a little cause for concern. We do not want to get to the point where we see a rapid expansion of *Hydrilla* and then we are chasing it with grass carp. He does not think we are there yet. He thinks we have a buffer because we have a good population of young grass carp on the system that are actively feeding. We will see what turbidity does, after what we saw going over the Congaree River today.

Mr. Holbrook wanted to look at this from another perspective. This graph is the same except the blue vertical bars represent estimated population of grass carp instead of it being grass carp stockings. As Mr. Kaczka referenced, we have used 32% annual mortality to estimate our grass carp population. He thinks we both have the same concerns about that number, but it is what we have used. It is what we base our decisions on. He felt it was a good thing to put in here for people to get a picture of how the grass carp population has changed over time. We had those really large stocking events. It took a long time for those grass carp to kind of work their way through the system and dwindled down into low numbers. We peaked that again in 2012 and 2013 with two large stocking events and now we are riding that downhill curve. Instead of riding that curve all the way down like we did previously, when we rode that curve all the way down to very minimal grass carp, we are trying to keep that from happening again. We are riding that curve down and then we are hopefully going to plateau that out and maintain a small population of carp in the system.

Mr. Holbrook showed a similar figure, just looking at the last four years. The estimated population is the blue vertical bars and then native vegetation submerged as the broken orange line and *Hydrilla* as the solid orange line. You can see that the population is still ticking down, but ticking down at a slow rate and eventually we will get it to where it is going to plateau it out. We are going to try to match our stocking number to what our mortality is for each year. We are going to stop bringing it down and just kind of make it go a straight line across.

Mr. Holbrook said we had one question about how we can show what the age structure of the population looks like in the S-C system. He noted that Mr. Kaczka ages fish and he can give you a snapshot of what it looks like right now. Today, he showed us what it looked like. We had a lot of fish in the 1- to 8-year-old range and then we had a kind of a spike of fish out there in the 20 plus year range. That is actual data from aging fish. These graphs are looking at it from a model perspective. This is modeling 32% annual mortality each year and taking a snapshot of what the grass carp population would theoretically look like using that 32% annual mortality in 1996, 2013, and 2022. He picked those years because 1996 was the last year of the big first stocking event, 2013 was the last year of the second big stocking event and 2022 is where we are currently. He wanted to keep the left axis, which is the number of grass carp, the same for each of these three graphs, even though he knows it is hard to see how many fish are out there currently by age, which is reflected the horizontal axis. It is hard to read those numbers for 2022, but it shows the disparity of how the population has changed over time. In 1996, we had a tremendous number of 1 through 5-year-olds. In 2013, a tremendous number of 2 to 4-year-olds. Currently, we have a very moderate number of probably 1 to 6-year-olds and a few fish still hanging around from that 2013 stocking event.

Mr. Holbrook noted on the next graphs, he did change the axis on the left side of the graph, so it makes it easier to see by changing each axis to better represent the numbers for those given years. The top graph has the left axis peaking at 80,000 grass carp. The middle graph has the axis peaking at 120,000, and in our bottom graph the left axis is peaking at

10,000. This gives you a better idea and easier way to see what that model population looks like, although the data Mr. Kaczka showed us is the truth. The fish that are not showing up in the model are a fair number of old fish out there. In actuality, you would have some little blue lines out here that better represent those fish that are persisting longer in the population than what the model says that they do.

Mr. Puckhaber asked if this chart answers the question that SC's lakes change over time. He knows this question is open to subjectivity. How the S-C lakes looked in 1996 is not how it looks in 2022 or how it looked in 2013. Over time it changes. It does not stay the same. Can this answer to the health of the lake? Mr. Holbrook asked if he was asking about the health of the lake in terms of forage and what it can provide for a fish. Mr. Puckhaber said yes. Mr. Holbrook replied no. This is a pretty static way of looking at a grass carp population. This is not taking into any account the variability from year to year. This is only looking at 32% in their mortality. That is what we are using and that is what we applied to each year.

Mr. Holbrook went back to one of Mr. Kaczka comments. It might be true that we have 32% annual mortality for fish when we initially stocked them and for the first year or two of their life because there are quite a few animals that can eat a fish of that size. Once they get larger, an alligator is really the only thing that is going to get them, and an alligator moves pretty slow. The old fish, or not even old, probably once they get to be five years old, the mortality rate probably decreases significantly in the system. That is just a guess. That is the way he would view it, just based off the predators.

Mr. Marshall said he was trying to think why there is a gap there from the 16-year-olds on the 2022 stocking. Mr. Holbrook said that was when S-C stopped stocking. It is interesting that in a modeled population, we stocked enough fish in 2013 that they are persisting at a relatively high level, even when they are 10- to 12-years-old. We have more of those in the system than we would 4-, 5-, and 6-year-olds from more recent stocking events. Ms. Moorer said between 2012 and 2013, we stocked over 200,000 fish and then we did not stock again for three years. After that, we started doing that consistent 10,000 per year stockings.

Ms. Holling asked if per year for this model for say the fish that were stocked in 2013, are you doing a 32% per year mortality to get to that number like the 10-year-old for the last year. Is that how you were doing that? Mr. Holbrook said yes. He can share that spreadsheet, but it basically starts with the initial stocking and reduces them by 32% all the way across. For each one of these graphs, he tried to provide a lengthy figure caption. Hopefully, it answers some of your questions. If you have additional questions, feel free to reach out to us. We can answer now if they pop up or send us an e-mail or give us a call, we can chat about it then.

Mr. Marshall said he appreciated all that information in the presentation. He was the one who asked, because we found ourselves reacting to the public's concerns about these things. He thought all of us want to see data and make decisions based on data. This really helps us and the public as well. Mr. Holbrook was glad and that is the way he and S-C staff took your questions that Ms. Holling shared with us. It makes 100% sense. We talk about and live this every day. You all have a big task of making decisions and it is not what you do every day.

You have a lot of other things to do. If we can provide information like this to make it easier, then by all means we will. Mr. Marshall thanked Mr. Holbrook again for his presentation.

Ms. Holling said before we move on to the review of the draft plan, she wanted to discuss something else, since we just got all this information on grass carp health, water quality, and kind of an overview of the system. She has a concern of getting behind on the grass carp numbers in the S-C lakes. If we continue to have clear water beyond that the large chunk of turbidity coming down the system right now, and she does not know how quickly that will clear up or fall out, she has concerns about just doing maintenance stocking. That is what Ms. Moorer recommended for this this year at the last meeting. She thought it might be a good idea to consider doing a little bit more than that maintenance stocking, so we have a little bit of a buffer. The maintenance stocking is 11,025. If we consider going up to maybe 12,000, it will give them a little bit more of a buffer and potentially help with Mr. Kaczka's numbers. She referred to the graph that she pulled up last time. Ms. Moorer noted we would be at 34,451 with a true maintenance stocking. If we stocked 12,000 fish, we would be at 35,426. Ms. Holling stated if we do it for two years, we will just go up a little bit more to just over 36,000 grass carp in the S-C lakes. She does not know if that would be worth it or not but thinks that might be something that we want to consider. She asked if anybody had any thoughts on that. She said we do not have to do that, but we might need to consider it if clear water continues and because they are seeing *Hydrilla* mixed in with native vegetation. She thinks if there is clear water, there is a higher probability of those smaller bits mixed in will outgrow and out compete some of the natives. She asked again if the Council had any thoughts on that topic.

Mr. Marshall said his thoughts are that we have a pretty good balance in the system in terms of the natives versus *Hydrilla*. He likes the approach we have had in recent years, the steady approach. He is comfortable with minor adjustments like you are talking about. That is just his perception of it. If the professionals here feel like we need to bump up, he is comfortable with that. Ms. Holling asked the Council members on WebEx if they had any opinions on this topic. Ms. Scherman stated she was comfortable tweaking that number a little bit, if the Council feels we need to. Ms. Holling asked anybody else in this room had any opinions. Do we want to move up? Do we want to stick with the maintenance stocking? Mr. Altman noted he would be comfortable with tweaking it a little bit based on what we have seen. Ms. Moorer commented that we are looking at about 700 fish. (Editor's note: Ms. Moorer said this should have been 900 fish.) That is not going to make or break us. The 12,000 is a nice round number. (Editor's note: Ms. Moorer clarified that this number was not randomly selected. It was one of several stocking numbers that were discussed in the 2017 and the November 5, 2022 Council meetings.) She is with Ms. Holling. She would like us to have a buffer. None of us can predict weather events. We have got to have a little bit of buffer in there. She does not want to get back to where we do a large-scale stocking. She thinks that consistency has really helped us out in the last five years, a lot. She believes that has been a big factor of the success that we are seeing with native vegetation on the lake system. She just wants to make sure that we avoid that and, as a Council, we think about consistency in our stocking numbers and not making those drastic jumps up or down. Just know that there are going to be some seasonal changes in there from weather events to what we see in our vegetation numbers. From S-C's standpoint, we would be comfortable at the 12,000.

Mr. Marshall wanted to make sure he understood Ms. Holling's term of maintenance stocking. He asked if that would keep the population where we are right now. Ms. Moorer stated yes, it would be 32% of our standing population right now, which would be 11,000 fish. That would start leveling us out. Ms. Holling noted it is basically increasing the total population by 1000 fish if we are doing true maintenance, and closer to 2000 fish if we go up to 12,000. She asked Mr. Simmons if he had any comments or thoughts. Mr. Simmons said he does not have any issues about the adjustment. He did not think there would be an issue. Ms. Holling asked Mr. Leaphart and Mr. Stout on WebEx if they have any comment. Neither had any comment. Ms. Moorer asked Ms. Holling what the stocking number was in the draft plan. Ms. Holling replied she had put true maintenance in the draft plan.

Ms. Holling moved on to the overview of the changes to the draft plan. She sent the Council the whole plan. We made some minor changes in both parts, including spacing, grammar, and formatting, as well as the dates in Part 2. Also in Part 2, we added Cuban bulrush to the main species. We added phrag to Back River Reservoir because there is about a 2- to 3-acre plot adjacent to the reservoir. We added *Chara* and *Hydrilla* to Lake Cherokee based on information from state lakes staff. They have requested some grass carp stocking to be included for this year as well. We added Lake Lyman, which you approved the treatment by us for them up in Spartanburg County, and Draper WMA Lakes in York County because they have some problem areas and wanted to get some grass carp. We increased the number of grass carp in Lake Greenwood from 350 to 375 to maintain the density of fish in that system. We increased levels of grass carp in the S-C lakes from 10,000 to 11,025 but will bump that up to 12,000 based on our discussion. We adjusted estimates of treatment costs and updated the expenditure table. She still needs to correct the map of the locations so that is accurate. She asked the Council members if there is anything else that anybody saw in the management plan that they think needs to be corrected or changed. Hearing nothing, she asked for a motion to post the plan for public comment with the adjustment to the S-C grass carp stocking number. Mr. Simmons made a motion that we post the adjustments to the plan with the changes to the number of fish that Ms. Holling recommended. Ms. Moorer seconded the motion. Ms. Holling asked for any additional discussion regarding the plan. Hearing none, she called the motion to a roll call vote since there are Council members on WebEx. The motion passed unanimously. Ms. Holling noted that Ms. Logion had to leave the meeting for an appointment, which was why she was not asked to vote.

Ms. Holling thanked the Council members and moved on to discussion for the next meeting. She said that will include a review of the public comments, any additional changes to the plan based on those comments and anything else we hear, as well as vote to approve the draft plan. She expects that meeting should be at the end the February to mid-March, depending on when we can all get together. She asked the Council if anybody else has any topics they wish to have included in that next meeting, or anything that needs to be addressed. Ms. Moorer asked if any additional information was needed from S-C staff that we may need to start working on. Ms. Holling asked Ms. Moorer if there was anything that she wished to add regarding *Salvinia* and the weevils. Ms. Moorer said they went up, probably 100 acres from what she reported in November. There was not a significant increase, and it was only to *Salvinia* acres treated. We are steady treating now with both our internal and contract crews for *Salvinia*. She can update Council if you want those new numbers, but there are no significant changes. We thought that the drone footage and the water quality stuff were a better use of our time. Ms. Holling noted we can wait until closer to time, if you feel like you need to make any changes.

Ms. Holling asked if anybody else had any new business for the Council. Mr. Marshall commented about some potential information for the next meeting or for a future meeting. The issue comes up from the public about the impacts on waterfowl harvest or hunting and the same thing with the fishing in terms of how the S-C system or any of our systems are managed. The criticism that we are getting is that we are wiping out habitat. He was wondering if there are recreational harvest numbers available that could shed some light on that issue. If there is habitat alteration, and it appears that we are having a dramatic effect on that, what is happening with the recreational people in terms of their numbers of harvest. Ms. Moorer wondered where that is collected other than the Hatchery WMA and Potato Creek. Mr. Simmons said we can pull those numbers, but caution people to remember that you can set a wonderful dinner table and you can have great habitat and a lot of times ducks still do not show up. What we have on the system is not an indication of the number of ducks that may be harvested. Ms. Moorer stated what Ms. Kneece shared with us at the last meeting was helpful. She noted that the Cooper River is full of *Hydrilla* and the skies are not black with waterfowl. Ms. Holling said she does not know if that would necessarily impact our decisions for this year. It might be good to have those at the meeting at the end of this year.

Mr. Marshall understands that with waterfowl, we are dealing with regional and continental issues, but maybe fisheries data. Mr. Kaczka said we have our long-term bass surveys and that can be a lot more standardized than looking at waterfowl harvest. He can pull the data. Off the top his head, it is remaining very consistent. We hear complaints from the public, but on a much larger scale, we have Bassmaster still wanting to come here and they are ranking our lakes highly. The data is still favorable. He could pull that data easily. Mr. Marshall noted in making that request, he would defer to those that know the data and how helpful that might be to address those concerns. It might be useful.

Ms. Moorer stated we try to stay plugged in to the local fishing clubs and Elite Series Bassmaster when they come. We just got involved in that and they have been coming for a couple years now. She tries to stay connected to waterfowlers that have been part of these larger groups, so we can have sidebar conversations to talk through some of these issues. The feedback she has received from this season, they have been pretty happy about what they are seeing on the system. We can also reach out to Monica Williams from the Santee National Wildlife Refuge and see if they have any counts of birds that are using the refuge. That might be some indicator of the flyway. Mr. Simmons agreed with Mr. Marshall that the answers to those questions would be helpful. Whenever we are talking to the public, we try to make sure we explain that issue to them. Mr. Marshall thanked the Council members for that.

Ms. Holling asked the Council if that is what we want to do for the next meeting or do you want to just wait. Ms. Moorer said she would reach out to Ms. Williams about the duck counts. They may not have them because it is just her and one biologist working on the refuge. She is not even sure if they are collecting duck counts, but she will ask. We might get some public input. We might get positive input from waterfowlers this year, at least that is what she has been hearing. Whether they will reach out before the next meeting, or during the comment period she does not know. Ms. Holling stated she will see if potentially adding that information to the next meeting will be helpful. Ms. Moorer suggested providing tournament results. We have been hosting a good many tournaments on the system with the results. Mr. Riser noted the Elite Series Bassmaster tournament is coming back this spring in April. Mr. Marshall said if there is any reasonably good and relevant data out there, that would be great to have for the next meeting. Ms. Holling said that sounds good. Mr. Kaczka stated that getting folks to listen and believe you is a different story.

Ms. Holling asked the Council if anybody had anything else, new business wise. Since there were no more discussions, she asked for a motion to adjourn. Mr. Marshall made the motion to adjourn the meeting, with Mr. Simmons seconding that motion. Ms. Holling called for a vote. The motion passed unanimously. She thanked everyone for attending this meeting. She adjourned the meeting at noon.