

## 133<sup>rd</sup> Meeting of the South Carolina Aquatic Plant Management Council

### Attendance:

**Council Members:** Chris Page, Willie Simmons, Chad Altman, Bill Marshall, Tammy Lognion, Casey Moorner, Matthew Lawson, Sara Carper (phone)

**Guests:** Julie Holling, Matthew Puckhaber, Carl Bussells, Brian Lynch, Allan Stack, Ernie Guerry, Judson Riser, Levi Kaczka, Stacy Scherman, Chad Holbrook, Matthew Chapman, Brandon McCarther, Billy Chastain, Ken Tuck, Heather Nix

**Location:** Clinton House, Overlook Room, 15171 SC-56, Clinton, SC 29325

**Call to Order:** 10:10 a.m. 1/22/2020

### Minutes:

Chairman Chris Page called to order the 133<sup>rd</sup> Meeting of the South Carolina (SC) Aquatic Plant Management Council (Council). He asked everyone to introduce themselves and tell who they are representing, including the Council member on the phone.

Mr. Page thanked Ms. Lognion for getting the meeting space for us. He sent out the minutes, but they are in your packet, too. He gave everyone a few minutes to look over them, so we can approve them. He said they are compressed pretty good. Mr. Page said a lot of minutes are not quite as detailed, but he was taught to get a detailed explanation, especially on issues where we have discussions. If you do not attend the meeting, you can read these minutes and know what went on. Ms. Holling noted that the extended version of the minutes and the audio recordings are available for anyone that is interested. Mr. Marshall made a motion to accept the minutes. Mr. Page said he had a motion to accept the minutes as written. Ms. Moorner seconded the motion. Mr. Page asked if there was any discussion. There being none, he called it to a vote. The motion passed unanimously.

Mr. Page asked if there were any public comments. There were none. Mr. Page thanked the members of the public for coming. It is interesting to see what goes into the plan that affects you, including Dominion, Lake Bowen, Santee Cooper (S-C), and even the SC Department of Natural Resources (DNR) staff. They often have a reason to be here. They are going to tell us why we are doing things right or wrong.

There being no public comments, we will move onto item 4, triploid grass carp health with Levi Kaczka, DNR. Mr. Page provided a little background while Mr. Kaczka was getting ready. For the past few years, we have been doing a grass carp survey, using standard methods, to determine the relative health of the grass carp in the S-C system, because there has been

discussion in the past that the carp were starving to death. He believes you are going to see some answers here that will change your mind on that, if that is your opinion.

Mr. Kaczka said at the last meeting he took the data from this year, collected over the course of a couple months this past fall, and summarized it very briefly. Before coming to this meeting, he thought it might be more valuable to look at the last three years of data ('17, '18, and '19) to see if we can notice any trends or patterns there to detect what might be going on in the lake, and see if that matches up with any trends S-C is seeing in the vegetation. Mr. Page's group supplies our funding for our trips to collect grass carp. We hire a guy that takes us out bow-fishing. There is not a good way to collect grass carp from a traditional fisheries standpoint. The most effective way is to shoot them with a bow and arrow. We hire a guide, because none of us are nearly competent enough with that gear to get them on our own. This past year, we took 6 trips. Generally, we shoot for a target of about 100 fish. If what we can get exceeds that, great. We like to get as many as we can. If we are short of that number, the guide is usually willing to work with us and throw an extra trip in there, because he cares about us getting this information as well. This past year, we had 6 sites, with 3 per lake. He showed slides with an overview and a close-up of the collection locations. Most of us in the room are probably familiar with these locations, 3 on Marion and 3 on Moultrie.

Mr. Kaczka showed their numbers from this past year with two figures. The top figure is looking at length frequency and the bottom figure is looking at age frequency, which are kind of two ways to tell a similar story. The three years were represented by different colors: '17 in blue, '18 in orange, and '19 in grey. Generally, you will ignore the small fish and the old fish. As you would expect when collecting fish via bow-fishing, the smaller the fish, the smaller the target. It is harder to collect these smaller, younger fish. If we look at the right half of the top figure, all three years kind of follow that traditional bell-shaped curve we look for in statistics. It is the same for the left half of the bottom figure, but he saw one pattern emerging. This past year, versus '17 and '18, the peak of this curve seems to be pushing out toward the larger size fish. You will see the same as when we look at our age frequency. The '17 peak is oriented around the 4-6 age fish. A year later, in '18, it is around 5-7 age. If we look at the grey from this past year, it appears that our fish on the lake may be aging, getting older. The overall population may be aging. Out here, where we see age 20 fish. This is all fish age 20 and older. When they get that old, it is hard to get a very accurate estimate on their age. When we take their otoliths and grind them down, we can count a whole bunch of rings. You cannot say this fish is 24 years old, when there is always a ring or two that is not definite. We just group those fish together into 20 plus. It does not seem to affect our results all that much, because these fish do not really seem to be contributing, as far as vegetation control goes on the lakes. We also had a period that no stocking was going on. He believes it was from '97 to '07. Technically, we should not have any fish collected in that age range, but with high water events, fish come downstream from other areas. That may be the reason we have a few representatives in this kind of mid-teenage years.

Mr. Kaczka said this figure kind of speaks to what he was saying about the older fish really not contributing. We are looking at a scatter plot of all the fish collected over the past 3

years and comparing their length versus their condition factor. For those that are not familiar, the condition factor is something that we use to gauge the overall health of a fish population. We use 1 as a baseline. Traditionally, that is a target that a lot of management aims towards for a condition factor. If your population is above one, they are healthy and robust, and are really making good use of their forage resources out there, whether that is vegetation for a grass carp, or shiners and minnow species for a large mouth bass. It is a way you can compare fish species of different feeding habits across a range of areas. What you will notice, if we are trying to shoot for that target of 1, most of our fish are below that and some are well below that. If you have sat at one of these meetings before, one thing we have talked about is these metrics are based off the former population. It is based off a population that was looked at in the early '90s, when *Hydrilla* was at its highest and the overall grass carp population was still fairly young. Basically, the living was just about as good as it gets on our lakes for grass carp.

Mr. Kaczka, said if we keep that in mind, we thought maybe it is not really proper to compare fish now to the fish that were around back then. We have also talked at this meeting about that factor being developed on young fish that were a maximum age of 6 years old, and maybe it is an issue that younger fish are more efficient at feeding and have more energy to move around and search for food. What he did for the last three years of data, he separated them out to young fish, middle-aged fish and older fish, to make for a more apples to apples comparison with those early '90s studies. All the dots in green are fish that were 1 to 6 years old. Even in those fish, we only have a handful that are above that condition factor of one. Our middle age fish, going up to 12 years old, really do not separate out that much from our younger fish, just in terms of being in poorer health. As we would expect, they are a little larger in overall length. They have just as much representation around this one line, with a few above the line, proportionally speaking, as with our younger fish. It is when we look at our older fish that you can see that they are in poor health, condition wise. What this tells him is that if we are talking about age being a factor for fish health, just their overall feeding efficiency and another factor being the amount of forage out there, the amount of forage is a much bigger, more important factor than just age. These younger fish here are probably feeding as efficiently as any, but they only have so many food resources to go after, compared to those fish in the '90's, when *Hydrilla* was really at its peak.

Mr. Kaczka noted another thing he wanted to do coming into this meeting was to try to compare some data statistically to try to take some of the subjectivity out of things. If possible, he tries to look at the condition factor from a statistical standpoint. He ran a model asking what contributes to a grass carp's condition on our lakes. Is it age? Is it differences among years, with the thought that the vegetation is not stagnant, and we have different levels of vegetation on our lakes from year to year? This is the model he ran with the same three years of data. As he was working through this, he tested the effects of day of year. He thought that was important because over the last three years, we have collected carp as early as August 23, and as late as the second week of November. That is a pretty wide date range. Initially, he thought that fish collected earlier in the season would generally be in better health, because it is the peak of their growing season, but that was not significant. Even within that three-month time span, we are

collecting fish that are of the same condition as far as the growing season goes. Two of the three effects that came out to be significant are age and year. The latter is understandable, because there is not the same amount of vegetation on our lakes from year to year, so it is conceivable that the overall population's condition would fluctuate from year to year. The last effect is this age times year interaction. What this is saying is that an older fish does not feed as efficiently or is not in as high a condition as a younger fish, but that effective age is not the same year to year. If we look at the slope of these lines and then just look at the overall numbers, from where we are starting at the age one condition to the 20+ condition, as we have gone forward in the past three years, the change in condition has become more extreme. For the past three years, it has been harder living if you are an older carp. He does not know if that matches up with what you are seeing on the vegetation side, if there is not as much vegetation out there or the quality has changed, but essentially, the starting point for a younger fish is in fairly similar health. As these populations aged over the last three years, they have significantly decreased in their overall condition.

Mr. Kaczka said the biggest question we have had, since he has been sitting in on meetings the last couple years, is that we have been using the same mortality estimate since the mid- or early '90's. At some point, this mortality estimate of 32% was estimated for our grass carp and all the population estimates since then have been based off 32%. We have discussed, over the last year or two, that this is not likely to be applicable anymore. It was developed for fish that were only a maximum age of six and now we are applying that to an age range of almost 30-year-old fish. We aged one last year that we estimated to be 28 or 29, depending on the reader. We are applying this to a much greater age range of fish, but we also know that was developed at a time when *Hydrilla* was at its peak. He does not know what the best way forward is for reassessing the mortality rate, but he thinks that we kind of all agreed that this may not be very accurate anymore.

Mr. Kaczka said another question he had when he was working through this data was how was this developed. He does not know if anyone in the room can speak to that, but the reason he asks is because the most common way we estimate mortality from a fisheries standpoint is a catch curve. With a catch curve, there are some assumptions you consider. A catch curve estimate assumes that recruitment is equal every year for that population. We know that is not true, because we have gone from stocking no fish in some years to tens of thousands of fish in some years. Surely, recruitment is not the same. Also, whatever your sampling method is, you assume there is equal catchability among all age ranges of fish. He does not know if the fish, that were originally sampled to develop this, were caught with bow-fishing methods. He thinks they were. That was his understanding, but not all fish are equally catchable, especially the younger, smaller ones.

Mr. Kaczka talked about this catch curve idea with two generic figures he pulled off the internet. Basically, you have age across the X-axis and abundance on the Y-axis, so the thought being that you caught one fish at age 0 and 3 fish at age 2 and so on. Assuming these ages out to the right did not fully recruit from year to year, you would ignore them. If you look at the slope

of this line, it gives you your mortality estimate. What he was thinking would happen when he applied a similar idea or plotted our catch curve, he thought we were going to have a shotgun pattern, where there would be no discernable pattern or downward trend. This is what he saw from the past three years of collections. As expected, we do not do a good job of collecting our smaller, younger fish, but surprisingly to him, we did see this nice curve down here starting at age 6 down to about age 12. He says age 12, because we know these teenage fish were not stocked by us, but just got into the system during high water events and there are only one or two of them. This one high dot on the right is our 20+ old fish that are not feeding efficiently. What he did was truncate the data between fish that were 6 years old and 12 years old, and that gave us a mortality estimate of 43%. That is somewhat surprising or unexpected, because what we talked about in previous meetings was that fish are probably living a lot longer than we originally expected and that 32% was probably an overestimate. He would caution against putting a lot of weight into this number, because it is not accounting for differential recruitment across the years or our ability to sample the whole age range that is out there.

Mr. Kaczka referred to the maps of where we were collecting fish. It is a relatively limited area of these two lakes that we collect fish from, and we are only getting about 100 fish per year. This is more interesting to him and something he wanted to look at, but he would not take it to the bank as our new mortality estimate. In fact, he thinks it is lower than originally estimated overall, not higher. He does think that is something we need to talk about. Moving forward, how can we get a better estimate of what the mortality is among this population? We were discussing this earlier in the truck. Do we really care so much about knowing the exact number of fish that are on the lakes? What is more controlling when it comes to aquatic vegetation, 50,000 grass carp that are all 25 years old or 10,000 grass carp that might be 6 years old? The overall number of fish out there may not be that relevant. It is more so looking at the number of fish that are of an age that they are still feeding efficiently. That might be something we discuss moving forward. Maybe applying a von Bertalanffy growth curve, which he has done, but did not include in this. We might consider looking at length, age, and the overall age structure of our population, and making decisions based on the age of our population and not the overall numbers. He does think that would be worth discussing moving forward.

Mr. Kaczka showed a few pictures. He does not know if everyone is familiar with the process of removing an otolith and aging a grass carp. We go out and collect grass carp. This was a better night for us. This is our technician Mr. Cribb and Mr. Riser from S-C that came out to collect one night and pull otoliths the next day. It is a pretty nasty procedure of cutting open the head and removing the otoliths from an area just below their brains. That was all he had. He offered to take questions. As far as the mortality estimate goes, he does not know what the hard answer is as far as how to develop a new metric, but he thinks that needs to be the focus of efforts moving forward. How do we gauge not necessarily how many fish are out there, but how many fish are feeding efficiently?

Ms. Moorer said the few things she jotted down while Mr. Kaczka was talking concerns comparing the older group of 20+ year old fish to that condition factor of 1. She said he did a

good job of explaining where that condition factor came from, as well as comparing them and looking at the vegetation on the system. The vegetation does change from year to year based on environmental factors. She would say in the past few years, maybe three years or so, we have had an increase in vegetation on the system. We have not flown imagery in the past two years due to Hurricane Florence and a couple other events that kept us from doing that. We are sampling in areas where we know we have stands of *Hydrilla*, where those fish would be. We also need to be thinking about how carp move through our system. That is something, from the standpoint of S-C management, which would be beneficial. We have talked about it with Troy Farmer at Clemson University and getting that kind of information would be helpful when we are thinking about management using grass carp.

Mr. Kaczka said because we are so limited to where we can sample by the guy we hire, it would really be nice if we could collect these fish over a longer period of time and do it on our own, so we are not so reliant on other folks. It would also allow us to get fish from other areas of the lake. The issue with collecting them later in the year, out of the growing season, is the fish really may be in poorer condition. We talked last meeting about, if we can for the next year or two, collecting fish around this time of year, comparing them, and trying to correct for any differences in condition due to the day of the year or seasonality. It would not be something we would collect right now or in the next year or two and say here is the answer. Rather, moving forward for several years, we could correct for it and divorce ourselves from being so reliant on this small timeframe and small spatial scale for collecting these fish.

Mr. Page said the original guy that did that was Phil Kirk from the Corps of Engineers (Corps), working with our fisheries biologist at the time, which was Miller White. It is an interesting number Mr. Kaczka is looking at. That 43% might not be as far off as he thinks, because of total overall age. As that population in the original study aged, the first few years, the mortality was 20-22%. It gradually went to 24-32%. He thinks it got as high as 38% in the end. He said Mr. Holbrook probably looked at that report.

Mr. Holbrook said he wanted to bring up one thing that Mr. Kaczka did a good point of mentioning. As the time range was shown, it looked like the fish that were recruited to the year were 4-5 years old and then it goes down from there. One thing we need to be careful about, when using a metric like this to estimate mortality, is one of the givens we must have is equal recruitment and we do not. Two of those years, we probably stocked close to 100,000 fish. In other years, we stocked 10,000 fish. To try to compare those years, it is not a fair comparison. In the years when 10,000 fish were stocked, it is going to look like a lot of those fish died. That was going to be his question for Mr. Kaczka. Could the stocking numbers be incorporated and kind of come up with differential numbers for how that should impact the mortality curve?

Mr. Kaczka said he has not done so, but he thinks there is a route for that. If this is all he has to work off of, then he is ignoring age 1-5 fish. Since these are on the ascending portion of the curve, this is saying that we are not collecting them in numbers proportionate to the numbers out there. His understanding was the original mortality estimate was done in '95 or so, or within

6 years of the original stocking, so they only had a maximum of 6- or 7-year-old fish out there. If they were collecting fish via bow-fishing, he does not know how they were doing it. He does not mean to say it was wrong, because he just does not know how they did it.

Mr. Page said they were bow fishing. They had a bounty on them. Mr. Holbrook said he looked through a lot of that old stuff, just familiarize himself with it. It was bow-fishing and it was a catch curve analysis for mortality estimates. The one thing we do not have, which would be useful information, would be their raw data. He would love to know their length at age. We expect that growth was much quicker. Maybe they grew to a size by age 2 that was recruitment to the year, whereas it may now take 4-5 years to recruit to the year.

Mr. Kaczka said one thing that kind of stood out to him was when we look at these young fish, aged 1-6, we have representatives out to over 1000mm. When talking about those young fish, there is not even the same feeding efficiency or growth rates within that younger age group. We have some fish that are smaller and those may conceivably be your 1-, 2-, or 3-year-old fish, and the bigger ones may be your 5- or 6-year-old fish. A fish may be reaching its maximum size in its first 5 or 6 years and after that may only have another 100-200mm of growth. That is another reason for warranting kind of forgetting about the overall number out there and focusing more on the number that are within the young age class. There may be 100,000 fish in the system that really are not doing anything and do not have any natural predators essentially. They are just swimming around, biding their time until they die.

Mr. Page said that is one of the reasons why we like the maintenance stocking to go a period on pretty consistent numbers. We will continue to have that same age class being recruited at the same level based on what we are putting in. That kind of justifies some of those years. We are stocking to keep that number in that range. Mr. Kaczka is right. They are not eating as much when they get older and there are no predators, so the mortality of that is weird. That draws us to another question. Do we need to determine a way to develop that mortality rate for those fish aged 4-8, so that we are getting good bang for our buck?

Mr. Kaczka said that would be the most valuable. He thinks it is safe to say, regardless of what type of vegetation is out there, these younger fish are feeding efficiently, and they are growing well. Knowing a mortality rate among that age group, 1-6 or 1-8, that is the real factor, but it goes back to how do we get that, knowing that this is our data and we are not really good at collecting these small fish. That is something that he did not know if there were any thoughts from anyone in the room that is involved in fisheries.

Mr. Holbrook said he is thinking you may not be as bad at collecting those fish as you think. If you look at those 5- or 6-year-old fish and track that back, he thinks that is the year that 100,000 fish were stocked. If you have a timeline, where you have 10,000-12,000 fish stocked per year, which is what we were doing in those 2, 3, and 4 age classes, you may not get that giant peak at 5 or 6. You may be collecting efficiently. Mr. Kaczka said proportionally speaking, the peak may be in a different location. If we can get the stocking numbers, that would be

something he could figure out a way to work into this and correct for it. That would be a route forward for having a better, more useful mortality estimate.

Mr. Page asked if Mr. Kaczka needed to do more sampling, if he had time to do more sampling, and how much is it going to cost. Mr. Kaczka said we collect these fish in late summer and early fall, which is kind of in between some of our other field seasons. Right now, in December, January and February, we do a lot of gill netting on the lake. We do have a break between February and March/April, probably a six-week period that we could get back out there. We would have to correct for any seasonality in conditioning, but we could do that. Without us trying it, he does not know what sort of numbers we could collect on our own. He would be willing to contact our guide and say we were thinking about adding a second season in late winter/early spring, and the guide would be willing to do that. That might be another way to increase our numbers, but he does not know that we would be getting outside of that small geographic range. He does have interest in seeing what carp in the upper parts of Lake Marion on other areas of Lake Moultrie look like.

Ms. Moorer asked about shocking in the February time frame. Mr. Kaczka said the reason we thought of shocking over the wintertime was because of last year, when we were getting ready for our annual bass surveys. We always take our electrofishing unit out and make sure it is running well. Normally, in the warmer months, when you shock a grass carp, they shoot out of the water and they are gone. You are not going to get them. When it was cold out, they were coming to the surface and staying put. He thinks there might be a way for us to collect them via electrofishing when it is cold out. He does not know what the numbers would look like, but just take a day and go to an area where anecdotally there are a lot of carp that have been seen by other folks out there. The S-C staff are out there in shallow water and he is sure they have seen carp. That was kind of the thought for additional sampling this year in the colder months, to do it with electrofishing.

Mr. Page said we can talk about it after the meeting, but if you guys have time in the next month or so and think it would be beneficial to that data, we need to try it a couple times. Mr. Kaczka said they are in the process of bringing on a new biologist, and a one-person addition does not seem like much, but right now our region 4 staff is at three, so that's 33% increase in personnel. If this were to become a valuable thing for us, there is always the possibility of any funding you might have to hire on an hourly instead of putting that money towards hiring a guide. It would probably be cheaper. That is something we can discuss outside of this setting. Things to consider. We do have a little more personnel help coming.

Mr. Page asked the Council if they would like him to explore that, if you think it would be beneficial. He cannot make that decision for you. Well, he can and present it to you later, but he would rather have you on board to start with. Ms. Moorer, Ms. Lognion, and Mr. Simmons thought it would be beneficial. Mr. Altman said he could talk with his folks and see if they would mind helping. We could come down and bring our boat and help you, because we have a little free time here and there. Mr. Kaczka asked if they had an electrofishing boat. Mr. Altman



said they have several of them. Ms. Moorer said S-C could give you a guide to show you were to go. Mr. Kaczka said that is really valuable, because where we are going currently, the guide we use bow-fishes several days a week, pretty much every week, but he sticks to that general area, so he takes us where he has seen grass carp the week prior, but he does not think he spends time up in the upper portion of Marion or other areas around Moultrie where there very well may be grass carp. Mr. Page said if he is a good guide, he is taking you where the fish are. Mr. Kaczka said it seems like the areas he takes us a lot of time were always full of grass carp the week prior or two days ago and we could have had a hundred in one night. That is fishing.

Mr. Page asked if there were any other questions for Mr. Kaczka. There were none. Mr. Page said he would get together with Mr. Kaczka to figure out some details and thanked him for the presentation. It was greatly appreciated. Mr. Page moved on to Ms. Moorer and her presentation of the review of hyperspectral species analysis data for the S-C lakes.

Ms. Moorer said she is going to start with a quick overview. She has one slide that goes over what we treated this past year, vegetation-wise, on the S-C system, which she showed at the last meeting. The main point of this slide is that we treated 1400 acres of invasives. A lot of time, across our system, you will hear people talk about treating native vegetation. In the S-C program, our goal is not to treat native vegetation unless it is impeding navigation, causing intake problems at our water systems or at our generating facilities. The last two rarely happen, because those intakes are in deep water areas. Where we treat some native vegetation is usually in a residential area and it is blocking someone's access to their ramp or their pier to fish from. Some of our commercial facilities are treated as well. You will see that number at the bottom is the 147. Within that 147, there are natives such as water willow, duckweeds, pondweeds and some algae, but most of that is water primrose and alligatorweed, which are invasive plants. Our largest number was 701 with crested floating heart (CFH), which we have been battling since 2005. Giant salvinia was the next highest, at right under 600 acres treated this year. That was found in the summer of 2017. It is a continuing and growing problem. We have had a mild winter this year. We were talking on the way up here and Mr. Kaczka said they were near Santee State Park, setting gill nets, and saw a raft of giant salvinia floating down the middle of Lake Marion, still green. What we can hope for and everyone should pray for tonight is a cold winter, maybe 20 consecutive days of freezing weather, would help us out. Those are our numbers for the year, 1443 in total invasives, and 147 in residential areas across the S-C system, Lake Marion and Moultrie combined.

Ms. Moorer said the rest of these slides are going to be an overview of our hyperspectral survey that we did this year. This year, we switched to satellite collection. The past 15 years, we have collected data with Galileo Group out of Florida. They did that via fixed wing aircraft. They would collect the data. Normally, we would collect late season: September, October, and November. The idea behind that is to give the reservoir time to drop a little bit and let the vegetation top out, so it is close to the surface of the water. Hyperspectral, depending on the clarity or turbidity of the water, can only penetrate a foot or two into the water. We really want that vegetation to be topped out, so we can get that signature off the imagery. We went to

collection through satellite because it was a cost savings to S-C, but the data collected is just as good. It is a newer technology, so it is something we switched to this year. These are our final numbers for invasive species. These are still being tweaked. We just awarded this purchase order in November, so we have had a month and a half to analyze that data, so they could adjust a little bit, but not that much. At the last meeting of the Council meeting, we talked about the *Hydrilla* number could change a little bit. That number stayed the same, right around 143 for the entire system.

Ms. Moorer said the good thing about the satellite collection is we can target dates. Weather and water clarity, we can kind of work around. Note at the bottom, this data was collected July 30 – August 2. Every time that satellite passes, we can select a window that looks best, water quality wise, for the system. We might be at a lower elevation or we might have lower turbidity, so that is the best time to be collecting some data. Going forward, what we may look at doing is collecting floating leaf, pads, and things like that earlier in the season, when they are doing their best. Later in the season, sometimes our pads start wilting away with the heat, when it gets a little extreme in the August and September timeframe. We want to look at our submersed species later in the season because they are topped out and closer to the surface.

Ms. Moorer noted the final number is 1707 invasives. CFH was at 777. On the previous slide, we treated about 700 acres of CFH, but this was only collected in one little snippet of the summer season. Depending on water levels and water temps, it is usually around June to September when we really see CFH taking off on the system. That varies from year to year based on water conditions. You will see *Salvinia* up there at 279. She whole-heartedly believes that there is a lot more *Salvinia* on the system than that. That could be because it is so small. She really thinks we do not pick that reflection up when we are in standing cypress areas. A lot of the places where we are treating *Salvinia* is in these back-water areas that are inundated cypress areas. Satellite imagery is not going to pick up that *Salvinia* signature. It will pick up that cypress signature before it will pick up the *Salvinia*. *Hydrilla* stayed the same at 431.

Ms. Moorer stated for native species, this slide is what we broke them down into, and some of these are grouped together. We grouped our native floating leaves. You will see lotus, waterlily, *Nuphar*, and watershield grouped together. Those plants are beneficial in the same way, so it is a cost savings for us to group them together. We do not break a species out unless we feel like we really are looking at that species. You will see the eelgrass is pulled out. It is a submersed species. We pulled it out of the native submersed because we are really interested in eelgrass right now. From a fisheries standpoint and a waterfowl standpoint, that is what we like to talk about, *Vallisneria* or eelgrass. Right now, we are at just under 23,000. It was mapped at the same time, late July to early August. That puts us at about 14% native vegetation mapped on our system. We have, in the memorandum of agreement (MOA) between S-C and DNR, a goal of 10%, which is roughly 16,000 acres of native vegetation on the system. We have got a new MOA in review now to push to a 15% goal.

Ms. Moorer noted that 2017 was the last time we flew Galileo data, which is the fixed wing aircraft data, and this number is close. She believes it was at 23,000 or 24,000 total. She really expected it to be a little bit higher. When she got the numbers back, that is what she was really thinking, especially with eelgrass. In 2017, we were running around 1100 acres or so. What we are seeing visually on the system, by being out every day, she really feels like the acreages are much higher. She does not know if it is just growing pains with this new satellite collection, or that it was collected in July and August. There is not much in that early season, but the water stays warm, so the vegetation was still booming into November. She asked if anyone had any questions on this.

Mr. Page thought the eelgrass was an interesting number, but he thinks eelgrass is probably one of the major species that is going to be affected by algae growth, because of the wide leaf. Ms. Moorer said it could be throwing a signature for algae instead of eelgrass. Mr. Page said all his photogrammetry classes, they always told us that certain species would not send that reflection out if it was covered, and if you have ever been around eelgrass, you will know you have that dirty looking algae coverage on it, which changes the reflective value of it.

Ms. Moorer said for the last few slides, she has some points about how we can improve on the new satellite collection and ground truthing, and we are going to get some more input from you guys about that. These pictures and videos were taken in late September or the first week of October. This is eelgrass right here. Everywhere we went, especially the northern side of Moultrie, this is what our shorelines were like. We would stop every so often, throw a rake, and pull up a sprig of *Hydrilla* mixed in. We did not see any huge stands on Moultrie like that. We do have larger stands of *Hydrilla* on Marion that were spot treated with ProcettaCOR. We have talked a lot about ProcettaCOR at these meetings, being a selective herbicide that does not affect eelgrass. We would go in and spot treat those areas where we had *Hydrilla* growth, especially on Lake Marion. There is a video on here of an area that Mr. Guerry and another staff member treated a few summers ago that had *Hydrilla*. It was all eelgrass with *Hydrilla* mixed in. He treated with ProcettaCOR. It is all eelgrass right now. The video is nice to look at. Both pictures on this slide were eelgrass. As stated, when you throw a rake sometimes, you would pick up a piece of *Hydrilla* mixed in. We have eelgrass and pondweeds and all that. You just have to look closely to find what you are looking for. It is the same thing with this picture of a rake toss. You will see a whole bunch of *Vallisneria* right there, with *Hydrilla* mixed in. It is spindly that time of year, but it is *Hydrilla*. Along the shoreline, you see we have a good growth pattern all the way out. The elevation on our reservoir, she went back and checked this date, was only 1 or 2 foot low. It was not extremely low. Pads had a good year. That is watershed with water lily mixed in and Mr. Riser on the front of the boat tossing. You cannot really see it on this, but underneath all this is a whole bunch of *Bacopa*, milfoils, and bladderwort, which are all native species that are all part of the native submersed category in the hyperspectral collection.

Ms. Moorer moved on to a picture on Lake Moultrie in an open area. You will see on the rake some Val. It is not what she calls technically topped out, like you saw in the previous pictures, but it is there. She does not know if you can see this dark line, but that is a bed line. It

is nice to see that we have val moving out into deeper water, where you would not really expect it in higher wave action areas and pushing further out into the reservoir. Next, she showed a panoramic view with a lot of watershield. That is something a lot of our waterfowlers are interested in. They like val and watershield. We did a vegetation project, that we talked about last time at the Council meeting, which mainly focused on val. There was a section of that where we did watershield as well, trying to move watershield to upper Marion and get it established in that area. This video is just a backwater area on Moultrie. You see a lot of Nuphar, which is a native pad, with some watershield mixed in. She moved on to the val area we were talking about where Mr. Guerry treated two seasons ago with ProcellaCOR, maybe the first season that it hit the market. ProcellaCOR is a new active ingredient that we have in our tool bag now to use. It will take out *Hydrilla* and it does not damage *Vallisneria*. It has a little bit of activity on pondweed and naiads. It will bang them up a little, but they recover fairly well. This video is a little longer. All that is val. This got treated with ProcellaCOR two seasons ago. There is watershield mixed in. This is the kind of stuff we are seeing on the system. This is an area where she would suggest going to shoot carp.

Mr. Bussells added that we are really excited about this new hyperspectral imaging from the satellites. It is not weather dependent. We are not relying on airplanes, but like Ms. Moorer was saying there are growing pains associated with this. We need to collect more ground truthing points. You know there is a combination of vegetation, like eelgrass mixed with lotus or algae growing on eelgrass. There is a distinct infrared signal that is associated with that mix of plants. The more ground truthing that we do over the next few years, the better this will get. Mr. Page stated you will be able to isolate those signatures better, and Mr. Bussells agreed. Ms. Moorer noted in the picture, that all the vegetation is topped out val. We really like to see that at S-C. She knows those Lake Greenwood folks were not happy with that, but we are. Thankfully, the Lake Greenwood folks let us poach some of their val this year and bring it back to the S-C system, because we did do that. It has been quite a few years since she has seen that on the system, and she has been in this group for 13 years. She has been through the yo-yos of 100,000 grass carp stockings, no grass carp stockings, and 10,000 grass carp stockings. It has been quite a while since she has seen that kind of growth.

Ms. Moorer said after she showed you all those beautiful pictures of natives, she will show you a couple of the invasives we are battling. This is Bee Tree Lake on upper Lake Marion. It was full of *Hydrilla*. We treated the *Hydrilla* a couple of times up there, doing some spot treatments before treating the whole area. This was an area full of cutgrass. If you remember a few years ago, we had some requests to treat some cutgrass areas on the system to open them up for waterfowl, and we did. Of course, as you remove something, something else is always going to move in, in its place. It has been *Salvinia*. We are treating that area. The area on the left is Elliott's Millpond Slough. It is one of our first areas that we tried fluridone on *Salvinia*. It is a backwater area. We have treated at very low rates. It is a five-bump treatment. We did 30ppb for five treatments about 30 days apart. It requires some testing of water concentration, but it was very effective.

Ms. Moorer said that is what we are focusing on in 2020, to start our program off by treating these backwater nursery areas with fluridone. The problem with fluridone is that it is not good in a flowing system. The S-C system is very much flowing system. We pick these backwater areas where the water kind of holds a little bit. We did it, Mr. Simmons, at Cola-Cola Slough. We probably will do Cola-Cola Slough again and get with Mr. Simmons about the irrigation restrictions. Mr. Page asked Ms. Moorer if they were using Sonar A.S. Ms. Moorer stated they were. Mr. Page asked would it be possible to do like what NC did on the Eno River and set up drip systems or feeders. Ms. Moorer stated S-C is talking to SePRO about that. They have systems now being controlled by mobile phones. We have looked at that, but the cell phone service in that area is very limited. She would say it is not the best idea there, and we are looking at power restraints. It is something we can investigate.

Ms. Moorer was really surprised on how well A.S. moved in this slough. She should have had an overview, but she pointed it out on the map. It starts at a highway where a bridge washed out in the flood of '15 and has yet to be replaced. You can walk to that bridge and we poured off 33oz. Ms. Moorer noted they poured 33oz. into 40 acres. It is only three to six inches deep in that headwaters of that creek area and it gets deeper further out. We literally poured 33 oz. off the bridge, and let it flow through. We went in and treated by airboat on the lower block, doing a transect with drop hoses. We came back one week later and did Fast Tests across that whole polygon and that whole slough area. It was distributed equally at 30ppb. She was surprised. She kind of questioned SePRO on that, but they stood behind it and they paid for the testing. They put us at ease. She thought there was no way this product is going to move like that, but it did.

Mr. Page asked Ms. Moorer if there is any way to use a granular product, maybe some of their selective release products. Ms. Moorer stated they did a couple other trials with Sonar Q, Sonar One, and she thinks we might have done Sonar PR. The problem in these areas is there is such an organic bottom, that the release profile does not really work with it. We went to the liquid formula. This is what Mr. Page is talking about if you are not familiar with Sonar products. A.S. is a liquid product. The same active ingredient, fluridone, is in their granular products. Q is quick release. PR is precision release. One is an extended release product. They do not perform well in organic, pluffy kind of bottoms and that is what they have in upper Lake Marion.

Mr. Page asked Ms. Moorer if they could suspend those. Ms. Moorer asked for clarification. Mr. Page said hanging a bag from a tree. Ms. Moorer thought they might could. Mr. Page suggested that or put one of those swimming pool things you put chlorine in, like some of those algae block holders. He said it would eliminate the bump. He thinks the biggest part of that is not the fact you want to keep it in there that long. It is the fact you must go back five times to check it. Ms. Moorer stated every 30 days or so we would go, and it was usually a cool day to travel to the site and do it. That is much better than chasing it with spray treatments. You can ask Mr. Stack how long he was in there, on Bee Tree Lake, fighting it with contact herbicides and systemic herbicides at lower rates. We were doing more man hour work spraying

than we did with having to go back and bumping it every thirty days. We do take into consideration the man hours it takes.

Mr. Page asked about doing it with a helicopter. Ms. Moorer stated a helicopter is an option on Bee Tree Lake, but not so much in forested areas, other than dropping granular through the trees to get it down there. Ms. Moorer said they could in Bee Tree Lake. This area was pretty much solid cutgrass and we did aerial treatments for two years in a row. There are a lot of organics in there. In one of these areas in Bee Tree Lake, we planted watershield. When she jumped off the boat, she was in organics up to her upper thighs. It was because of all the decay of cutgrass from the years of us treating it by helicopter.

Mr. Page had asked Ms. Moorer to investigate a buoy system to restrict the movement of *Salvinia*. He knows it is a pain in the butt with the Corps, but with that species and the Corps experience with it across the southeast, he thinks they might be happy to help. Ms. Moorer stated she really thinks that is something we should look at, especially in the cove areas like Cola-Cola Slough, Elliott's Millpond, and places we can boom off. It is not going to cause main navigation travel issues. It will just block people having access to those coves. There might be people cutting buoys and letting go of the line, but maybe not. She asked if anyone had questions about the survey or hyperspectral stuff.

Mr. Page said that is a two-edge sword, because they use to not fish in Cola-Cola Slough and all those places when it was full of vegetation until you put the helicopter in there. Mr. Page stated now it is open and a little bit more navigable, which is what some waterfowl hunters wanted. He would like to know just how many hunters have been over there, besides Mr. McCrary. Ms. Moorer noted Mr. McCrary has been good to us. When he finds *Salvinia*, he will drop a pin and send us a picture. Any time he sees something on the system that looks suspicious, he will send a picture. Mr. Page noted that is good. Ms. Moorer stated it is good to have built a relationship with those groups.

Ms. Moorer showed the slides from last time of the hyperspectral for *Hydrilla*. This is what we were talking about, Mr. Kaczka. We can go into areas where we know we have hotspots of *Hydrilla*. In upper Lake Marion, just outside the river bend, these areas were spot treated with ProcellaCOR this year by Estate Management, our contract airboat group. These areas in the bottom right were also spot treated. On Lake Marion, it is the same thing on the northern side right there. A lot of the pictures you saw earlier were on this northern shoreline, where we had a lot of eelgrass, *Bacopa*, and natives. That was where we would throw rakes and pull up *Hydrilla*. Not really a surprise to us that the hyperspectral came back showing some *Hydrilla* there. It was the same thing over at Duck Pond. She showed a zoomed in part of northern Lake Moultrie and pointed out Angel's Landing and Sandy Beach.

Ms. Moorer moved on to the chart that we all love looking at. This is our fourth year of the 10,000 grass carp stocking. It is what the council had talked about sticking with, a stocking plan that held us at 10,000 fish for five years. At the end of 2020, we will be at a population of

about 38,000 fish. We are up to 41,000 this year with our 10,000 bump. She really feels like we are backing into the ideal number. She thinks we are nearing where we need to be, looking at Mr. Kaczka's data, what we are seeing on the S-C system, and how things are recovering. Earlier this morning, Mr. Holbrook said it is nice to see the val or eelgrass number compared to the *Hydrilla* number. You are looking at 1500 acres of val and 143 acres of *Hydrilla*. We are spot treating *Hydrilla*, but the grass carp are doing something for us. The val are recovering nicely, as well as other natives. She does not want to focus on just val. Our pondweed and everything else are looking great as well. It is just we look at val a lot, because that is what our constituents are concerned with. This is a breakdown of where we would be if we continue that 10,000 stocking at 32% mortality. You will see in 2020, we will be at 38,000.

Ms. Moorer threw these impoundments back in, because they were going to be part of the plan, but she did not know if they were in there or not. They might be in her comments when we discuss the plan a little bit. These three areas are impoundments to our systems. Church Branch has a carp gate, so they cannot move into the system. Fountain Lake is only connected by a culvert that does not lend to carp being able to access the main reservoir. It is the same thing with Dean Swamp, which has an overflow area. We may look at this, and lessen this amount of fish, but this is what we ask the council to consider allowing us to stock in 2020 for those three impoundments. She showed zoomed in areas of those impoundments. You can see where they are closed off from the system. Fountain Lake is a totally residential area. You can see where it is residential all the way around there. A lot of the 147 acres of residential work was done in Fountain Lake this year.

Ms. Moorer discussed things they can do to improve on their hyperspectral work. When thinking about 2020 and the timing, we might do the floating leaf survey earlier in the season, do the submersed collection later in the season, and do our ground truth scheduling better. A lot of what we did for ground truthing this year was our crews out ground truthing and sending that data back. We awarded the purchase order in November. It has been a few months of ground truthing, other than what we had already surveyed earlier in the season. That and the past data we had from Galileo has to be put into that analysis for ReMetrix. The more data in that analysis strengthens the confidence we have in the data. Confidence improves with more data over time. Just know that the analysis is going to improve over time with the satellite collection. She said that was all she had, unless you have any questions.

Mr. Page stated that he does not have those impoundments in the plan. It has been a gray area, because they are separate waterbodies, but he guesses they probably should be in the plan. Ms. Moorer stated they are inside our project boundary, but they do not have to be in the plan unless you want them in the plan. Mr. Page stated they are state waters in a sense, because you own them, so we probably ought to put them in the plan. He noted we kind of treat them differently, because they are really separated from the lake. The only ones we have in there are impoundments that are actually connected to the lake. Ms. Moorer stated she thinks you have Potato Creek in there because it is a WMA. Mr. Page agreed and noted that when the grass carp gate is not in place, that impoundment is connected. Ms. Moorer said it could also happen when

it floods and goes over the road. Mr. Page stated at certain times of the year it is connected. The other you talked about are not. We need to talk about how they are in the plan.

Mr. Page said this hyperspectral stuff is neat and the fun thing about the hyperspectral from satellite is the resolution from the satellite is now greater than aerial photography from a fixed wing aircraft. He thought it was down 30 centimeters. Ms. Moorer said there is some question there with the fixed wing and the differences between them. She is trying to have JT come down from ReMetrix. She is happy for you guys to come listen in or call in, just to get educated with us on what the differences and limitations could be. Mr. Page noted if the council would like information from one of these side meetings we do after we made some of these decisions, we could get that in for information.

Mr. Page asked if all the *Hydrilla* on the S-C system was still monoecious or dioecious. Ms. Moorer stated it was dioecious *Hydrilla*. We have not had it tested in quite a while, but the last test was dioecious. It is something we can consider doing. The way ProcellaCOR is working on the *Hydrilla*, it lends us to believe it is dioecious. ProcellaCOR has a little more trouble with monoecious, and we have not seen that. Mr. Page noted it does work on monoecious. Ms. Moorer stated she was just going off what sales representatives have said. Mr. Page noted we had a small amount of *Hydrilla* pop up on Lake Murray. We probably could have waited and let the grass carp eat it, but instead we wanted to try ProcellaCOR. Ms. Moorer asked Mr. Page if he used Komeen with it. Mr. Page responded no, but it knocked it out. Grass carp were eating anyways, so he does not know if ProcellaCOR worked as well as we think. He knows the carp were eating it.

Mr. Page said you are always going to have those patches pop up. There been a lot of research done on those tubers for the public. *Hydrilla* tubers were first thought to live for five to six years. The latest studies have said ten to fifteen years. He thinks it is like a lot of science. You can only say it is going to live fifteen years because you have studied it for fifteen years. If you studied it twenty years, it is going to live twenty years. He thinks it is the same thing with grass carp. Grass carp were said to live ten to twelve years. You see twenty-eight-year-old grass carp out there. He knows they are probably the exception to the rule, but like every natural thing, we do not all die when we turn 60. Some of us are going to live until 95 or 100. Some of us are going to die when we are 40. It just works that way. You are going to have some outliers.

Mr. Marshall wondered about giant salvinia, public awareness and the degree in which the public users contribute to the spread. He asked if we are stepping up efforts to inform the public. Ms. Moorer stated yes, that is something we have been thinking about, and talked about on the way here. From a S-C standpoint, we did mail outs to all lease holder properties, both commercial and non-commercial lease holders around the system. They got a mail out with a *Salvinia* warning and contact numbers for the DNR Aquatic Nuisance Species office and our office. At the campgrounds, we do door hangers and dropped them off at those offices. We did posters for bait shops, landings, and stuff like that. We were hanging up information.



Ms. Moorer noted the B.A.S.S. Elite Series is coming to S-C system in April or March. Our group is getting together to do something with that. The biggest concern for us is that these guys travel across the country and they are going to be fishing in the main areas where there is *Salvinia*, although it is on both Lake Marion and Moultrie. They are launching at John C. Land landing and that is where we have *Salvinia*. We are looking at setting up courtesy boat checks at the landing when they come back to weigh in, just to get the message out to them. Even if they are parked at the landing, we can check boats, trucks, live wells and things like that. We are trying to educate them, for when they move on the next reservoir. It is on us to be responsible to make sure that when we are hosting an event like that on our system, we are doing our part to keep the spread not only from our in-state reservoirs, but across the country. It is something we should either talk about as a Council, or between S-C and DNR, to try to come in there as a force to be able to help people out and identifying issues. It does not take much, as you know. It could be one piece of *Salvinia* on someone's rod that goes to the next place, or in their live well or on their trailer. *Salvinia* can survive between the hull and a bunk board for weeks at a time. Mr. Page noted that you do not have to always see the plant, because it is a spore producer, since it is a fern. The spores are pretty much invisible unless you are looking for them. Ms. Moorer stated we talked about doing something like that, maybe having a side area setup with a portable wash down tank for doing wash downs. We cannot legally make people do that. Some states have wash racks where you must wash, but we do not have that in SC. She thinks it is something we should consider doing, especially for a tournament that size and knowing that these people are crossing state lines. It would be the responsible thing to do.

Mr. Page stated that leads to some other business, so he will go ahead and talk about it now since we are on it. We have been doing *Salvinia* education since the mid- to late- '90s, when it first was discovered in two private areas. The place just below Walterboro was the first occurrence of *Salvinia* in the United States, supposedly. Luckily enough, it was in a pond situation and it got eradicated. Then, we had it again at Delta Plantation down a little closer to Hilton Head and it got eradicated, mostly through private efforts. Luckily enough, both of those areas were able to back flush with salt water. They were on saltwater creeks and salt water is deadly to it. We have had our brochures out there and some of our signs have that on there, too. We have always tried to push that.

Mr. Page said regarding the wash down stations and stuff, the southeast has been derelict in their duties. He just got back from a meeting in November of the Gulf State Regional Panel, which is an extension of the Aquatic Nuisance Species Federal Task Force. There are two hotspots that are getting all the funding, the Great Lakes for zebra mussels and carp, and the western states. The Corps has a pot of money out there with millions of dollars and the only way we are going to get it is for our regional governors and legislatures to be on the same page. Several western states are getting all their wash down stations paid for by the Corps. The money is sitting there in a pot, ready to be doled out. All the money is going to the Great Lakes and Mississippi River people and the western states, mainly because of the Western Governors' Association. They have always had water right issues out there, but when invasive species came

up from state to state, they jumped on the bandwagon big time and did a great job, kind of on their own, of recognizing the problem and dealing with it.

Mr. Page said our organizations are not that strong. We cannot get our legislators to agree which side of the street to walk on sometimes. They need to be more educated and get that money. When they start pushing for it in Washington, that money comes from the Corps. They are kind of reinstating the same program they had back in the '80s and early '90s, where we got tons of money from them to do work. We supported our program. S-C supported their program on it for the first twenty years of existence, basically. It was all Corps money. We did not have any state funds. We did not have to match it. We were lucky enough to be able to use that. We charged all our equipment back against them on rental fees, and eventually we could buy new boats, trucks, or whatever based on the revenues coming in from that. We could not buy directly out of the Corps funds, but could send them a bill for the gas, mileage, and boat usage, and then retain that money. We recently raided that pot for the last time about two years ago, and finally tapped out.

Mr. Marshall asked if Rep. Clyburn was the person Mr. Page was referring to. Mr. Page stated it was Rep. Clyburn and our senators. The senators seem to have more clout. Back in the day when we were getting a lot of Corps money, the Southeast was getting more than other states. That was back when we had Senator Hollings and Senator Thurmond. They were the power brokers in the Senate. The House of Representatives can help, but he thinks the Senate would be more beneficial, and maybe the Governors' Association. He knows we have the Southern Governors' Association, but they do not seem to push for much from the federal level sometimes. If we can get them involved, and Mr. Marshall might know about that more than Mr. Page, who is not a political person and does not like politics.

Ms. Moorer asked Mr. Page if DNR could support S-C in doing something for the Elite Series, the B.A.S.S. tournament, for *Salvinia*. Mr. Page stated he was surprised that our wildlife and law enforcement sections are not already doing that. Mr. Simmons asked Ms. Moorer if they know about it or if they have assisted in the past. Ms. Moorer noted she did not know. It will be the first time they will be on our system in quite some time. She asked Mr. Stack when was the last time the Elite Series came to S-C system. Mr. Stack noted it has been a while. Ms. Moorer stated it was before my career. Mr. Page noted he knew in the past they did that. Our groups at DNR did that at some of the bigger fishing tournaments. Ms. Simmons asked Ms. Moorer what the dates are for that. Mr. Puckhaber told Ms. Moorer it was April 16-19. Mr. Simmons noted he would talk to the colonel and Ms. Cope and get back to you. Ms. Moorer thanked Mr. Simmons. Mr. Page stated he is sure law enforcement is already doing something out there. Ms. Moorer stated she is sure they are, but she is thinking from an aquatic plant management standpoint.

Mr. Page suggested the Council take a ten-minute break and come back at a quarter 'til 12. That way we will out of here at 12:15 or 12:30 p.m., hopefully.

Mr. Page called the meeting back to order at 11:47 p.m. He does not think there are any major changes. Most of the stuff in the big plan is just typos and adding things like ProcettaCOR, where we did not have it in properly. The major topics of interest are always the grass carp. You have got your little plan that he sent you. If you did not, there is one in your packet. The first several pages are nothing but typos being changed. The very first one on the list is Lake Bowen, and it also talks about Reservoir #1. We put this in there after a problem in Lake Bowen one year. It is just a safety precaution to list it in the plan. It looks like this year in Lake Bowen, we need to do a maintenance stocking of grass carp in Reservoir #1 and in Lake Bowen. That maintenance stocking looks relatively low, but you have to consider the initial stocking was only about 400-500 fish. If you look at 32% mortality, you are looking at 80 fish and 25 fish.

Mr. Page asked the Council if they wanted to go through items in the plan separately and approved them separately, or do you want to wait until we get to the end to approve them. The Council decided on waiting to the end to approve the plan. Mr. Page stated if you have any questions as he moves, that was page 8. He moved on to Lake Greenwood on page 10. He noted that he changed the ratio from 1:6 to 1:5. After listening to Mr. Kaczka, he is kind of curious as to his numbers, but that number is based on our standard little table, which assumes some things about morality. He thinks Mr. Kaczka is right. We can take a guess at what numbers are out there, but we cannot tell you exactly. We can get close. We can see how vegetation has affected some of these places through the years when numbers get to certain levels. We are basing it on our old data. Lake Greenwood is 300 fish. He thinks it is the same thing we did last year. He thinks we are in that ramping stage, to get us back up. We did some modifications to the plan several years ago, after everybody had opened their flood gates. We determined, at that stage, that we lost a significant amount of carp out of there because it was never opened. Ms. Moorer asked Mr. Page if DNR ever did a survey on Lake Greenwood for a condition factor there. Mr. Page responded no, we have not. He thinks if you went out on Lake Greenwood to find fish, with only 2,000 fish out there, you might have a hard time. That is the problem with all the other places other than S-C. No one has tens of thousands of fish. Lake Murray does, but that is kind of hard to do.

Mr. Page moved to Lake Murray on page 12, where he was redoing his numbers. He had 1800 originally in mind, but 2000 looks like the number that we are going to keep there to keeping that lake at 1:6. He is trying to run these different lakes a little bit different. Lake Murray and Lake Greenwood are a lot like, so he is trying to see what 1:5 is doing at one place and 1:6 is doing at the other place. We should be coming back down to that number now and maintaining about 2,000 fish in there. Another thing about these plans over the years is that when we first started these plans way back when, Lake Murray was 50,000 acres. Now it is a different number. Mr. Page went on to say Santee Cooper Lakes was 160,000 acres back in the day. Now we are using 170,000 acres. He still sticks with 160,000 for some of these numbers. He thinks it is based on a lot of things. Our mapping is a lot more accurate than it used to be, but he does not think it has grown that much. It is probably reduced in size.

Mr. Page moved on to the S-C lakes and asked that everyone switch to the handout specific to S-C. They made some comments on some things. He will agree to disagree a little bit, because some of problem plant species that are listed are natives. He understands they are not necessary non-natives but are problematic in some places. There are a lot of native species that can be problematic. They wanted to remove those from there. He does not have a problem with that, but they will be treating that at some stage probably. Ms. Moorer stated the idea behind that was the perception of “treating natives” and we really do not treat those, even in residential areas. Mr. Page stated they are not classified as problem plant species, generally. We left them in the treatment section which is good. We just added a few more formulations. Ms. Moorer noted that is just so if we do have a problem, we can treat them by the plan, but it is not something we would categorize as a problem species for our program. Mr. Page stated Ms. Moorer and Mr. Holbrook rewrote a paragraph that he was struggling with. Mr. Page is glad they rewrote it. He likes theirs better. He pointed out the location and gave everyone a minute to read it. He thinks it explains what we are trying to do. Just to let you know, some of the stuff will get wordsmithed just a little bit between you and actually print stage, because you find little things you see, and you cannot just fix it until you are focused in on that sometimes. Ms. Moorer thanked Mr. Holbrook. You do not want a biologist writing the fish biologist section and Mr. Holbrook had that one. Mr. Page stated that is pretty much all for S-C. The only other thing for S-C is whether we need to put your other impoundments (Fountain Lake, Dean Swamp, and Church Branch) in the plan. He asked the Council for their opinion. Ms. Moorer stated those are the three that we showed, and they are inside our geographical structure. Mr. Page asked if she wanted to put them in the regular portion or as isolated impoundments and list them out. Ms. Moorer suggested we list them as isolated impoundments and list them out. Ms. Lognion agreed with Ms. Moorer. Mr. Page stated he would put them in one little section. He asked if there were any questions so far.

Mr. Page moved back to the bigger document. We are basically done after S-C. We just changed the numbers on the proposed management operation expenditures. That is just typos. All the sites remain the same. The map really is not going to be changed. We did include, on page 24 on your handout, the MOA that we have been trying to revise since before Mr. McCord retired, but we could never gain any traction on the DNR side. The original one is crossed out. It basically does not do anything except change the vegetation goal from 10% to 15%. It also expands project boundaries. Originally, it was the lakes. Now, it is only listed as a project boundary, if he is not mistaken. That is our interpretation of that. It still does not say we are going to have *Hydrilla*. It says we are going to maintain 15% surface area of the water as beneficial vegetated habitat. That does not necessarily mean pad plants and submersed species. That could be buttonbush, tupelo, or even cutgrass. That can be anything beneficial, to some degree, for waterfowl, wildlife, fish, and other organisms. It talks about trees and shrub species being dominant as a part of the diverse wetlands habitat that is good. He asked for confirmation from Mr. Simmons, who agreed, although some other people may not. Ms. Moorer stated they have had some push back there, and that is what she and Ms. Cope have been talking through. When we spoke with David Strickland with Carolina Wildlife Syndicate, one of the things we were talking through was pulling out cypress. He did not want cypress included in that, but we

can all argue that cypress, tupelo and other wetlands sedges and grasses or things of that type are beneficial wildlife habitat. They may not be for what he wants. Mr. Page stated to wildlife, not necessary waterfowl, like he wanted. It is beneficial to all kind of wading birds, other types of species of bird, predators, and all kind of stuff, even fish.

Mr. Page noted the MOA also says S-C will monitor using aerial photography, visual surveys, etcetera. It also says we will cooperate in monitoring the health of the fishery and the wintering waterfowl populations. Mr. Page thinks DNR is still doing some of those waterfowl population surveys but may have cut back on them. Mr. Simmons stated we have cut back but they are still being monitored. Mr. Page stated that our fisheries guys are continuously out there monitoring species. It says grass carp will be a major component and we are going to meet annually to review. That is what the plan says we are going to do anyway. We are going to review it annually. It does not necessarily mean we have to vote on it annually. If there are no changes to the plan, then we do not have to vote. The plan stays in effect. We will always have that discussion, as it says in the plan. The plan says we will discuss it and do our thing. The plan also says we will also be able to adapt that management strategy if we need to during the season. If Ms. Moorer has a bloom of *Hydrilla* in June and she has a thousand acres out there, we may have to think seriously about having an emergency meeting and letting her stock more carp before the end of the summer. He does not anticipate that the way we are doing things. He really thinks we are on the right track for a change, without being diverted from it. If we had done this twenty years ago, we would not be sitting here talking about it. We will be cruising along with good habitat and a lot of less invasive species.

Mr. Page read number 5 on the memorandum: "Aquatic vegetation will not be controlled in Santee Cooper Project water bodies that are totally isolated from the Lakes unless it conflicts with specific water uses or is identified as a state or federal noxious weed..." Ms. Moorer noted that was part of the whole Potato Creek impoundment question. Mr. Page said it repeats "meet annually" several times. S-C and DNR meet more than annually. Mr. Page said he and Ms. Moorer are in contact at least monthly.

Mr. Marshall had a question about the 15%. It is only a geography question. A moment ago, we said something about considering the project boundary, not just the lakes. What was that about? Mr. Page said it includes wetland habitats that are kind of upstream that were not always included in the lake boundary. Ms. Moorer noted Sparkleberry Swamp. Mr. Marshall asked if the 15% applies to the project boundary or to what we used to think as the lake. Mr. Page stated it applies to the project boundary, from my understanding. Ms. Moorer stated it clarified it, because a lot of people did not consider Sparkleberry Swamp as an area that we would consider, but it is a major part of the ecosystem on the S-C system. Protecting that is the idea behind it and it is inside our project boundary. Mr. Page stated a lot of people do not consider Sparkleberry Swamp a part of Lake Marion. Mr. Marshall asked where we are on the 15% goal, although you might have said it. Ms. Moorer noted 14%. It is a goal. She knows that is something we may struggle with, especially with some public interest groups. She can say it all day long that if we could have 50%, that is what we want, if it is native vegetation.

Realistically, with the areas on the S-C system that are conducive to having that kind of habitat, we could probably be in that 15% range. The average depth on the system is 15 ft., but we have a lot of deep-water areas. You are not going to have vegetation growing in those areas. Mr. Page noted 50% is a high number, but if it is native, we are happy. If it is problematic, it is still problematic. It can be problematic because you are looking at other uses out there, everybody's usage. We are not talking about waterfowl and fisheries, folks. We are talking about water supply, recreational activities like boating, and even jet skiers. Now, we are talking about ecotourism, which is one of the biggest growing businesses in the country, probably in the world. People just want to go out and see birds. Ms. Moorer also noted commercial fisheries and just having access to areas. She asked if that clarified things. Mr. Marshall said it did.

Ms. Moorer stated this revised MOA started happening almost a year or two ago. The regional biologists with DNR and S-C staff sat down and kind of hashed through what we could do to improve this. We had input from special interest groups. This what we came up with, as a group, that we all felt comfortable with it and felt like we were looking at the best interest for the system. Mr. Page stated this was approved by everybody in the working class a couple years ago. They looked at it and thought it was a good idea. There were no huge changes, just a little bit of tweaking. It got bogged down when it started up the chain of command. Ms. Moorer noted the one that was in the plan was last signed was 2005. Mr. Page noted we have been trying to do this. Mr. McCord wanted to do this before he left, and he pretty much had it set up and ready to go, but we could not get enough traction. Mr. Page stated it seemed to come up in every meeting we had, including at the SC Aquatic Plant Management Society (SCAPMS) meetings.

Mr. Page noted we have periodically, from year to year, had a meeting with all the biologists. We did not do it this year, but we talked to them by phone. It seems like everything is under control. He has not heard any big issues coming up. They know to call and check if they need help. The big plan is out there. Even if you pass it now, all you are going to pass is the fact that we are going to post it for public review. As members of the public or staff, if you see something in there is wrong, put it in your comments and we will make those minor changes. There is a perception that it is a vote. It is not a vote. If your arguments are not valid arguments, as the stuff that we discussed already and kind of worked through, you probably would not get any traction and you are not going to be happy with us. We already thought of that and already a step ahead of you. If it is something we have not thought about, we will consider it. We have made some minor changes to the plan because of that. Most of the time it is just some rewording to make it clearer. Everybody has an opinion. Most of the time, it is not an informed opinion. People around this table have made this their business for years. He and Ms. Moorer have been doing this how long? Ms. Moorer noted 13-15 years. Mr. Page stated you are looking, between us, at 50 years of experience plus probably. We are losing those guys. Mr. Marshall has been around from the first council meetings and he is back on his second term. He got suckered back in. He was smart enough to stay out of it for 20 years. Ms. Lognion has been around. If we have chemical questions, she puts us in touch with the right people. We try and go through PRT and the people that do not really deal with this a lot. They have other issues. We try and talk to

them separately, let them ask questions and educate themselves. They have some good ideas though. He has gotten some good stuff out of some of their new people. They are on the ball.

Mr. Page asked the Council if there is any section of the plan they would like to look at, other than that small handout. We have the whole plan on the laptop and can pull it up. Basically, there are no extensive changes. We tweaked those carp numbers just a hair. S-C remains the same at 10,000 fish. The biggest thing on S-C is adding that little section about the impoundments and the new MOA. He asked if anyone had anything they wanted to look at. He noted to Mr. Simmons that the WMAs are in there. Mr. Page stated he does not know how accurate they are anymore, because he cannot get feedback. He also noted the state lakes information probably is not accurate either. He cannot get any information from those guys, but they are a small staff, too, and stretched thin.

Mr. Marshall made a motion to accept the 2020 draft plan with the changes that have been discussed. Ms. Lognion seconded that motion. Mr. Page asked if there was any discussion on the plan. There was none. Mr. Page called for a vote. The vote was passed unanimously.

Mr. Page asked Ms. Carper if there was anything from OCRM that they wanted the Council to talk about and discuss. Ms. Carper noted she did not think so but would contact him if needed. Mr. Page stated about the only thing that will affect you is when we are working the lower branches of the rivers, probably just the Waccamaw River. He asked Ms. Carper if Goose Creek Reservoir and Back River Reservoir are in OCRM's purview. Ms. Carper said they are.

Mr. Page asked if there is any other new business or anything you would like to see at a meeting. He knows not the next meeting, but we had a discussion earlier about educating us on hyperspectral photography, maybe one of those summer or fall meetings. He asked if the Council wanted an update from Dr. Susan Wilde about VM. If so, he would see what he could do. Ms. Moorer stated she would like to hear Dr. Wilde talk at a meeting where we had some public interest. She thinks most of the people here know Dr. Wilde's research, but she thinks that will be beneficial.

Mr. Page asked the Council if there is any other business. Mr. Page noted he will have this plan posted by tomorrow, hopefully. It needs to be posted for 30 days. He would like to have a meeting in the last week of February, probably the 26th or 27th. Ms. Moorer noted that is a Wednesday or Thursday. Several Council members said either of those would be good. Mr. Page stated he can send out a doodle poll with those two dates. He will find a location. There was an extended discussion by the Council about potential locations for the next meeting and meetings in the future.

Mr. Page asked if there was anything else. There being none, Mr. Page stated he would accept a motion to adjourn. Ms. Moorer made the motion to adjourn. Ms. Lognion second that motion. Mr. Page called for a vote on the motion brought up by Ms. Moorer. The vote was passed unanimously. The meeting ended at 12:19 p.m.