138th Meeting of the South Carolina Aquatic Plant Management Council

Attendance:

Council Members: Julie Holling, Willie Simmons, Chad Altman, Bill Marshall, Casey Moorer, Stacy Scherman, Chris Stout (WebEx), Adam Leaphart (WebEx), Tammy Lognion (WebEx)

Guests: (in person) Ken Rentiers, Emily Cope, Matthew Puckhaber, Allan Stack, Chris Page, (Web-Ex) Levi Kaczka, Billy Dukes, Bobby Stanfield, Brian Lynch, Adam Deal, Jim Anderson, Roy DeHaven, Carl Bussells, Ernie Guerry, Miles Alterman, Sam Chappelear, Tyson Bunn, Joey D'Amico, Thomas Stevens, Michael ?

Location: Poinsett State Park, 6660 Poinsett Park Rd, Wedgefield, SC 29168 and WebEx

Call to Order: 10:17 a.m. 1/11/2022

Minutes:

After getting confirmation that the people participating via WebEx could hear okay, Chairman Holling apologized for the delay and called to order the 138th meeting of the South Carolina Aquatic Management Council (Council). Some of our council members are participating via WebEx: Mr. Leaphart, Mr. Stout, and Ms. Lognion. She thanked everybody for attending and hoped this will be helpful for everybody. She noted that this was her first attempt at a council meeting, so if things get a little screwed up, she wanted to apologize ahead of time. She hoped to get the public notice out a little bit sooner in the future. She thanked Ms. Scherman and Poinsett State Park staff for hosting the meeting. She asked that everyone introduce themselves. Everyone in the room and on WebEx introduced themselves. Deputy Director Rentiers thanked the Council for their many years of service and noted that he appreciated what the Council does. Ms. Holling thanked Mr. Stack for assisting with the WebEx controls.

Ms. Holling said the first thing on the agenda is the approval of the minutes of the March 10th, 2021, Council meeting. All the Council members should have received copies of those minutes. She asked if there were any corrections or changes to those minutes. Mr. Marshall noticed there were some places where there was information that might have been stated and recorded correctly but might have been an incorrect fact. We referenced a meeting as happening in 2015, but that meeting happened in 2017. He asked if we wanted to correct that or just leave it because it was said. Ms. Moorer asked if we are talking about the 2017 meeting when the Council voted to do the five years. Mr. Marshall said yes. On page 5, in the big paragraph in the middle there are two notes when it says 2015, but he was pretty sure it was 2017 that was being reference there. Ms. Holling thought 2015 was correct because she thought the fifth year was 2020. Mr. Marshall noted that later in these minutes, we refer to this same meeting and call it 2017. Ms. Moorer stated it was 2017 that we started 10,000. We stocked 10,000 for five years: 2017, 2018, 2019, 2020, and 2021. Last year was our fifth year of 10,000 or not this year. Mr. Marshall suggested that the correction could be in parenthesis and that the actual date was 2017. Ms. Holling said we could make that correction. She will go through and make sure that is correct there and in any other locations. Mr. Marshall noted that on the same page, page 5, in that

second paragraph, on the fifth line down, he thinks it is referring to grass carp instead of a grass population in South Carolina. It is just missing the word carp. Ms. Holling asked if there were any other corrections to the minutes. There being none, she asked for a motion to accept those minutes with those corrections. Ms. Moorer made a motion to accept the minutes with those corrections. Ms. Holling asked for a second. Mr. Marshall seconded the motion. Ms. Holling called for a vote. The motion passed unanimously.

Ms. Holling stated the next agenda item is public comments. She asked if there was anybody that wished to make any comments. There was no response. She moved on to the next item on the agenda, a review of the 2020 control operations on Santee Cooper (S-C). She gave the floor to Ms. Moorer.

While Ms. Moorer was getting her presentation ready, Mr. Simmons asked her when the last survey was flown over the S-C lakes. Ms. Moorer asked if he was talking about the helicopter surveys or the hyperspectral. Mr. Simmons said the hyperspectral. Ms. Moorer said they switched to the hyperspectral two years ago, which is satellite data collection. We do not do fixed wing collection anymore because of the price and the resolution on satellite work is much better these days. The technology has improved greatly recently. We collected it in August of this year. It is on one of these slides, but she does not remember the exact dates.

Ms. Moorer noted that this whole presentation is a brief overview of aquatic plant control on the S-C lakes for 2021. We are going to talk about what we treated, what we saw vegetation wise with our survey work, and the outreach programs and habitat enhancement work that we have gotten involved in this year. The last part will be a good update for any of our partners in the restoration work on Lake Marion this year.

Ms. Moorer said for 2021, We were up in species treated. The biggest number there is 3,200 acres of giant salvinia. For comparison, last year we treated 1,300 acres of *Salvinia*. This year, we are treating *Salvinia* year-round. We are using contact herbicides this time of year, just trying to reduce the biomass, so that in early spring we have less plants on the system. Hopefully, they are not really growing as fast right now. We are hopeful that we can keep treating, reduce that biomass, and get ahead of it. When the water temps and the air temps get up in the spring, we will be ahead of or right there with the growth of *Salvinia*. We treated 167 acres of crested floating heart (CFH) this year. Last year, we treated 4 acres less. We are about the same on that. Total invasives treated were 3,700 acres. In 2020, we were about 1,000 acres less than that.

Ms. Moorer moved on to the hyperspectral survey work that was done this year. We are looking at 764 acres of CFH and 1,600 acres of giant salvinia picked up on hyperspectral. We cannot see through the tree canopy with hyperspectral imagery. We are only picking up what is in open water areas. A lot of the giant salvinia on the system is under tree canopy, which is a challenge. We cannot treat with a helicopter in those areas because we cannot get through the tree canopy. We put air boats in there as far as they can get. We have done some work with Sonar (fluridone) in-water treatments. We treated upstream and let the water move through while trying to hold a certain concentration level. We have been fairly successful in some of those backwater areas with *Salvinia* like that, but the S-C system is a flowing system, and we are at the mercy of our inflows. If we have a lot of inflows or a lot of rain in our watershed, it is going to

come through our system and flush out, so it is very difficult and challenging for us to hold a concentration of fluridone on *Salvinia* in some of these areas. We picked up 52 acres of *Hydrilla* on hyperspectral. We treated either 200 or 186 acres. When we get to the slide of total acres of *Hydrilla* on the system, that is going to be a combination of what we have treated and what we picked up on hyperspectral. Water hyacinth was at 303 acres. Water hyacinth used to be a huge challenge on S-C system. We have made a little bit of ground on that when we have had giant salvinia and water hyacinth mixed. The herbicide that we are using is active on both of those plants. When we have an area where there is hyacinth and giant salvinia mixed, we are treating both species at the same time and we have made a dent in the water hyacinth.

Ms. Moorer noted that the data was collected on August 19, 2021. About 5% of the data was collected on September 23rd, because of cloud cover. That is one of the advantages that we have with using satellite. When we had fixed wing surveys, if there was cloud cover and they could not get it within that week, we just lost that section of the lake system. With satellite imagery, every time that satellite passes every two weeks or so, we can go to that window and try and tease out areas that had cloud coverage. That is one good thing about satellite collection, and another reason she was kind of excited about satellite collection. A lot of the pad plants are at their highest growth earlier in the season. When we fly later in the season, the pads are already kind of petering out. We are not capturing that native vegetation coverage. This year, we did not split out sections because of budget concerns. If we pull different times, it does cost us more, but is something that we can look at in the future.

Ms. Moorer stated that our invasive species mapped increased by 1,100 acres compared to 2021. This is just the third-party mapping. This does not include any boat survey work. The only boat survey work was ground truthing, which is going out, throwing a rake, and dropping a pin saying that this plant is here. Whenever the satellite imagery is collected, that is just a verification process. This is through ReMetrix, owned by SePRO, a third-party group. When we ground truth, they sent staff down and our staff took them out by airboat. They went to areas where there was a lot of different species and tried to tease that signature out. That is how we do our survey work.

Ms. Moorer moved to the next slide, which was our native vegetation. Our eelgrass (Val) increased a little to 1,776 acres. All these pretty much increased. We had a couple that went down, including cutgrass and cattails, which are native to our system. We did treat over 800 acres of cutgrass this year, which was habitat enhancement for waterfowl up in the Super Flats. This was collected right after we treated. That vegetation probably did not get picked up because it was brown. We have some drone footage of that. Our native species mass increased by 1,400 acres. That was a great sign for us. Keep in mind that this does not include any environmental impacts such as water quality or turbidity. Those things impact our system highly. If we have a hurricane or flood like we had for several growing seasons in the past, that can especially impact our submersed native species. They do not take kindly to turbid or high water and will be displaced. The past couple years, we have had pretty good water conditions. If you guys do not remember, in 2021 we were in a drought. Then we got rain, and we were right back to normal. We had some fluctuations in there, but she feels good about this increase of 1,400 acres in native species. Overall, there is 14.27% native vegetation on the system. We talk about it some of our goal of 10% natives. People talk about that goal for S-C, and a goal for a lot of people in this

room, she is sure, is as much native vegetation as we can get on the S-C system. If we could have 50% native vegetation coverage, that is what we would want, as long as we could serve all our users. She noted that algae were not included in this number. We used to include algae. One of the issues with that is *Lyngbya* is an invasive algae. That signature is hard to tease out. While some people will argue that algae can be a benefit to ecosystem, we pulled it out. The acreage was not that significant and did not drop the native vegetation percentage by much. Because we cannot tease it out, so she is not going to put that in there. While there may be some benefit to *Lyngbya*, it is an invasive species, and she does not feel confident about keeping it in there. She asked if anybody had questions.

Mr. Marshall said Ms. Moorer probably mentioned it, but he did not quite understand. He understands the satellite data now can capture acreage numbers for you. When you are doing that field work, does that expand the acreage of a given species like *Hydrilla*? Hyperspectral was 52, but you had a 186 number. Ms. Moorer said that was in addition to what we treated. Mr. Marshall asked if she gets that additional number by GPS. Ms. Moorer said yes. That 52 number is solely hyperspectral. Later, we are going to be talking about *Hydrilla* on the system and grass carp stocking. She has another spreadsheet that shows the acreage we treated and the acreage shown on hyperspectral. We treated 186 acres. We map an area and calculate the area, which was 186 acres. We use that number to calculate the rate of herbicide we use. Those numbers are dead on, of what we treated and the hyperspectral. She wanted to include that so people know it is 52 acres, but that does not tell you we treated 186 acres on the system in 2021. It was treated just before the hyperspectral was collected. You know it was there and it will be there next year. There will be a tuber bank. We will have to continue treating it. That 186 acres was our second-year treatment. It is a pretty good success story. It was *Hydrilla* and coontail mixed. We went in there with ProcellaCOR, treated it, and were able to keep the coontail. The one drawback of that herbicide is that while it is selective, it is expensive. Treating that 186 acres was pretty expensive, but we did not want to damage the coontail.

Ms. Moorer started to go to the next few slides, which are going to just be pictures before backtracking to the slide of acres. Invasives treated were 3,700 acres total, with residential treatments of 164 acres. This is one of the things that we hear a lot. It was not always done this way, but for the past five years at S-C in our program, we focused hard on invasives because we have giant salvinia and CFH that takes most of our time. You hear a lot of times that we are focused on residential areas. We treated 164 acres of residential areas. That included water primrose and alligatorweed, which are both invasive species. We do not tease them out because the acreage is not significant enough for us. Residential submersed treatments included *Cabomba*, pondweeds, and milfoil, which are native submersed species. We do not like to do that, but when someone calls and their canal is totally blocked off and they cannot get a boat out or they cannot fish, or they cannot launch a boat, then we do treat it. We treated five acres of native submersed species on the S-C system this year. It is not something we like to do, but when it is needed, that is what we do.

Ms. Moorer moved on to the pictures. This is majority of what we spend our time on. She thinks this is Poplar Creek, but it is one of the residential areas that we have. That is a pontoon boat in the background, but the boats are stopped up. That is giant salvinia and we go in with different mixes of herbicides. This area will take weeks and weeks and weeks of them going

back and treating. We can do a foliar application that has a little bit of in water activity, but we cannot maintain a concentration purely because of flow. The other picture is an example of an area where we cannot get an airboat. We pull up to that dock, get off with a hose reel and try to spray back in there as much as we can. The issue is that *Salvinia*, especially in secondary growth stage or even primary group stage, will be about the size of your pinky nail. Those plants can get up in any little nook and cranny or on a Cypress tree or root tucked away. In ideal conditions, it can double its biomass in 48 to 72 hours. We go spray, and we leave some behind because we cannot get to everything and then it turns into this in a few weeks.

Ms. Holling interrupted Ms. Moorer because the majority of our WebEx participants cannot hear you. The meeting was paused to try to get the technical issues resolved. Ms. Moorer connected to the meeting with her cell phone. Once we determined that the WebEx listeners could hear her, she gave a quick summary of the first few slides.

There was another minor technical difficulty with the PowerPoint presentation. After confirmation that it could be seen by the WebEx audience, the meeting continued.

After catching the WebEx participants up, Ms. Moorer continued with her presentation. The image on the left here is Poplar Creek Landing Campground. Right around the 4th of July we try to hit our commercial facilities. One of the issues with giant salvinia is that it can live between the bunk and the hull of your trailer for up to two weeks dewatered, if not more. We really get heartburn and feel kind of bad when we see an area like this where people are going to be launching boats and pulling it out and moving it to other water bodies or reservoirs across the state or outside of our state. We try to get in here, pay good attention and try to knock off all the *Salvinia* in areas like this especially. On the right is another picture of us trying to treat. What you see in that light green is *Salvinia* mixed in with giant cutgrass. We are trying to get in there with an air boat and try to take care of treating *Salvinia*. In some areas like this, we did do a helicopter treatment this year. We got some drone footage of that, which we will talk about in a few minutes. This is just a panoramic view that she thought was worth showing. This is giant salvinia in a residential area where the guys are just in there spending a good bit of time coming back every week or every other week. She noted they have, in the summer months, two internal crews. They are made up of two environmental folks that work with S-C and two summer students, who are with us from May to early August. Our growing season, as you all know, is much longer than that. We also have contract crews that help us, but those contract crews are also working across the state and other areas. That is a challenge, since we were fighting something which has such a fast growth rate.

Ms. Moorer threw in this picture of a trailer with lots of vegetation on it. That is one of the things that is very sad when putting in at a landing and seeing this. You know this is going to go to the next reservoir. It is going to be downstream, upstream, or across state lines. This past year and probably for the last two years, we have been making a push to attend any public event that we can go to. Covid made it a little bit difficult, but we did get to go to the Elite Series when they were here on the system. Mr. Bussells and Mr. Riser both do some outreach work. We try to educate folks on making sure that they clean their trailers, dump their live wells and check their equipment. That is another thing people do not think about when they are wading, wearing waders or their dogs are in the water. It can be stuck on you, your equipment or dog and it will

go to the next body water or even to maybe a private impoundment. We are trying to educate folks on what can happen when they do not check their trailers.

Ms. Moorer moved to a success story. This is the back of Chapel Branch, just above I-95 where I-95 crosses Lake Marion. If you are familiar with the condos right there on the point, this is at the very back of that cove. Giant salvinia on the left and several weeks, if not months of work on the right. That was Mr. Stack and his summer student and maybe even Mr. Stack and Mr. Guerry towards the end of the season were going back in there touching up just trying to keep this area clear.

Ms. Moorer got an opportunity to fly when we were doing some aerial work on the Super Flats. She got to go up with the pilot just to fly over and look at what we were seeing. The image on the left is upper Marion, just below Elliot's Landing and the railroad trestle. In between all these trees is giant salvinia. In areas like this, we cannot treat by helicopter, because there will be tree damage. There was some tree damage from the cutgrass work, but the mission for that was much different. That was to restore an area which was historically open flats. They got inundated by cutgrass during some drought situations, and the cypress took off in there. There were dead cypress on that. This is not an area where we were going to treat by helicopter because we know we would be killing all the trees in there. These are the challenges we have. The little speckles in the picture on the right is CFH. The peak of CFH was 12,000-16,000 acres on the system. We are down to about 2000 now. We were fighting that battle for a long time with aerial work and then doing follow-up treatments of those areas and standing tree areas with air boats She asked if there were any questions about that. She noted that the CFH has *Salvinia* caught up in it. As it floats through, it is catching on the CFH.

Ms. Moorer showed two pictures of *Hydrilla* from some survey work. When the guys were out doing ground truthing and throwing rakes, they might see a good stand *Hydrilla*, which would be a significant area of nothing but *Hydrilla*. They would move along and find some *Bacopa* or Val with one or two strands of *Hydrilla* mixed in there. That is what we have been seeing for the last four or five years. She feels like having a good number of carp in the system has kept that *Hydrilla* suppressed enough that we are not seeing huge stands or monocultures just yet. We are in some areas and treat it when we find it. That was the 186 acres we treated with ProcellaCOR. It is expensive, but selective. We kept our coontail and took out *Hydrilla*. The areas that fringe Lake Moultrie and Lake Marion are where we are seeing submersed vegetation and it is mixed. We would not go in there and treat it with ProcellaCOR. It is just not enough. It is too much acreage to treat. It is too costly to do that type of spot treatment work right now.

Ms. Moorer showed some of their natives. On the left is a huge stand of Val and on the right is Illinois pondweed, both native species. We are seeing good, dense stands of our native species when we are doing our survey work. On the left of the next slide, we have some pickerelweed up in the Stump Hole Swamp area. Our shoreline natives are looking good. On the right is *Bacopa*, but in the background is a little bit of CFH mixed in with some other pads. We have a lot of good stands of milfoil and *Cabomba*, especially on Lake Moultrie.

Ms. Moorer noted that our Val is doing well. A lot of people remember in the years following the drought in 2007, when Spires to Rocks Pond was literally a pasture of that. You

could go out at Spires Landing, look out, and it literally look like a cow pasture. In the following years, that was gone. It was displaced, whether that be from a high water or high turbidity. We also had to stock 109,000 grass carp because *Hydrilla* had gotten out of control. It was probably a combination of both. Right now, the Spires area is looking good. You throw rake, you find Val. In some areas, it is topped out like the picture on the left. Mr. Stack fishes competitively, and he can vouch for the areas that he finds out on our system. The picture on the right here is the canal area. It is really hard to see, but up close in that picture at the corner of the airboat, that is actually *Cabomba*. You will see like a little haze on top of the water. That is actually white flowers from *Cabomba* flowering. That whole back water area is just full of *Cabomba*. We threw a rake and found a couple strands of *Hydrilla* here and there, but predominantly *Cabomba*.

Ms. Moorer said the next several slides were just going to be a quick overview of some of the other projects that the S-C team has been working on this year. The first one is the watershield project. Over the past few years, we have been trying to focus on a project that we can do in-house to improve waterfowl or fishery habitat or food sources. Our team, once a year, comes together, takes input from a lot of different groups and we come up with a project. In the past, we did a Val transplant. We took Val from Lake Greenwood and transplanted it onto the S-C system. This year, we moved watershield into the borrow pits that border Lake Moultrie. Last year, we treated those borrow pits because they were inundated with cutgrass, cattail, and water lily. It did not give much open water for waterfowl to utilize, so we treated by helicopter. This year, we planted some of the things we do want in there. We transplanted some watershield and smartweed. She thanked the South Carolina Department of Natural Resources (DNR) Region Four group, Will Carlisle and Alicia Farrell. They helped us decide what plants we should look at. We are all know we cannot do a better job than Mother Nature, but we can help her along and introduce native species that we do want and are beneficial to waterfowl. That area is open to public hunting. That was one of the reasons that we chose it. It is walk-in access. You do not have to have a boat to get to it. That is one thing that is a benefit to the public. She showed a couple more shots of them harvesting the plants. She noted that people should not go around moving aquatic vegetation, as you can move some things that are not beneficial, and you do not want. The parents of one of our previous summer students own a pond that is full of watershield. They agreed to let us come in and harvest watershield every couple of years. We go through it to make sure we are not moving something we do not want to move. That is a couple shots over at the Roger's pond. We do it in totes, and 13 totes were transplanted. The final slide of the project was an aerial shot of the borrow pits. That pale green in the middle just underneath the transmission right away lines is watershield. We do still have some cutgrass work to do. With cutgrass work and any monoculture, it takes several seasons of treating. We will be back in there treating by airboat or helicopter if we need to, and as our budget allows. It was a pretty good project that we were excited about. In conjunction with this, we put wood duck boxes in there. We also teamed up with Will Carlisle when they had a couple students checking and maintaining duck boxes along the system. We got with them, went out, and treated cutgrass and giant salvinia that had blocked off some duck boxes. We opened those back up so they could be utilized. These were joint projects, all focused on waterfowl.

Ms. Moorer moved to the Super Flats project, which started this year. S-C partnered with South Carolina Ducks Unlimited (SCDU), South Carolina Waterfowl Association (SCWA), and DNR. We were approached by some organizations to look at restoring the Super Flats, which is

on upper Lake Marion near Jacks Creek. That area, if you are familiar with it, is just below Hickory Top Wildlife Management Area (WMA). It is adjacent to a WMA where people can walk in. One of the driving forces was to try and restore this area to open water for waterfowl. Some people have different objectives for S-C. We are looking to promote a diverse habitat for all wildlife. Obviously, SCDU and SCWA were focusing on waterfowl. That is part of it. We all got together. We had the SCDU biologists and the DNR biologists there at the meeting to give us their recommendations. In the past, S-C has treated this aerially and that was for bass survey work. Scott Lamprecht, when he was in Region 4, requested that we open this area back up because he used to do bass survey work in there. The dead trees you see are from previous aerials. We opened it back up, but funding things happened, giant salvinia happened, and we have not been back in there for several years. The lighter green you see is cutgrass, cattails, giant salvinia, alligatorweed, primrose, and just a whole host of different things in there. These are before pictures taken in June of 2021 by drone. The area on the right, that we call Lizards Cut because it looks like a lizard from the air but is basically looking downstream from Hickory Top towards Jacks area. On the left of the next slide is another pothole area we wanted to open up. You can see it was previously treated but had filled back in.

Ms. Moorer said the next pictures are after treatment in November. Mr. Guerry or Mr. Bussells flew this for us to give our partners an update. The treatment was successful. We did have tree damage. We expect to get phone calls from folks questioning that when they get out and see that. We knew that was what would happen. When we cycle through droughts, trees, especially cypress, get stressed and they try to reproduce. We get a lot of scrub cypress and a lot of other trees, hardwoods or other woody plants coming into those areas. We went in here with a mix of imazapyr and glyphosate, which works well on the cutgrass. The bonus of that is the glyphosate is active on giant salvinia. It does not have in water activity. When you have *Salvinia* mounted up, you are just burning that top layer off. We were targeting cutgrass in this. One perk was that we did kill some *Salvinia*, but that was not the goal. If our goal was to go in there and kill *Salvinia*, we would have chosen a different mix to do that. With the biomass of cutgrass, we would not have been able to put enough gallons to the acre to penetrate that canopy of cutgrass to get down to where that *Salvinia* was tucked in. The idea is to continue the partnership for three years, check in with our partners, and see how we continue. When we fly it this year and it is more open water, we may go in there with a different mix and target more *Salvinia*. This is an aerial view of the Super Flats restoration area. The partners are providing monetary support to this project. That has been a huge help to S-C. We all have a lot of the same goals. It is one of the projects she is super proud of and excited be part of.

Ms. Moorer said the last couple slides are just some other things we are doing around the system. Mr. Bussells has really been the head of this effort. He is part of Keep Berkeley Beautiful, which is a part of Palmetto Pride. Our landings are public and often in WMA areas. This is a shot of the Hatchery Boat Landing, which is a WMA. They just get trashed. It is just awful, and a lot of people utilize those areas. Mr. Bussells has been coordinating and he has done an excellent job of trying to keep these landings clean. He is also educating folks on the opportunities that are there: the bike trails and the hiking trails at the Hatchery. When we first started talking about people swimming, she was not enthralled about swimming at the Hatchery or taking her child to swim at the Hatchery. But there is a beautiful beach out there that you could swim at because you can see what is going on around you. It is a beautiful area. She

wanted to include these shots. She is super proud and thankful for Mr. Bussells' effort and our whole team's effort for being part of this. She showed a couple more shots of other things that we have done. Lowfalls Landing had a good clean up. Wilson Landing is downstream of our spillway. If we ever need to spill water, all the trash there gets pushed downstream. That has been one of the areas that a lot of people are starting to utilize now, because of the growth in the Lowcountry. A lot of people are there, and it is a good place to do a cleanup.

Ms. Moorer's last slide plugs what we have coming up. Palmetto Pride on Martin Luther King Day is a day of service. They are going to be doing the Lake Moultrie passage. Anybody who wants to volunteer can contact Mr. Bussells at S-C, or you can go to their website, www.palmettopride.org, and sign up for that day. On March 17th, the BASS Elite Series is going to be joining us again on the S-C lakes. They were here in October of 2020. That was supposed to be in April 2020, but it got postponed because of Covid. It was still a very successful tournament. We are excited to see what comes in March and what kind of weigh-in bags we see. S-C staff will be there handing out information about *Salvinia*, doing courtesy checks on trailers and setting up a booth to try and educate people on the importance of not spreading *Salvinia* or any other invasive across the system or across the United States. There will also be the state youth tournament, which she believes is in April, right around the same time as the Elite Series. S-C people will have a booth there educating those high school and middle school anglers about the importance of cleaning, drying, and dumping equipment, checking live wells, and things like that. We will take any help, if anybody wants to come join us and hand out goodies.

Ms. Moorer asked if there were any questions. Ms. Holling thanked Ms. Moorer. Mr. Stack said there was a question from Mr. D'Amico, who asked if she could discuss more about the partnership with DU and other waterfowl groups and goals you have. Ms. Moorer said the partnership is with SCDU, SCWA, DNR and S-C, and the goal of the project is to restore the Super Flats to have more open water that can be utilized by waterfowl. It is just outside of the Santee National Wildlife Refuge and historically has been known to be used by waterfowl. It just got inundated with cutgrass and giant salvinia. The goal is to open those areas up to provide public access for hunters and hope the waterfowl start utilizing those areas more. One great thing about that area that she was really excited about is the same thing she talked about on the borrow pits on Moultrie, people can access it by water or walk in. If you park at Hickory Top WMA, you can walk into those areas. It gives a lot of hunters the opportunity to access those areas.

Mr. Deal asked if having enough people working on projects like the Super Flats is a problem. If so, how do we get involved. Ms. Moorer said this is our first year, and we coordinated an aerial treatment. It would probably be beneficial to the partners to have eyes on the ground. We have two members of the S-C team that are drone pilots, which has been a huge help. We cannot always get in there with airboats because it is so inundated with cutgrass and other vegetation. In areas with trees, we cannot fit the airboats between them. If anybody has a drone license or can get in there with different types of boats, like direct drive or pro drive boats or mud motors. She is sure it can get through there. Taking pictures, dropping pins, and sending them to us is helpful. The S-C team has a group email that goes to our entire team. It is aquaticplantcontrol@santeecooper.com. She asks people all the time to send pictures and drop pins if you find *Salvinia* or see something that looks suspicious. If you do not know what it is, you can email us that. If you go into Super Flats and think it looks pretty good or it does not look

good, you can always send that in. In the future, once we get through opening up these areas, we likely will go in there and introduce watershield, smartweed, and things like that that waterfowl will use, similar to what we did in the borrow pits. This is a larger version of what we did in the borrow pits.

Mr. Stack said Mr. Tyson has a question about how we are using weevils. Ms. Moorer said salvinia weevils are a biological control for giant salvinia. They have been used in Texas and Louisiana. S-C does use an integrated pest management approach to our management strategies. That means we focus on using biological controls, chemical controls, and educational outreach, such as educating people on the importance of controlling or managing invasives. We are going to be growing and stocking giant salvinia weevils. We are going through the permitting process right now with Clemson. We are constructing a greenhouse. The only places right now that grow weevils are LSU in Louisiana and an Army Corps of Engineer Project in Texas that actually uses greenhouses. The LSU group uses ponds to rear their salvinia weevils. That was not something that our team felt comfortable with. We opted to do a greenhouse. We are going to have several beds in there where we will have our salvinia weevils and can continuously stock them on the system. What we are doing with salvinia weevils are kind of hedging our bets. If we have a mild winter and have stocked a significant number of weevils, those weevils will overwinter and hopefully start their own wild population to give us a little bit relief from giant salvinia. If we have a harsh winter, we will likely lose our weevil population because they cannot survive freezing temperatures. We will lose our population, but we may get a little burn from the cold weather on the *Salvinia*. We are looking into that. The green house is constructed, but we are waiting on our inspections from the Clemson invasive species group to come and permit that greenhouse facility. That is something that people could help us with. If you find a large stand of *Salvinia* somewhere on the system, drop us a pin. We can go there and stock weevils.

Mr. D'Amico asked what is the balance that you see once the cutgrass is knocked back, to restore *Hydrilla*, which is key to wintering waterfowl on the lakes. Ms. Moorer said her goal is once we reduce or knockback the cutgrass, we promote native submersed species like *Cabomba* and milfoils. *Hydrill*a does host macroinvertebrates and things which are important to our waterfowl, but *Cabomba* and other submersed species can do the same. The Cooper River is inundated with *Hydrilla* right now and she is not sure waterfowl are wintering there either.

Mr. Stevens asked if S-C has any other projects like the Super Flats coming up this year. Ms. Moorer said the Super Flats will continue. We committed to a three-year program. That is not saying that we will not look at other options. It depends on staffing. We are a group of 6, including her. Five folks are consistently in the field doing water quality work and aquatic plant management work. We have a pending FERC license. We will be responsible for a good bit of fisheries work on eel, shad, and herring. As time permits, we always have a goal to have a habitat enhancement project each year.

Mr. Stevens commented that a simple 10% coverage of native vegetation goal ignores that some coverages, especially submersed aquatic vegetation, are much more valuable than others, such as trees or emergents. Ms. Moorer said that depends on what your think is valuable. Are you just talking valuable for fisheries or waterfowl habitat? Trees, she would argue, are just as important to other wildlife. Maybe not specifically the wildlife you are interested in, but

wildlife most definitely nests in and uses trees and shoreline vegetation. It is good habitat, just maybe not for the species that you are most interested in.

Ms. Holling moved on to her update on our program. Since Mr. Page retired, our program is down to two people. We will be hiring at least one more person, hopefully shortly. Ms. Holling stated this slide is control effort by species for the 2020 calendar year. The species are the primary species treated and may have other species mixed in. Total acreage was down five acres in 2020. Total cost for us significantly went up because we covered a helicopter treatment of Cuban bulrush on Donnelley WMA for DNR's wildlife section. Mr. Stack interrupted to notify Ms. Holling that we are having audio problems. Ms. Holling shifted around some until the audio on WebEx improved and repeated what she had said about the slide. Water hyacinth continues to be our most problematic species, but we also had a jump in our primrose. Helicopter treatments were done on Phragmites at Santee Coastal and Chinese tallow on Bear Island WMA, which was paid for by those groups.

Ms. Holling moved to the treatment by water body. Ashepoo River is mostly water hyacinth. The saltwater content has gone down. Native species continue to expand in the upper regions, although we are also fighting some invasives. Back River Reservoir includes water hyacinth, *Hydrilla*, fanwort, and primrose. We introduced some alligatorweed flea beetles there because there is some alligatorweed. Black River and Black Mingo Creek has hyacinth, alligatorweed, primrose. We do have to be careful in that system, as well as Waccamaw River, for a slightly rare species that has a limited range. Cooper River has *Hydrilla*, *Egeria* or *Elodea*, fanwort, water hyacinth and primrose. Goose Creek Reservoir has always been our most diverse system. Things that we are working on there are hyacinth, spatterdock, duckweed, and *Hygrophila*. That is the only location of *Hygrophila* in this state. We also have common salvinia and water lettuce there. Santee Coastal, as she noted before, is Phragmites. We also worked at other WMAs, including a giant salvinia treatment on Santee Cooper WMA, and the tallow treatment she mentioned earlier on Bear Island. She and Mr. Puckhaber also went into Sandy Beach and did some minor treatment on some of their ditches and provided them with a recipe for treating in the future. Most of the stuff that we deal with on state parks is clearing edges and submersed vegetation for fishing, swimming, and boating. On the Waccamaw, the biggest issue is water hyacinth. We have gotten pretty good control on the lower portion and getting better control of the nursery areas in the upper portion. We have also got common salvinia in that lower portion, which she does not see as an issue right now. Mr. Stack told Ms. Holling that there seemed to be an issue with WebEx.

After a slight delay while trying to resolve the technical issues, Ms. Holling stated she will just read off the information from the slides and moved to our triple grass carp stockings. These are maintenance stockings, with the exception of Lake Wallace, which was a stocking to control the *Hydrilla* treated in 2020. For the people on WebEx, those numbers are: Lake Murray - 1500, Goose Creek Reservoir - 800, Lake Greenwood - 300, Lake Bowman - 65, and Spartanburg Reservoir Number One - 25. A WebEx participant interrupted to say the audio is terrible and there was no content being shared on the screen. Ms. Holling paused the meeting to

try to resolve the technical issues, including switching to a landline phone. After checking to see the last thing the WebEx participants heard, Ms. Holling went back over the grass carp information.

Ms. Holling discussed our challenges. Our manpower is no longer three members. We are down to two. Hopefully, we will get back to three shortly to work on everything in the state. We always have to deal with Mother Nature and her changes in water and turbidity. Our budget fluctuates because that is based on gas purchases and the gas tax. We have not had a whole lot lately, but we also do public outreach. We will be attending SEWE in Charleston and Palmetto Sportsman's Classic in Columbia this year to promote our program and answer questions from the public. We have not had a whole lot of COVID-19 delays and limitations. The biggest issue is hotels when we travel. We must have separate rooms for everybody, so that cuts into the budget a little bit more. A WebEx participant said they still are not seeing the content. Ms. Holling answered that Mr. Stack is working on that.

Ms. Holling gave everyone a break while Mr. Kaczka was getting his presentation on carp ready and came back at 12:05pm. After confirming that the WebEx participants could hear okay, Ms. Holling said we are going to move on to the 2020-2021 triploid grass carp health. She gave the meeting over to Mr. Kaczka from DNR's fisheries group.

Mr. Kaczka said if anyone cannot hear him or see the presentation, just let him know. If you have been here the last three to four years, this will sound very familiar. The method for our data collection has been very consistent, in terms of the results that we are getting. He started with a quick overview of the lake and a rundown of what was collected last year, in 2020 and 2021. He noted that we first must make sure we do not have any outliers in our data sets. We expect to see this nice smooth, exponential increase in length versus weight, really in any type of fish species. We do not collect very small fish. The smallest fish we collected this past year was over 500 millimeters in length. We do collect larger fish. They can get big, such as a 16,000-gram fish (about 35 pounds). We see fish out there pushing 40 pounds. These fish get quite large.

Mr. Kaczka said this is a quick overview of what we collected this past year. Historically, since he has been part of the project, we have treated this year by year. We are getting away from those single collections and taking a more holistic approach throughout the year. We are collecting fish at different times of the year, rather than what we had previously done. He wanted to combine some of our data from the past few years to see if we noticed any trends. You will see the blue bars are what we have collected this past year, with 2019 and 2020 represented as well. We have big bars out here (20+ age class) for 2019 and 2021 collections. For our collections in 2019 and 2021, our oldest fish numbers seem oddly high. Keep in mind that we age every fish to the exact year until we get to 20 years old. There are some difficulties with aging any fish, but those difficulties are very much increased when aging grass carp. They are a very difficult fish to collect to get the otoliths, the ear bone, that we used to age them. Typically, when aging any fish, the rings we are looking at are very close together as they approach the end their lifespan and it is just very hard to get an accurate age. Rather than take a guess at some of

these older fish that may be 24 or may be 26 years old and since we rely on agreement between multiple readers when aging these fish, we lump these oldest fish together. This is not as representative as being of one age class. This sort of bell-shaped curve is typical of collecting most fish species, especially in our area. This is because the smaller, younger fish are harder to collect with the gear types that traditionally are used in fisheries. The older fish may not be collected due to some other difficulties, including the fact that they are less common, so they also tend to be collected in smaller numbers. You typically do see this bell-shaped curve, but he does not believe that is the reason why we are seeing it here. He thinks it is because in 2012-2013 we got behind the curve in stocking and there was a drastic increase in *Hydrilla*. In 2012-2013, there were stocking events that were much higher than normal and would correspond to these fish in this age range, since they are stocked at one to two years old. It is coincidental that we are of seeing that bell shaped curve, because we are collecting fish in much fewer numbers than we typically do in traditional fisheries samples.

Mr. Kaczka showed the length versus the condition for the last three years. This is a factor we use to gauge the health of individual fish and the whole population. You will not see a whole lot of difference between 2019, 2020, and 2021. There is sort of a shotgun blast of dots. Each dot on the graph corresponds to an individual fish, with the colors corresponding to different years of collection. A lot of times, fishery projects look at condition factors. You will see a condition factor of one as being a standard for what is desirable. Fish that are above one are typically fat, healthy fish, and are in systems where there may be an excess of forage. Fish that are below one or drastically below one, such as the fish down here, are thought to be in in less ideal condition. When you look at this, you might be thinking there are a lot of unhealthy fish out there. There is not a lot of forage for them. There are some considerations that we need to talk about. We developed the condition factor for grass carp with fish that were there back in the early 90s. He is pretty sure most of us here today are aware of what the conditions were on S-C in the early 90s. There was a buffet of *Hydrilla* out there. From a practical standpoint, we are comparing today's fish to fish that were in line for a buffet. Back in the 90s, the situation was not desirable and that is something you need to keep it in mind when looking at this and getting that initial impression of "wow, look at all these really unhealthy fish." Although we are looking for a condition factor of one as being a baseline, the way this calculation was come up with was using fish that were above average in terms of their health. These fish right around one are not average fish. They are above average. When we see a fish that is 0.9 or mid-0.8, those are healthy fish, as well. These are things to keep in mind. If you are just looking at this initially, without having any background, you might tend to think that these fish are much less healthy than they are.

Mr. Kaczka wanted us to look at length versus condition by age group. For this slide, he took all three years of those collections and separated the fish into age categories. This is based on the belief that younger grass carp are much more effective at feeding, are much more mobile, and therefore, are going to be in a healthier condition. On the right, you see the colors for young, middle age, and old fish. The young fish are six years old or younger. Middle aged fish are six years old to 12 years old. The older fish are above 12 years old. Generally, fish tend to decline in condition as they get larger and that is a product of being older. You can see that with the green

dots. You really do not see any older fish that are above a 0.9. In our young fish and in our middle-aged fish, we have plenty that are approaching one or above one, in terms of the condition factor. Young age does not necessarily mean that they all could be in the same condition. We do see some of the young fish a little bit lower on the condition scale. Again, we need to keep in mind that we are comparing them to fish in the 90s in a situation that was not very desirable from any standpoint. To look at this past year, the average condition value for all our 2021 fish combined was 0.79, but then you cannot see that there is somewhat of a correlation between age class and condition. The older fish are only averaging about 0.67, and the youngest fish being the healthiest at 0.84. Mid-0.80 to around 0.90 and above is really a healthy fish.

Mr. Kaczka noted some new methods we engaged in this past year and are planning to continue moving forward. We are still collecting grass carp via bow-fishing. When the water temperatures will permit, we are using electrofishing, as well. We cannot use electrofishing during the summer when water temperatures are warmer. These fish are too large and too strong. They get away from the electrical field too quick. We can use that in the wintertime when it is cold out and their metabolism is slow. They are not moving around as much. We are still using that, but we are also collecting fish throughout the year. Previously, we were using a bow-fishing guide on the S-C lakes. Those collections involved going out with him and his team and those collections were made between mid-August and late October.

Mr. Kaczka said he and his staff sat down to discuss what information we were trying to gather from this study and what information we were still lacking. We realized we needed to start getting these fish throughout the year and throughout the lakes rather than a few spots where this guide liked to go. Fortunately, Mr. Kaczka got to talking to one of our DNR guys in the upstate that comes to S-C and bow fishes recreationally. He is much more effective with a bow than we are. For the past year, when he has made visits, and he does come throughout the year, he has collected grass carp for us, and we have either gone out with him or met him early the next morning. That has been great, being able to get fish throughout the year. This will provide us the ability to look at the effects of seasonality on condition. Naturally, with any type of vegetation, there is a growing season, as there is with fish. We were previously only getting fish late in the summer, right at the end of growing season, when you would expect the fish to be in optimal health. By collecting fish year-round, we can look at how seasonality affects the condition of grass carp. Previously, we collected fish at the end of the growing season in 3-4 productive spots, but we were really interested in gauging the health of this population from a systemwide standpoint rather than a few select locations.

Mr. Kaczka noted that the upstate DNR guy had to postpone his trip this past weekend for a week or two because the conditions overnight on the S-C lakes were windy and below freezing. Those are just not very safe or effective conditions to go out and collect fish in. Our coworker has asked us what areas of the lake we would like him to go. We have been able to get fish from the upper Marion, in the Lowfalls area, on Marion near Russellville, and some areas we were unable to get fish from before. That will also provide us the ability to look at condition of fish throughout the lakes. While we are looking at seasonality, we can also look at spatial

differences between fish health. He stated this is all new, so we have limited numbers of data points. In the coming year or two, we should have a much more robust data set with these different variables added in. He will be able to comment more in depth on that moving forward.

Mr. Kaczka said he and his team are also looking at the fish condition at the initial collection and comparing that to the condition of the fish at the time they are working it up in the lab. When he says working up a fish, they are taking length and weight and collecting their otoliths. This is important because of the tremendous amount of water at the bottom of the collection cooler. From the initial collection time to the time they work up the fish, it will lose some of its water weight, especially when it have been sitting for a while and has been collected via bow fishing. We need to keep in mind that when we are calculating the condition factor, weight is one of the two things that you are looking at. When you have a fish that has been sitting around for eight or ten hours, that decreases it weight by quite a bit, and that is going to artificially decrease its condition. By keeping track of whether we collect these fish via bow fishing or electrofishing, we can compare fish of similar lengths and weight. We are adding more variables to our study. We are not necessarily collecting more fish. We are collecting the same number of fish but are collecting more information off these fish to better analyze the health of the total population. At this point, the preliminary relationship between condition and time since collection has been negative. The longer the time between collection and when we work them up, the poorer the condition is. While this is a very limited number of data points, he would expect in the next year or two that the relationship will be clearer as we continue collecting information off the fish in this fashion.

Mr. Kaczka's last slide addressed the elephant in the room by saying there is still no updated actual mortality estimate for S-C lakes. We are currently using the former estimate of 32% annual mortality to calculate the standing stocking of grass carp in the S-C lakes. We have not been able to update that mortality number because we have a large system and a limited number of fish, about 100 or so each year, that we collect. We are looking for some opportunities for additional funding, as well as getting one of our local universities involved and having a dedicated project on the system.

Mr. Kaczka thinks we are moving toward answering some of the big unknowns, the biggest being the updated mortality rate. He noted that the former estimate may not be far from the true value. We need to keep in mind the conditions when this was originally calculated were very different from what they are now. The original stocking of grass carp on S-C lakes was in 1989. The study that came up with this estimate was done from 1998 through 2002. We have realized that grass carp can live very long in our system. We have aged fish from their mid-20s to some pushing 30. The mortality estimate was calculated before all these fish potentially started to die off. He noted that these are large fish that do not have many predators, even when they get old and slow down, besides maybe an alligator that can consume these 35-pound fish. That is something we really need to get a better handle on.

Mr. Kaczka informed the first-time listeners, that we know there is a difference in the efficiency of a grass carp on vegetation depending on how old it is. Younger fish, in comparison to fish that are 20+ years old, are much more effective at eating and controlling vegetation. What we are concerned with, in terms of vegetation management and standing stock of grass carp, is not so much how many total fish are on the system, but also how many fish that are out there in specific age classes that are effectively managing vegetation. There are still many unknowns. We do know where we are lacking data, where we need to increase our data set, and some of the questions that need to be answered. That will come into play if we can get some additional funding to increase our field sampling time and possibly having a project dedicated solely to grass carp. He emphasized that the size of the system is working against us, but the known recruitment is working in our favor.

Mr. Kaczka stated there is not a whole lot of information out there from scientific literature on grass carp. What you do see out there comes from systems that are much smaller. The S-C lakes are a 160,000-170,000-acre system. We are trying to use a relatively small number of grass carp to speak to the entire population for a large system. That is working against us. When it comes to recruitment, we know how many fish are being put in every year. He said "being recruited" in quotation because the grass carp being put into the S-C lakes are sterile, so they are not reproducing naturally. With us knowing how many sterile grass carp are being put into the system, that is the recruitment. He noted that in any fisheries analysis, one of the biggest functions is to control the unknowns, one of which is recruitment. Many of these analyses assume year after year that the recruitment is steady when environmental factors do not alter the calculations. Having that unknown can really mess up your calculations. In this situation, we know exactly how many fish come in every year, which is working in our favor.

Mr. Kaczka stated that is all he has for the 2021 data. He reiterated that there are some questions that we still need to be answered, but at this point we finally are in a good spot in terms of what we do know, what information we are lacking, and what our path forward is to getting those answers. He stopped sharing his screen, so he can read any questions that were sent via chat. He said he would address those first before taking questions from the room.

Mr. Deal asked what studies Mr. Kaczka is using to determine life expectancy within such a large system. He has not found a study that shows something within such a large system. If so, could we add the studies to the comments of the meeting.

Mr. Kaczka said, in terms of life expectancy, one of the things that we are doing with all the fish that we collect is pulling the otolith out of their head. That is just an ear bone. We grind it down and age the fish just like we do trees. You can see individual rings and the fish will lay down a growth ring every year of its life. If we counted five rings, then that fish is five years old. We have seen fish that are 28-29 years old i this system. In the last couple years, we have collected some fish that were not far off from being one of the originally stocked fish, as the first grass carp were stocked back in 1989. Every time we go out and collect, we are getting a better feel for life expectancy. Those fish that are mid-20s to pushing 30 years old are rare. At this

point, based on what we found, he would think about 25 to 30 years is about the max. As we continue to collect fish, we will continue to age them. As we see older fish, and we can get a confirmation between multiple readers on those age or growth rings, we will increase that age expectancy. At this point, he would say about 25 to 30 years. Not all fish are living to that, but that is a possibility.

An audience member asked if we do not have a current or better understanding of mortality and life expectancy, why are we still stocking with old indices of the fish. Mr. Kaczka said that is a great question and that is something that we have acknowledged in the past, that we do not have an up-to-date estimate on mortality. One thing we have is that we are able to compare an estimate of *Hydrilla* coverage and grass carp stocking rates. Any time *Hydrilla* or any other invasive increases greatly and that is met with an increase in the grass carp stocking number, we can see that the fish do a very good job at controlling the vegetation. Although, we do not know the exact mortality estimate or the exact age at which the grass carp being stocked are being effective, we do know that within a year or two of a big stocking, they are starting to get a handle on those big sporadic increases in *Hydrilla* or other invasives. This is another indicator that fish are aging out of contributing to the control of vegetation in the system. Having fish in the system that are five to six years old or younger by having some level of steady stocking, whatever level that may be, is important to continue doing to maintain control of invasives.

Mr. Alterman asked if the data collected indicate that existing fish are maintaining vegetation at an adequate level, why is money being spent on more fish in the system? Mr. Kaczka said he would let someone from S-C speak to that, but from our end, we can see that when you take a step back and have a couple years of no grass carp stockings, there is an obvious and apparent jump in invasives like *Hydrilla*. When that happens, you sort of get behind the 8 ball and that is met with an above average level in stocking grass carp to get control of that increase in invasives. That is just not a desirable stocking, with these big swings and no grass carp stocking followed by tens of thousands or 100,000 plus stocking. Low-level maintenance stockings to keep *Hydrilla* and other invasive at a controllable level are more desirable and he believes that that S-C would say something similar in terms of why they spend money to have a maintenance stockings year and year out.

Ms. Moorer said she would echo exactly what Mr. Kaczka said. He was spot on. Over the last five years, we have stocked a small amount, 10,000 fish, of grass carp on the system, which is below the mortality rate. We are slowly decreasing the population, the standing stock, on the system. We are taking a slow approach to that. As Mr. Kaczka said, we have seen in the past when we stopped stocking, we had to react to a large amount of acreage of *Hydrilla* on the system with large numbers of grass carp. That is something that no one in this room wants to ever see it again. When we had to stock 100,000 grass carp, it is a detriment to our system. It is a detriment in the native species that we have. It is a detriment to S-C's budget. That is why we are continuing to stock low numbers. Even though we are seeing a slight increase in *Hydrilla* on the system, we are trying to keep a low enough number of carp in there to keep *Hydrilla* suppressed

so it does not push out our natives and we do not have so many fish in the system that would negatively impact the native vegetation. That is what we have been seeing. The Council agreed over the last five years to do 10,000 fish per year. That does not replace mortality. It is dropping the population of grass carp in our system slowly. That is the goal. It is to do this slow and steady and avoid those knee jerk decisions that we have made in the past. We also do not want to be reactive to pressure to stop stocking, then starting up again, repeatedly. That is when we are negatively impacting native vegetation on our system.

Ms. Lognion said she disagrees with the stopping of using the grass carp because when you do a natural control like this, we can steer away from using high amounts of pesticides in our water sources. Stocking puts pesticides in as your secondary control mechanism to control the *Hydrilla*. If the grass carp stocking is eliminated, then we will be behind 8-ball because we are going to have pesticide leakage into our ground water systems, and we are going to have other fish come up against that contact. There are a lot of issues we need to think about when thinking about completely withdrawing stocking grass carp as a natural control for *Hydrilla*. We must look at things from an integrated pest management standpoint. That is what we are looking at when we think about *Hydrilla* being controlled by the grass carp and not by pesticide use. Mr. Stevens noted that herbicide application is a very targeted thing and he understands what you are saying, but grass carp go wherever they want to. There are tradeoffs to what you are saying. Ms. Lognion answered that from an expense standpoint, we could do more targeted treatments with the grass carp in the system and she thinks that would be a better situation. You said the carp go everywhere, but you still see *Hydrilla* in specific areas. Where you see increased growth patterns, you can stock those specific areas where you see a resurgence of *Hydrilla*.

Ms. Holling thanked everyone for the comments. Mr. Kaczka asked if there were any other questions. Ms. Holling reported none and thanked Mr. Kaczka for the presentation.

Ms. Holling moved on to the review of the draft plan. She neglected to print out the information on the update, which is an overview of the changes, but will share that. She noted there were a few minor changes on part one. She commented that this information is usually something we do not deal with. The changes were very basic information including changing staff names, making minor grammatical and formatting changes. She also updated some scientific names in the history section and added some information about species that have been found in the state since that part was last updated.

Ms. Holling moved on to part two, the main part of the draft plan. She made minor grammatical and formatting changes, date changes, and staff name changes. Several species were added to Ashepoo River section. Some of them are invasive and some are native, but they have the potential to be present in larger numbers and cause issues. Cuban Bulrush and tallow trees were added on Donnelly WMA and Bear Island because both of those were treated this past year. Bladderwort was added in Goose Creek Reservoir section. That plant is native but can be problematic. It is not very widespread, but there is potential for it to be an issue. We added common salvinia into the Pee Dee River because it is spreading into the lower reaches from the

Waccamaw River from the tidal flows. She added giant salvinia and common salvinia to Santee Cooper areas WMA's, those which are adjacent to the S-C lakes because those plants are likely to spread to those areas. Mr. Stacks interrupted Ms. Holling with technical issues. Ms. Holling paused, confirmed that the list of changes was visible to everyone online, and then repeated what she just said before continuing. Watermilfoil was added to Poinsett State Park and Sesquicentennial State Park. Chicken Creek was added to Back River Reservoir because we are already treating that area.

Ms. Holling noted she increased the levels of carp to be stocked in Lake Greenwood and Lake Murray to maintain the appropriate density of fish in those systems. Lastly, she updated the cost table at the end. She hoped most of the Council members have looked over both parts of the plan and taken at least a quick look at those changes. She asked if there were any questions from the Council. There were none.

Ms. Moorer stated she would like to make a motion. Ms. Holling asked her to proceed. Ms. Moorer made a motion to proceed with the draft plan as it is written, move forward with the 30-day public comment and accept the changes that Ms. Holling has made. Before asking for a second, Ms. Holling paused to answer a question about the grass carp numbers in Lake Greenwood. She said the change is purely to keep the total number of grass carp in the system steady based on what we know about mortality. Ms. Lognion seconded the motion made by Ms. Moorer. Ms. Holling thanked her and opened the floor for discussion.

Mr. Marshall stated that he does not agree with that because of concerns that are being expressed by the public about the negative effects on habitat. He recommended a pause in stocking grass carp in the S-C lakes. He would make a counter motion, but that is out of order. His comment is there is a need to take a pause for this coming year rather than stock 10,000 grass carp. Mr. Simmons agreed with Mr. Marshall and recommended looking at a pause. Ms. Lognion disagreed with that. Based on the data we just looked at from Mr. Kaczka's presentation, we are behind the 8-ball with the grass carp numbers being stocked already. We are looking at a mortality rate that we are not catching up to. Look at how the older population of carp are eating the vegetation. They are just going to eat less. They are going to be in survival mode. Based on Mr. Kaczka's presentation from DNR that we just saw, we really need to keep a younger population in there. She cannot see where that would be advantageous at all. That would put us way behind the 8-ball. Ms. Moorer agreed with Ms. Lognion. She feels like that suggestion is a non sequitur with what this council has gone with for the last five years. We are still consistently decreasing the number of fish in the overall population of the system with the addition of this 10,000.

Ms. Moorer gave Mr. Stack a flash drive with the curve, that we have seen in the past, of acres of *Hydrilla* and the grass carp population. In the past, when we dip below that is where we lose control. She values public opinion, and they absolutely have a say and consideration in this. She feels like the 10,000 fish that we are asking for in a 160,000-acre reservoir is appropriate when we are seeing an increase of native vegetation. We are not even taken into to consideration

the water quality effects. Native vegetation on the S-C system is doing well. Her concern is if we stop stocking, this puts us behind the 8 ball. Then S-C is left paying for stocking 100,000 fish. She does not want to get into these large stockings. She does not think anybody here does. S-C and the Council have been through that twice.

Mr. Marshall said as reflected in the last meeting minutes, that we approved today, there was an interest from the former chairman and comments from the public that we begin a step down. There seemed to be some interest among the Council members. We were at 10,000 for 5 years. There was an interest in stepping it down to a lower level of stocking. He asked if it was possible that pausing for a year just give us that step down that there was some interest in doing.

Ms. Moorer thinks we are still stepping down the overall population. When it comes to the pausing of stocking 10,000 grass carp, we need to think about year class and the effect of that. That is what Mr. Kaczka just talked about, the importance of the consistency and knowing that recruitment number. He needs to know that we are stocking fish and not skipping years.

Ms. Moorer turned everyone's attention to the chart that we have pulled up right now. You can see where we have started and stopped in the past. The blue line is the population of grass carp. The red line is *Hydrilla* acreage. A goal of this Council was for us to transfer from control mode stocking into this maintenance stocking. We missed that. We missed that back when we stopped stocking in 2014 through 2016. We stopped stocking and we missed it. We had to stock a large number of fish. That was a detriment to the system because we lost a lot of native vegetation. We do not want to do again. When you look at this and you see where we were going up and down, we do not want to get below that line. Eventually, we are going to have to go to a true maintenance stocking. In her terms and S-C terms, true maintenance stocking is replacing mortality. At some point, we are going to have to maintain a small population on the S-C system to help us control *Hydrilla*. We are talking about a small enough number that is not going to negatively impact to our natives. We are dealing with giant salvinia, water hyacinth, crested floating heart, and water quality issues as we manage a very large system. We cannot afford to just use herbicide to treat *Hydrill*a. An integrated approach to pest management is the best of both worlds by using biological control, aquatic herbicides, and educational outreach. That is the industry standard.

Ms. Lognion stated she is a huge proponent of integrated pest management. We are dealing with such an older population of carp and we are getting confirmation of that from the data. We just need to go slow and steady here, stay with what we are doing and keep collecting the data. If we had to switch over and start using aquatic herbicides, it is very costly, and she does not like the impact it has on the environment overall. She does not think the public would be very happy with a lot of that usage. She does not want *Hydrilla* to get out of control. If we get a year where it is warm and we do not have a hard winter, we are going to see a surge the next year. If that happens, we would be behind the 8-ball. We already have part of the grass carp population that are not eating as they should because they are old and eating to survive. Continual stocking is the way to keep a younger population in there.

Mr. Simmons asked the Council if we were to look at a situation where we were to take a break for just one year, do we know that we would have to bump up to stocking 100,000 fish if we put fish back into the system. He asked is it possible to take a break and it not throw us that far behind. He realized we may have to look at dealing with a higher stocking number than 10,000 the following year after we take a break, but would we be looking at dealing with 100,000 the following year or a different number.

Ms. Moorer said that is unknown and dependent on environmental impacts. If we got a drought year and then had clear water and low turbidity, that would make it highly possible for *Hydrilla* to take off. *Hydrilla*'s growth rate is exponential. If that situation were to play out, we would be behind the eight ball. In the past, we stocked 100,000 grass carp, which was a control stocking. She does not want to ever see us go back to the level of a control stocking. Right now, we are in an adaptive stocking mode. Eventually, she would like to see us keep decreasing the overall population of grass carp and get to a true maintenance stocking. That is replacing mortality every year so we are keeping a low level of fish in the system. Ms. Lognion said she thought something everyone can agree on is that we want to get to a point where what we are putting into the system each year will cover what we lost in mortality the previous year. She thinks stopping stocking will not get us where we are trying to go.

Mr. Marshall asked if we have a target population that we are looking for. He knows this is adaptive management but what is the target population for grass carp.

Ms. Moorer wished that we knew. She wished we could have 30,000 fish in the system, and we would be okay. She thinks we need to get somewhere near that and give ourselves a buffer to take into account environmental conditions. When we see high water and high turbidity, we will see a drop in vegetation. When we see low water and low turbidity, we will see a surge in the vegetation. We have to take a look at where we lose control, and we start chasing our tail. She pointed to a time in the past where both red and blue line were close to each other. If they continued with stockings then, the S-C lakes probably would have been okay, but we stopped. Right now, those lines are getting close together. If you are asking about a population number, that is we are looking for. She came into this meeting wanting to replace mortality, which would have been 12,000 grass carp. She and her staff were seeing vegetation increasing. *Hydrilla* is there, moving around on the system and in denser stands, but she decided to go another year of 10,000 grass carp and keep dropping the overall population. She feels like we are getting very close to the target population on S-C system and then we can move to a true maintenance stocking, which in the history of the Council, has never happened before. It has either been adaptive or control stocking.

Ms. Moorer stated she cannot tell you if it is 35,000 fish, which is roughly what is in the system now. We lost control at 12,000, 20,000 and 30,000 fish because of an environmental condition. If we have environmental conditions like the 2015 flood followed by a hurricane like Hurricane Florence, we cannot predict the results. She thinks we need to give ourselves enough

of a buffer so that if we have high water or high turbidity, that the number of fish we have in there will not be detriment to the vegetation that we are trying to hold on to. On the other hand, she hopes that if we have a low water or clear water year, that we have enough fish that it does not let *Hydrilla* start out competing our natives that we have been working so hard to keep. She thinks we are close to that number. As she said, we talked about it internally, looked at some stuff, and we were thinking about asking for a true maintenance stocking, but decided that we can drop down a little bit more. We are still dropping the population with a 10,000 stocking. She and her team, after talking about it, felt like what we are seeing on the system is not enough to run around with our hair on fire yet. We feel comfortable going with 10,000 to drop the population a little bit more, reassess next year, and get to a point where we are at a true maintenance stocking. Reassessing will include looking at the survey data, Mr. Kaczka's data and what we are physically seeing on the system.

Ms. Lognion agreed with what Ms. Moorer was saying, but she also wanted everyone to think back a little bit here. We had the flooding, and we lost a lot of fish. We do not know how that affected our numbers. There have been some things that happened outside the norm in the last couple years. We do not have an idea of the exact number of fish we lost on the system with all the flooding from the 1000-year flood. She asked what would we do in that situation if we were to stop. We are behind again because we cannot anticipate what might happen. She thinks the timing is wrong. She was not saying that eventually, we cannot reduce the number of grass carp. She thinks the time is not right to stop. She really thinks the timing is wrong to do this.

Ms. Moorer noted that because native vegetation is thriving, she did not want there to be an argument on whether *Hydrilla* is beneficial or not. We can talk about the past, but my team does not take a hard stance against *Hydrill*a. There is *Hydrilla* on our system. We are aware of where it is, what it is doing and how it is moving and is distributed across the system. When you take a hard stance like that, it can be a detriment to other vegetation. We do not want to be there. We want to be where we can have a small population of grass carp on the system to keep *Hydrilla* suppressed, and at the same time allow our natives to flourish. In the past, the knee jerk reaction or the yo-yo response to whatever happened on the system has gotten the Council in trouble. This Council has been committed to consistency for five years. What we are seeing is awesome. She thought when the decision was made it was great. It was the right decision.

Ms. Holling reminded the Council that in the S-C section, as well as the whole plan, there is always an option for the Council to come back later in the year if there is an issue with a waterbody, whether it be S-C or anywhere else. There is always the option to come back and revisit carp numbers and stocking numbers. If something else or something new shows up on the water body, we can always have another Council meeting and discuss adding something in that was not in the original plan. Ms. Moorer asked if Ms. Holling was talking about grass carp on the S-C system, like adding them in or out. Ms. Holling said in general. There is always the option, for anything in the plan, to be revisited later in the year. Ms. Moorer said if we are talking about grass carp stocking, she prefers and thinks it is best to stock in the spring. Fall stockings are different. That throws in another variable. We are trying to achieve consistency.

Ms. Holling asked if there was any more discussion regarding the S-C stocking. Mr. Simmons said a pause may put us behind some, but we do not know exactly how much because of weather conditions and everything else that is going on. He reminded the Council that it was said in the fisheries report that younger fish are more effective in controlling *Hydrilla*. This is true for fish in general, but particularly for grass carp. If we did have the stocking, we would be stocking with younger fish and maybe we could gain control that way. He just wanted to mention that.

Ms. Holling asked if there was any more discussion. Mr. Miles Alterman, asked via chat if it is possible to acknowledge the possibility that food sources and shortages are leading to poor fish health. He asked if we could simply keep the population where it is and let more SAV grow. The amount of native SAVs is not at the level to allow the animals that use the habitat to thrive. Ms. Moorer said the condition factor is not poor, from what Mr. Kaczka showed us. It is showing that the fish are in really good shape. A one is a fish that was sampled earlier when we had 40,000 acres of *Hydrilla* on the system. That addresses that the fish are not in poor condition. The older fish were in poorer condition, but Mr. Kaczka said the older fish are not really contributing to control. They are eating just enough to maintain and eventually their health is going to look different. It is nature. Our bodies look much different when we get older. In regard to keeping the population where it is, what we are doing is decreasing the overall population. You have a 32% mortality of the population in the S-C system. If we were to replace that, it would be over 10,000 fish. We are decreasing the overall population of the grass carp by replacing less than the mortality. We are slowly bringing down the overall population of the system. She asked if that makes sense to everybody.

Ms. Lognion thinks that might be something that some people do not realize. The S-C stocking being done right now is below the mortality rate. That is an important point. Based on the scientific data, we are losing the older fish on the system. This stocking is not trying to keep up with mortality, it is just trying to keep us in front of that 8 ball.

Mr. Marshall said in terms of overall population, he might have missed something. We have stocked, over the past five years, 50,000 hungry, young fish. We have a robust and hungry stock of fish there now, but it was said that our population was in poorer condition. Ms. Scherman stated some fish have already aged out of being really useful. Ms. Moorer noted Mr. Kaczka did not say they were in poor condition. Mr. Marshall said Ms. Lognion just said that. Ms. Moorer noted Mr. Kaczka said the older fish were 0.6 and were not as healthy as the younger fish. Ms. Lognion meant the older fish were not in good condition and she was thinking about those numbers. The older fish are not consuming at the levels they need to be consuming and are just in maintenance mode. They are not in control mode. We are talking about younger fish being more aggressive eaters and that is what she was trying to say.

Mr. Marshall knows we have older fish in the system, 20 to 30-year-old fish. He was talking about the 50,000, 1- to 5-year-old fish that have already been stocked. That was his point.

We have got a lot of young fish in there. Ms. Moorer stated we do, but we have that consistency in there and mortality is affecting them. With grass carp, you do not see automatic control the year you stock. She is not a fisheries biologist, but discussions with our fisheries biologist says that there is a 1- to 2-year lag for control from when you initially stock or stocking that year. That is something to keep in mind, and every year they are being impacted by a 32% mortality rate. That mortality rate, whether it is 32% or 22%, is impacting the population. We have been using that 32% for consistency. When she is looking at things, she is looking at those lines, what we have done in the past, and what happens when those lines cross on that curve. Mr. Marshall guessed that mortality is more affected on the smaller fish, which is one way of looking at this issue. He noted that Mr. Kaczka said earlier that the alligators might eat those 30-year-old fish but not much else would. Ms. Moorer said those 30-year-old fish are easier to hit with a bow. Ms. Holling noted when we are stocking, she has seen great blue herons take a 12-inch fish, but they are not going to touch the big, older fish.

Ms. Holling asked if there was any more discussion regarding S-C. After confirming no addition S-C discussion, she moved on to a comment online. Mr. Adam Deal asked if we could remove the treatment of Val and naiad on the treatment list for Lake Greenwood. Ms. Holling noted that those are problematic in some cases. She noted that Greenwood Lake Management oversees what is problematic based on complaints they receive. She believes they are leaving things that are not in in places where people have homes. Anywhere there is lake front which does not have homes, they are leaving those areas alone so there is plenty of fish and duck habitat. That was her understanding. Mr. Page said he did not think that there was any Val treated on Lake Greenwood in the last couple of years. Ms. Holling asked the online listeners if they could hear okay. After they said they were only getting part of the information, she went back over the Lake Greenwood response.

Ms. Holling asked the Council if there were any additional comments on the motion to approve plan with the edits that she made. There being none, she called the motion to a vote. Six council members voted aye. Two council members voted nay. The chairman abstained. The motion passed.

Ms. Holling moved to the topics and dates for the next council. She asked if the Council would like her to continue sending out the notice for them to vote on what dates are good. The Council said they would like that. Ms. Holling asked if there any other topics that the Council would like to see addressed regarding the plan. She asked if we need get a waterfowl biologist or any other waterfowl groups in here to discuss any issues with waterfowl in the state and how waterfowl is being affected by various changes. Mr. Simmons asked Ms. Cope if it would be possible for Ms. Kneece to join us. Ms. Cope said if the committee would like for our waterfowl biologist to come in, we can coordinate that. Ms. Holling thought that would provide us more information for how things are doing in state. Ms. Moorer asked if Mr. Kaczka could come back again, in case there are questions on the grass carp condition factor. He may also be able to share some information on bass surveys and things with BASS. Ms. Holling noted Mr. Kaczka

provided some information to us last year and he can give us kind of an update on the sportfish numbers as well as the grass carp numbers.

Ms. Holling asked if there was any other business that needs to be brought before the Council. Mr. Simmons asked if the plan was going to go from here to be posted for public comment. Ms. Holling said it will be posted for public comment for 30 days and those comments will be provided to the council just prior to the next meeting.

Ms. Holling asked if there is no other business, could she get a motion to adjourn. Ms. Lognion made the motion to adjourn. Ms. Moorer second the motion. Ms. Holling called for a vote on the motion to adjourn and it passed unanimously. She thanked everyone for coming and wished everyone a great day, before adjourning the meeting at 1:10pm.