GULF & SOUTH ATLANTIC REGIONAL PANEL
ON AQUATIC INVASIVE SPECIES
MINUTES
Tuesday, October 30, 2018 – Wednesday, October 31, 2018
San Antonio, TX

On Tuesday, October 30, 2018, Chairman **Lisa Gonzalez** called the meeting to order at 8:30 a.m. The meeting began with introductions of the members and guests. The following were in attendance:

Members & Proxies
James Ballard, GSMFC, Ocean Springs, MS
Paul Carangelo, Port of Corpus Christi Authority, Corpus Christi, TX
Corrin Flora, NC DEQ, Raleigh, NC
Pam Fuller, USGS, Gainesville, FL
Lisa Gonzalez, HARC, The Woodlands, TX
Leslie Hartman, TPWD, Palacios, TX
Tom Jackson, NOAA, Miami, FL (via conference call)
Chuck Jacoby, Indian River Lagoon NEP, Palatka, FL (via conference call)
Peter Kingsley-Smith, SC DNR, Charleston, SC
David Knott, At-Large Member, Charleston, SC
Monica McGarrity, TPWD, Austin, TX
Robert McMahon, UT Arlington, Arlington, TX
Matt Neilson, USGS, Gainesville, FL
Jim Page, GA DNR, Waycross, GA
Michael Pursley, MS DMR, Biloxi, MS
Matt Phillips, FWC, Tallahassee, FL
Dennis Riecke, MDWFP, Jackson, MS
Cindy Williams, USFWS, Atlanta, GA

Staff
Ali Wilhelm, GSMFC, Ocean Springs, MS
Joe Ferrer, GSMFC, Ocean Springs, MS

Others
Chuck Bargeron, UGA, Athens, GA
Kelly Gestring, FWCC, Boynton Beach, FL
Michael Kendrick, SCDNR, Charleston, SC (via conference call)
Hans Landel, Lady Bird Johnson Wildflower Center, Austin, TX (via conference call)
Susan Pasko, USFWS, Falls Church, VA (via conference call)
Astrid Schwalb, TX State University, San Marcos, TX
Elizabeth Underwood, SCDNR, Charleston, SC (via conference call)

Public Comment
Chairman **Gonzalez** provided the opportunity for public comment. No public comments were received.

Adoption of Agenda

A motion to adopt the agenda was made, and passed unanimously.

Approval of Minutes

The minutes of the April 10-11, 2018 GSARP meeting in Jackson, MS were presented for approval.

A motion was made to approve the minutes, with minor changes. The motion was seconded, and the motion passed.

Overview of Texas' Aquatic Invasive Species Program

McGarrity gave a PowerPoint presentation "Texas Statewide Aquatic Vegetation and Invasive Species Management Update (a.k.a., "The State of the State"). The total TPWD annual AIS budget has historically been approximately $1.4 million. Legislature allocated $6.3 million/biennium to TPWD Inland Fisheries for 2016-2017 and 2018-2019. Federal boater access funds and partner funds augment state-funded efforts. Public awareness campaigns focus on preventing the spread of AIS by day-use boaters. There will be an increased focus in 2019 on targeted marina outreach to prevent movement of mussels on wet-slipped boats.

Efforts for zebra mussel early detection include monitoring over 50 lakes by partner collaboration; analyzing plankton samples with microscopy and eDNA; settlement samplers and shoreline substrate surveys. Fifteen lakes, and 5 river basins are infested. Elephant ear in the Llano River and Colorado Bend SP are being treated. Arundo in Texas Hill Country is being managed through the Healthy Creeks Initiative, with over 300 landowner partners, TxDOT, river authorities, cities, and others. The Arundo Control Man Prevention Program is also being utilized. From 2016-2018, over 10,400 acres of saltcedar were treated in the Upper Brazos River. Hydrological and habitat monitoring is ongoing.

Current giant salvinia management tools include herbicides and giant salvinia weevils. In FY2018, 12,255 acres were treated with herbicides. Six new infestations were found. Infestations in four lakes have been eradicated. Weevils are in 15 water bodies. In FY18, 188,527 weevils were released by TPWD. Over 200,000 were released by CBA. Current water hyacinth management tools are herbicides. In FY18, 2,001 acres were treated. Eleven lakes have been eradicated. Current crested floating heart management tool is the herbicide ProcellaCOR, being used in four water bodies. In Moss Lake, ProcellaCOR was used on 18 acres for yellow floating heart management. Grass carp and herbicides are being used for hydrilla management in three water bodies. ProcellaCOR was used to treat 122 acres. Six acres in Old City Lake were treated with herbicides for American Lotus. Future treatments include herbicide treatments and more floating booms by TPWD; cold-tolerant weevils by USDA; endocide by SFASU; and terrestrial herbicides by LSU. Public treatments can also be done, but only the area directly adjacent to their property, with an approved vegetation treatment proposal.

A Year in the Life of Texas Zebra Mussels

McMahon gave a PowerPoint presentation entitled "A Year in the Life of Texas Zebra Mussels" about his study conducted from August 2016 – August 2017. Research sites included Lake Texoma, Lake Ray Roberts, Lake Belton, and the University of Texas at Arlington. Aspects of

zebra mussel population dynamics studied were: Mussel seasonal cohorts, growth rates, and spawning periods; temperature impacts on spawning and juvenile settlement and adult mussel life spans; mussel settlement periods and density; impacts of low pH and low oxygen concentrations on mussel reproduction and density; size distributions of veliger larvae in relation to juvenile settlement; impact of lake water variation on mussel densities.

Mussels were settled on earlier deployed house bricks held at a constant depth of 1.5 – 2.0 m from floating marina docks. Mussels were randomly sampled monthly, and shell lengths determined. During spawning periods, plankton net tows were taken monthly, combined into a single sample, and preserved in alcohol. Microscopic examinations for veliger larvae were done, and surface water temperatures were measured hourly. Shell lengths of over 100 randomly chosen veligers from each sample were measured. Surface water pH and oxygen concentrations were measured at each sampling visit. Maximum mussel densities were compared to degree of annual lake level fluctuation from 2012 – 2017.

The studies revealed that zebra mussels had distinct spring and fall periods of spawning and juvenile settlement. Spring spawning at >16°C was suppressed by summer water temperatures (>30°C). Fall spawning at <25°C was suppressed by low winter water temperatures (<16°C). There was rapid shell growth rates with spring and fall cohorts reaching shell lengths of 20-30 mm within 12-14 months. Texas mussel cohort life spans were 1-1.5 years. Veligers reached settlement-competent sizes for abbreviated times during a spawning period. Settlement occurred 2-4 weeks or more after spawning. Applying molluscicides only when settlement-competent pediveligers occur in the plankton to prevent mussel fouling could reduce molluscicide costs and the molluscicide release into source waters. Mussel cohort densities varied between the studied lakes, and over the years. There was a general trend for decline in settlement and adult densities, with increasing length of lake infestation. Extensive water level variation during spring-summer in 2015 resulted in major reductions in mussel densities in all three lakes through 2016. Variation in physical parameters such as pH and O^2 concentration and in lake levels are likely to cause Texas zebra mussel populations to experience “boom-bust” population dynamics.

Dispersal of Zebra Mussels

Astrid Schwalb gave a PowerPoint presentation entitled “Dispersal of Zebra Mussels”. The Schwalb Stream Ecology Lab studies dispersal, ecology of zebra mussels, unionid mussel distribution, and reproductive ecology and behavior. Collaborative projects include genetics to assess the status of unionid mussels, and environmental contaminants.

Since 1988, there has been a rapid spread of dreissenid (zebra and quagga) mussels throughout North America. Dispersal has been via boats and water current. Through a collaboration with USACE, a study was done to predict zebra mussel invasion via boats, and habitat suitability. Invasions since 2012 have been mostly close to urban centers.

The model: 1.) The number of infested boats travelling from invaded reservoir to another lake, which depends on the number of boats per lake (based on registered boats per county), the distance between lakes, and lake attractiveness (most attractive are large lakes near urban centers). 2.) Whether a lake becomes invaded depends on the number of infested boats arriving, and the threshold for invasion (number of infested boats required to guarantee a successful

invasion), plus habitat suitability (dissolved calcium/hardness, maximum lake depth, pH, conductivity). The habitat suitability index affects survival probability of arriving mussels. Starting with Lake Texoma, the model correctly predicted the invasion of the 11 reservoirs that had been invaded at the beginning of the study, plus 30 others. Of those, Lake Austin has since been invaded, and Lake Levon, Richland-Chambers Lake, Lake Worth, and Grapevine Lake are on the watch list. Most lakes in central Texas are predicted to become invaded in the near future. One preventive effort is boater compliance. High compliance (86%) is needed to completely prevent new invasions. With 0% compliance, 34 new lakes were invaded. When there is 75% compliance, seven new lakes were invaded.

Lake attractiveness is an important parameter. The model predicts restricted spread to east Texas due to habitat limitation, and to west Texas due to dispersal limitation. In streams, zebra mussel populations depend on recruitment from an upstream located lake or reservoir. Impoundments facilitate persistence of zebra mussels in larger rivers. Low-head dams could act as stepping stones. There are 7,305 registered dams in Texas, plus a large number of unreported small and medium sized dams. This could possibly facilitate the spread of zebra mussels in Texas.

Dispersal and settlement rates were quantified. Veliger samples were filtered in 100 gallon site water through a plankton net. Initial findings from 2015-2016 revealed that juvenile settlement was restricted to ≤ 6rkm in 2015, and up to 54 rkm in April 2016. Prolonged periods of increased river discharge may have facilitated their dispersal further downstream in 2016. In 2018, the largest dispersal distances occurred between April and June, when the highest lake veliger densities occurred. Temperature is a key variable for zebra mussel reproduction, and is a major driver for lake veliger densities, which affect downstream dispersal. Initial findings from 2015-2016 revealed that substantial settlement was limited to sites upstream of low-head dam. More lentic conditions may have enhanced recruitment. Riverine recruitment currently depends on how long ago the lake was invaded. Veliger dispersal was farther downstream than juvenile settlement. The absence of juvenile settlement farther downstream was associated with less suitable habitat conditions such as higher summer water temperatures and higher turbidity. May had the highest veliger densities.

Scuba surveys were done near dams and upstream in Canyon Lake and Lake Belton. In Lake Belton, mussels were not found >14m depth, which is associated with soft sediment and low visibility. Higher densities were only closer to the dam in greater depths. In Canyon Lake, mussels were not found >18m depth. Mussels were found in higher densities upstream. Closer to the dam, there were higher densities at greater depths. Impacts of zebra mussels include a decline in phytoplankton, likely also caused a decline in zooplankton, which may affect fish recruitment. Also, likely impacts to unionid mussel species in Lake Belton.

Conclusions of downstream dispersal and distribution studies revealed that riverine recruitment depends on source population and the factors affecting reproduction in the lake, and is associated with optimal temperatures in lake relatively high DO in hypolimnion (bottom-release dams). Experimentation studies are needed to examine the potential ole of habitat limitations. The role of low-head dams may become more important in the coming years. Adult zebra mussel population and ecological impacts should be monitored.

Establishing CWMAs and CISMAs in Texas

Hans Landel gave a PowerPoint presentation entitled "Citizen Scientists, CISMAs and Invasives, Oh My!" The Invaders of Texas Program was established in 2005, and covers all of Texas. It is managed by the Lady Bird Johnson Wildflower Center. The goals of the program are: To train a cadre of citizen scientists to find and report locations of selected invasive plant species in Texas; validate and use the data to develop maps of invasive species to improve understanding of invasive plant distributions in Texas; partner and provide information to regional resource managers and agencies, and provide opportunities for volunteers to help in the efforts; bring volunteers to a level at which they can train the next generation of citizen scientists. The Invaders of Texas Data Detection Database tracks species observations submitted by volunteers, provides the public with full access to citizen science data, and has links to species observation detail page, plant detail page, and validation information. There is also a mobile app. The Invaders of Texas Data summary from 2005-2018 showed 139 workshops done, 77 satellites, 3,185 trained citizens, 22,099 observations, and 9,000+ hours.

Texasinvasives.org contains integrated components: Early detection and rapid response (EDRR) system, citizen science program, website, mobile app, facebook page, monthly e-newsletter, and outreach. It is a partnership between the TX Forest Service, USDA-APHIS, TX Parks and Wildlife Department, and others. It is designed to present a coordinated approach to address invasive species throughout Texas. The website contains illustrated descriptions, ecological information, distribution and habitat, biology and spread, history of introduction, ecological threats, control and management, native look-a-likes, and references.

The Texas Invasive Plant & Pest Council (TIPPC) is comprised of stakeholders from government agencies, conservation organizations, academia, green industry, and the public to form one unified body in addressing the threat of invasive species.

The Sentinel Pest Network trains citizens to identify and report specific "high consequence" pests that threaten the natural biodiversity of the state. Reporting a species does not require login. The Early Detection and Rapid Response System findings for 2018 showed over 50 pest reports submitted, 21,057 website views, 28 participants completed the EAB online training, 66 completed the SPN online training, and 143 participants trained in workshops.

The Cooperative Weed Management Area (CWMA) is a non-regulatory long-term partnership of federal, state, and local governments, NGOs, institutions, and individuals. It is focused on invasive species management, and facilitates cooperation and coordination across jurisdictional boundaries. The organization forms and governs themselves using a steering committee. They create and implement a comprehensive and strategic plan to manage their invasive species issue within their area, and create a formal agreement. Creating a formal agreement shares the workload and existing resources, produces usable data and tracks distribution, raises future resources, and creates a community effort that lasts long after the initial project is completed.

The Texas Gulf Region Cooperative Weed Management Area (TGR-CWMA) was officially established in 2014, with the mission to address the problem of the invasive Brazilian peppertree from Port O'Connor to Packery Channel on the Texas Gulf Coast. Activities include mapping,

work days, coordination, outreach, administration, and meetings. Over 5,700 acres are under improved management. Over 130 acres have been restored.

Two incipient Texas CISMAs (Cooperative Invasive Species Management Areas) are being planned in northeast Texas and the Houston area.

Spatial Conservation Assessment to Inform Exotic Species Rule Revisions

McGarrity gave a PowerPoint presentation entitled "Spatial Conservation Assessment for Balancing Avoidance of Impacts of Tilapia Introduction on Imperiled Fishes with Economic Impacts to Stakeholders". In the original tilapia regulations, blue and Mozambique tilapia were exempted because historically, it was believed that limited cold tolerance would limit distribution in Texas. Current regulations prohibit tilapia of 3 genera: *Oreochromis*, *Saratherodon*, and *Tilapia*. Regulatory exception allows possession of Mozambique without permit, and are commonly stocked in private ponds. Unfortunately, although both blue and blue tilapia hybrids have become established more widely than originally believed possible, too many aquaculturists were rearing these species to practically allow a total ban.

At issue is the inability to identify to species inhibits enforcement. There are no consistent morphometric or meristic distinguishing traits, and no "pure" genetic stocks for comparison. Unfortunately, many tilapia species have become badly hybridized, especially among aquacultural specimens, including some native stocks in Africa. Identification of most species is difficult or impossible without resorting to electrophoretic analysis to conform genetic identity. The proposed solution is to regulate all three, or possibly four, tilapia species the same.

Another issue is private pond stocking and escapement. Mozambique tilapia sales for pond stocking appear to be increasing. There is no oversight of pond stocking and potential for escapement. Escape of fish from private ponds into public waters without a 'stocking permit' is a violation of Texas Statute [PWC 66.015]. TPWF response is to conduct review of regulations in other states, transport invoices, literature on tilapia, and potential impacts to imperiled fishes, and identify potential solutions.

A review of exotic species transport invoices revealed that new buyer numbers were over 1,000. Private pond permits would not be feasible – there are too many ponds, and they would have to be fee-free. Buyers from 2016 (96%) had viable location information.

A review of tilapia literature showed that knowledge gaps need reviewing, and areas where SGCN impacts were likely should be identified. The role of thermal refuges is a key knowledge gap for Texas. Native fish are being impacted through competition, predation, and habitat impacts. *Oreochromis* is being implicated in declines of several species of native fishes, and 28 fish Species of Greatest Conservation Need are being potentially impacted.

Spatial Conservation Assessment found 28 Texas SGCN fishes with congeneric impacts and available geographic data; 31 with potential impacts. Zonation spatial assessment software selected is flexible and modifiable, and facilitates inverse prioritization of lost opportunity costs for stakeholders. A comparison is done of prioritization at landscape-scale vs. regulatory unit. Conservation Prioritization Concept – Core Area Zonation minimizes biological loss and

considers important species occurring in biodiversity-poor areas. It is used when biodiversity data layers represent a species. It is a mechanism for comparing different solutions, and facilitates investigation of tradeoffs between conservation and economic losses in the most informative and flexible way. Biodiversity features and habitat conditions are also assessed.

County Planning Units facilitate interpretation with respect to potential regulatory approaches, and biodiversity value and opportunity cost are aggregated. Landscape identification is an objective evaluation of priority areas for conservation. Each conservation priority zone must include at least one county among the top 10% of conservation priority valued counties across the state. Final output requires interpretation, review, and revision.

Draft recommendations include: Private pond stocking of tilapia – proposed Conservation Zone – pond "approval", and Proposed Economic Zone – allow without restriction.

In summary, many things are needed: A science-based regulatory approach that balances conservation value and economic interests; conservation that provides added protections for imperiled fishes and their habitats in the southern Great Plains, Edwards Plateau, and Chihuahuan Desert ecoregions; minimize impacts of conservation actions on stakeholders and reduce regulatory burden; bridge gaps between identification of conservation priority areas and translation to implementation of conservation actions; support success of current and future conservation initiatives.

Overview of Cuban Tree Frog Introductions in the Southeast Region

Hardin Waddle gave a PowerPoint presentation entitled "USGS Response to the Recent Invasion of Cuban Treefrogs in Louisiana". The Cuban treefrog was first introduced to the U.S. in the 1920s in the Florida Keys. By the 1970s, they were established throughout southern Florida. By the 2010s, they were established in north-central Florida. They are fast growing, have a generalized diet, have high fecundity, thrive in human dominated habitats, and have the ability to dominate the native treefrog community. USGS research in Florida found that the presence of Cuban treefrogs could explain the absence of native species. When Cuban treefrogs were removed from experimental plots, populations of native frogs recovered almost immediately. It was also found that the presence of Cuban treefrogs at a site reduced the probability of occurrence of native Green and Squirrel treefrogs. Cuban treefrogs eat a broad diet, including native vertebrates (mostly frogs). There is evidence that native treefrogs do not avoid Cuban treefrogs, and seemed to be unaware of the threat.

From April 2013 to November 2016, there were several occurrences of single Cuban treefrogs in Louisiana that almost all could be associated with recent plant acquisitions from retail nurseries. In December 2016, USGS was contacted by Audubon Zoo in New Orleans that they were finding what they believed to be Cuban treefrogs on their property. From September 2017 to present, monthly trips have been conducted at Audubon Zoo and the surrounding park property to search for and remove Cuban treefrogs. Dissections for diet study will be done. Disease research and possible genetics study will be developed. Student-led research will be done. Over 500 Cuban treefrogs have been removed. Captures declined when it got cold. The source of the frogs is believed to be palms planted in the Elephant enclosure.

In September 2018, USGS was made aware of another potential breeding population in Saint Rose, LA, where a commercial nursery is located adjacent to the site.

USGS is conducting acoustic monitoring in protected natural areas. Automated audio recording devices are in use as sentinel for Cuban treefrog invasion in Jena Lafitte National Park and Gulf Islands National Seashore. All known Cuban treefrog sightings in the state are documented and responded to.

An EDRR program could be developed to attempt to eradicate the known breeding populations before they spread into natural areas. Management actions to decrease the spread of Cuban treefrogs on landscape plant shipments could be explored. More research will be conducted on the thermal tolerance of the species to better define the areas vulnerable to invasion.

Cuban Tree Frog Rapid Response Discussion

Fuller stated that she spoke to **Kristen Sommers** about Florida being a problem source in other states. **Sommers** is looking into what can be done, and is contacting the Florida Department of Agriculture, who is in charge of inspection stations for shipments leaving the state. However, it would be difficult to find all of the frogs hiding in the shipments. Perhaps prevention could start at the plant nursery level by preventively spraying trees to deter frogs. Other options could be looked at. The frogs are sensitive to citric acid and vinegar, which could be sprayed onto the trees. **Knott** asked how effective acoustic monitoring for detecting the frogs is. Waddle explained that, while inexpensive to use, it works only if there were lots of male frogs in a vicinity that were producing calls for breeding. **Knott** asked if the software could distinguish which calls were coming from the Cuban tree frogs. Waddle stated it was possible because their calls are very distinct. **Fuller** said that another consideration that needs to be looked at is where are the frogs breeding? Waddle stated that they are very versatile on their breeding sites. They will breed in a bucket full of water, or a bird bath, or in anything that has standing water. Also, ditches and ponds. Their larval period is not very long. **Knott** asked if any information had been published on relative difference in tadpole sizes, and if they were larger and more distinct looking in comparison to native frog species. Waddle said that the tadpoles are larger and distinct looking. He said that tadpoles of native species are rarely found, as they are secretive. A study was done that found Cuban tree frog tadpoles are predatory on native species, as well as their own species when they are larvae. **Carangelo** asked if removal efforts were successful at suppressing the Cuban tree frog population. Waddle stated that they believed they were successful at removal efforts in Audubon when their numbers declined. However, numbers are now climbing, and he suspects that all that is needed are a few strong adult frogs to survive and repopulate. **Fuller** asked what preyed on tadpoles and adults. Waddle explained that Cuban tree frogs and tadpoles secrete toxic compounds, and most mammals cannot consume them. Snakes eat adults, but then experience diarrhea and weight loss. **Riecke** wondered if Louisiana Department of Wildlife and Fisheries was fully aware of the threat. Waddle replied that they probably are not yet. **Fuller** asked the members to consider what they would do if this situation popped up in their states in an isolated location. Several members suggested to involve members of the public, students, etc. for removal efforts. However, caution must be taken because of the toxins the frogs secrete. Also, reports received from citizens who had killed frogs they believed to be Cuban tree frogs turned out to be native species. There is a need for outreach and education. Also, how state agencies could respond once observances have been noted in their

state. **Ballard** asked Waddle if, besides the monitoring they are doing in the Gulf Islands National Seashore in Florida, there were also plans to expand efforts into the Gulf Islands National Seashore in Ocean Springs, Mississippi. Waddle stated that they have a collaborator at the University of West Florida who is already working at the Davis Bayou site, so he could assist. **Ballard** said that staff at the Gulf Islands National Seashore might also be able to assist. **Pursley** stated that the Mississippi DMR has set out PVC traps at Buccaneer State Park and an RV park in Jackson County. Traps have been checked for several months, but have only contained native frogs so far.

Kingsley-Smith asked if enough is known about the species to make a reasonable prediction about what their potential invasive range is in the southeast? Waddle stated that they do not have a good thermal tolerance study, and the frogs have behavioral strategies for dealing with the cold, so what would limit them would be cold temperatures, since they are from a tropical environment. However, no studies have been done to see how far inland they can thrive. They can also survive more salinity than normal tree frogs.

Gonzalez asked **Fuller** to be the point of contact for this issue between now and the next meeting so that members can contact her for ideas, etc. on this species.

Effects of Non-native *Procambarus clarkii* on Native Crayfish Populations

Michael Kendrick provided a PowerPoint presentation entitled "Effects of Non-native *Procambarus clarkii* on Native Crayfish Populations in the Carolinas". *Procambarus clarkii* is native to the Gulf Coast and Mississippi River drainage. They are aggressive omnivores that are the cause of "crayfish plague", a fungal disease that has decimated native crayfish in Europe. They were introduced via the pet trade, culinary discards, and as live study specimens for classrooms. They become quickly established, and it only takes one fertilized female to establish a population. They cause direct and indirect effects on food web structure, and can shift macrophyte-dominated ecosystems to open-water ecosystems. Burrowing can be problematic to levees, dykes, etc. which results in water loss and damage to fields.

There are 60 native crayfish species in the Carolinas – 38 species native to South Carolina, and 45 native to North Carolina. The Waccamaw crayfish is found in the Waccamaw, Lumber-Little Pee Dee, and Pee Dee rivers in flowing blackwater streams and is a conservation priority in both NC and SC. State Wildlife Grant funds were received to assess the current range of the Waccamaw crayfish. Crayfish were sampled from 44 locations throughout the region and retained for identification. Three records of the Waccamaw crayfish, one record of the sandhills crayfish (*Procambarus pearsei*), and 2 records of the coastal plain crayfish (*Procambarus ancylus*) were documented.

There were at least 20 new records for the red swamp crayfish, *P. clarkii*. The next steps for understanding red swamp crayfish in the Carolinas are to continue documenting location and abundance information for native and non-native crayfish in the Pee Dee drainage, improve understanding of introduction and dispersal events leading to the recent expansion of *P. clarkii*, and comparing genetic structure of populations within sub-watersheds of the Pee Dee to help distinguish human-mediated from natural dispersal in crayfish. A three-year USFWS State Wildlife Grant was recently awarded to the SCDNR (PI: Kendrick) to conduct such research.

Salinity Tolerance of Invasive and Native Coastal Crayfish

Elizabeth Underwood provided a PowerPoint presentation entitled "Investigation of the Salinity Tolerance of Invasive and Native Coastal Crayfish in South Carolina, USA". Freshwater crayfish in the near-coastal zone of South Carolina face numerous threats, including salinization of their wetland habitats due to coastal flooding, sea-level rise, and storm surge. Further, the threat to native crayfish species posed by salinization of habitats is exacerbated by the invasion of the red swamp crayfish, *Procambarus clarkii,* in the region. Thus, research was conducted to determine the salinity tolerance of *P. clarkii* and two native species, the eastern swamp crayfish (*Procambarus troglodytes)*and the hummock crayfish (*Procambarus lunzi)*, to predict their responses to salinization of wetland habitats. *Procambarus troglodytes* (n = 96) and *P. clarkii* (n = 96) were collected from freshwater wetlands in Wadmalaw and Georgetown, SC in October and November 2017 and placed in environmentally-controlled, replicated tanks maintained at one of six salinity treatments (0, 6, 12, 18, 24, and 32 psu) at the SCDNR Marine Resources Research Institute in Charleston, SC. Trials were conducted for seven days and mean percent survival for *P. troglodytes* and *P. clarkii* at 30 psu was 62.5% and 56.3%, respectively. Survival was 100% for both species at all other treatment salinities.

Field sampling was conducted in February 2018 to collect *P. lunzi* from freshwater wetlands on the hammock island, South Williman Island in Beaufort County, SC. Salinity in these wetlands ranged from 0.7 to 7.0 psu. Thirty-two individuals were collected and exposed to one of two salinity treatments (0 psu and 30 psu). Mean percent survival at 30 psu at the end of the first 7-day trial was 18.8%. Crayfish from the first trial's 0 psu treatments (n = 16) were maintained in freshwater and fed every other day for two weeks before being placed in either 0 psu or 30 psu replicated tanks. Mean percent survival after seven days was 87.5% at 30 psu. Continuous monitoring on a second hammock island, North Williman Island, showed low abundances of *P. lunzi* and salinities ranging from 1.3 psu to 6.1 psu throughout the year, likely caused by saltwater inundation from Hurricane Irma in September 2017. The presence of *P. lunzi* in these saline conditions indicate that this species can survive in mesohaline habitats. These results indicate that crayfish species can tolerate high salinities for a short period of time, but chronic exposure may have negative effects on their survival.

Overview of the Pinecrest Gardens Renovation Project

Gestring gave a PowerPoint presentation entitled "Eradication of Bay Snook and Blue Mbuna – A "Silver Lining In Every Hurricane" Story. In 2014, non-native cichlids (*Petenia splendida*) "red bay snook", were reported in an isolated series of waterways at Pinecrest Gardens in Miami-Dade County. The fish are large, fish-eating cichlids from Central America. If they escaped into the wild, they could potentially cause harm to South Florida's native fish communities. Representatives from FWC and Everglades National Park met with the horticulturist at Pinecrest Gardens to collect specimens for identification and assess the risk of release. The main concern was that the bay snook might escape from the network of ponds and streams into the Snapper Creek Canal via an overflow drainage culvert. Also, the species was reproducing in the koi pond and interconnected network of streams and ponds. Other varieties of common non-native fish species were also observed on the premises. The property had a long history of illegal dumping of non-native fish. An ECISMA early detection/rapid response workday was planned to remove non-native fish, except for a number of highly-prized koi, pacu, redtail catfish, and an iridescent

shark that posed no escapement problem. This made it difficult to eradicate the targeted species without harming other native and exotic species.

On August 19, 2014, 15 members of ECISMA met at the gardens to conduct the removal effort. The koi pond was drained, and fish were removed by seining and dip-netting. Four species of non-native fish were removed, mostly bay snook and Jack Dempsey. An "upside down catfish" was also removed. The interconnected waterbodies were more challenging. The water level had risen, all the channels connected, and the pond was deeper. The fish had access to many more hiding places. A variety of methods to collect fish were tried such as seining and cast netting, with little success. Separating the koi, pacu, tarpon, and other large fish from the areas was attempted, but was not very successful. Cast netters had some success when the seiners pushed the fish into shallow, snag-free areas. Minnow traps and small fyke nets were deployed and fished overnight. Bay snook were collected, along with a variety of small native fish species. Spotted tilapia were also removed. Overall, 302 pounds of non-native fish comprised of eight species were removed, along with 242 pounds of spotted tilapia and 39 pounds of bay snook. An electrofishing crew sampled the freshwater section of Snapper Creek Canal to look for bay snook and other non-native fish species. No bay snook were found. The overall fish abundance was low. The removal effort eradicated bay snook from the koi pond, and reduced their numbers in other streams and pond. Spotted tilapia numbers were substantially reduced as well. The potential risk for bay snook to escape into the Snapper Creek Canal remained. Draining the koi pond by Pinecrest Gardens staff periodically removes all unwanted exotic fish.

From May 2016 to March 2017, monitoring was limited to seining, minnow traps, backpack electrofisher, and hook-and-line due to the presence of a high value of non-native fish such as koi, pacu, redtail catfish, etc.

On September 10. 2017, Hurricane Irma hit. There was lots of vegetation in the water bodies, loss of power, and flooding. Koi, pacu, and catfish swam out of the ponds and died when the water dropped and stranded them on land. The bay snook moved into the waterfall pond, and the blue mbuna stayed put. It was decided to renovate the waterways containing the bay snook using rotenone, a plant-based, biodegradable compound commonly used to remove unwanted fish. The renovation was conducted in November 2017 by staff from FWC and the USGS. Fish were collected for three days. A total of 158 bay snook, and 1,019 other non-native fish were recovered after the treatment. These other species included spotted tilapia, black acara, and blue mbuna. Several walking catfish survived.

In follow-up sampling, no bay snook were observed. The renovation was considered successful. Native fish have now been restocked. Prevention messaging has been done, and the connection to Snake Creek has been restored. The site will be checked again in November 2018.

Wild Spotter: Mapping Invasives in America's Wild Places

Chuck Bargeron gave a PowerPoint presentation entitled "Wild Spotter – Mapping Invasives in America's Wild Places". The Wild Spotter Mission aims to protect America's wild places from invasive plants, pathogens, and animals which outcompete native species, and threaten the biodiversity and health of every aquatic and terrestrial ecosystem. Wild Spotter engages and empowers the public to help find, map, and prevent invasive species in America's wilderness

areas, wild rivers, and other natural areas. There are currently 12 pilot national forests throughout the US in the program.

Wild Spotter has four components. The National Website component contains the project overview, identification materials, survey, inventory, and mapping protocols, citizen science volunteer recruitment and coordination, and customized site information with access and contact information, maps, and invasive species list. The EDDMapS (Early Detection & Distribution Mapping System) is a web-based mapping system for documenting invasive species distribution, and is uniquely designed for the project, has supporting information for use by volunteers in the field, and smartphone apps for data collection. The Marketing and Promotion component deals with networking and list-serves, media, presentations at conferences and tradeshows, and targeted marketing to diverse groups. The Volunteer Recruitment and Coordination component deals with partnerships and recruitment at all levels, Citizen Science Program Connection, USFS Volunteer Program Connection, working with Corps Network and other conservation corps partners, and recognition and support. To become a Wild Spotter, people register either online or download the Wild Spotter app on their smartphone or other mobile device. When invasives are "spotted", the location, etc. is entered into the app and a picture can be uploaded. Volunteers are also recruited to map invasives. Wild Spotter Partners partner with non-profit and for-profit organizations and agencies across all levels of government universities, and communities. Additionally, Partners benefit through logo placement in print advertisements and promotional items.

In addition to the Wild Spotter website, there is also a Wild Spotter Facebook page, promotional brochures, stickers, posters, and rack cards.

Update on New Introductions

Neilson gave a PowerPoint presentation "New Nonnative Species Occurrences and NAS Program Updates". From April 1, 2018 – October 18, 2018, there have been new nonnative occurrences of 16 plants, eight mollusks, 14 fish, 5 herps, two crustaceans, and one mammal. A brown hoplo was discovered in Charlton County, Georgia in the St. Mary's River, near Folkston. Giant applesnail were discovered in the Sam Rayburn Reservoir in Texas and south Louisiana. Clown anemone fish were captured in Pinellas County, FL in Fred Howard Park, and given to the Clearwater Aquarium. A potential breeding population of Cuban treefrogs was reported in Saint Rose, LA. There is an established population in New Orleans, which was discovered in 2017. It is the first established population outside of Florida. Eggers' Nutrush, a new plant to the U.S., is established in the Everglades. Tropical nutrush is new to a county and drainage in Florida. Chinese mysterysnail is new to the state of South Carolina. Its status is unknown, but multiple specimens were found. Redtail catfish is new to the state of North Carolina. Its status is failed. There are two new alerts for red swamp crayfish for Georgia. They are new to Floyd County in the Upper Coosa Drainage. Their status is unknown. They are new to Coffee County in the Satilla Drainage, and have an established population there.

New developments and products have been created. The Alert Risk Mapper (ARM) attempts to identify the risk of spread associated with new introductions, and provides Maps as images, along with emailed alerts. The Flood and Storm Tracker (FaST) provides a timely assessment of the potential spread of NAS in flood impacted areas, and provides a tool for natural resource

managers to inform NAS survey efforts. Nonindigenous Aquatic Species Flood and Storm Tracker (NAS FaST) Maps were created to help assess the transportation of nonindigenous aquatic species between drainages due to storm sure and inland flooding. As part of the EDRR system, the NAS program alerts managers of these possible new introductions.

Flooding from Hurricane Michael in 2018 helped spread giant applesnail in the Florida panhandle. Flooding from Hurricane Michael in 2017 helped spread silver carp in coastal Texas.

Discussion of ANSTF Recommendations

Recommendation: Ask that other federal agency members of the Task Force participate in the monitoring effort for Cuban tree frogs in the southeast region, and assess if it is an isolated issue or if there are other established populations besides the two isolated locations in Louisiana. **Knott made a Motion to approve the recommendation**. **McMahon seconded. The Motion was approved.**

Discussion – Instituting Panel Conference Calls between Meetings and Panel Membership

Ballard stated that some other panels have instituted in-between meeting conference calls, and he would like to institute them for the GSARP. The conference calls would be around January and July, and focus on action items from previous meetings. Several members stated that they have found them useful for other committees, etc. that they are/were members of. **Gonzalez** asked how the topics would be chosen for the calls. **Ballard** stated that following up on action items from the previous meeting would be a standing item, and he would call the members if there were any new issues that needed to be addressed to the full membership.

Kingsley-Smith asked if this could be an opportunity to reinvigorate some of the working groups, and address action items that could be worked on between the conference calls and next meeting. **Ballard** agreed, and stated that the work groups floundered probably because their goals were very large and out of reach. It would be better if specific action items could be targeted, and one issue at a time addressed, and then move on. **Knott** asked if the conference calls would be restricted to panel members only. **Ballard** stated that if the membership wanted to invite a speaker to participate, it would be allowed. **Gonzalez** asked the panel if they wanted to institute the conference calls beginning in January 2019. The panel agreed. **Kingsley-Smith made a Motion to institute panel conference calls beginning in January 2019 to strategize and prioritize action items to address priorities ahead of the next panel meeting. Hartman seconded. The Motion passed.**

Ballard spoke on panel membership status. Several members have stated that they will be stepping down from the panel. The panel membership list was provided to everyone in their meeting folders, and the members discussed the status of membership. The USDA, FDA, and Navy memberships are still vacant. **Leigh McDougal** is retiring from the USDA Forest Service at the end of October 2018. **Ballard** has contacted the Task Force about getting a replacement for the Forest Service seat. **Ballard** will contact **Bobby Reed** from Louisiana DWF about his possible retirement. **Mike Pursley** is the new permanent member for Mississippi DMR, and replaces Rick Burris, who stepped down. **Ballard** spoke to **Steven Rider**, who said that his other job activities have kept him from attending meetings, but he will soon be able to participate again. **Jim Page** is the new member for Georgia DNR, and replaces Tim Bonvechio. **Ballard**

spoke to **Chris Page**, and he is possibly retiring. **Lad Akins** is no longer with REEF. That seat on the panel was non-standing, so it does not have to be replaced. **Linda Walters** is stepping down from the panel due to not receiving funding in the last several years to do invasive species research. The university seats are non-standing, so they can either be re-filled or eliminated. **Ballard** has not heard from Herb Kumpf in quite some time. After an online search at the meeting, it was learned that he had passed away on December 17, 2016. **Kingsley-Smith** asked what the process would be to refill or research a seat on the panel. **Ballard** stated that to establish a non-standing seat, a recommendation would be made and approved by the panel. The non-standing seats serve for two years, after which the panel chooses whether to keep the seats for longer. **Gonzalez** asked if members could submit nominations for membership. **Ballard** stated that this could be done, and then it would be brought up to the full panel for a vote. **Riecke** asked if the non-standing seats should be re-filled. **Ballard** stated that the university seats are important to have, and would be beneficial to the panel. If there is someone from an organization, etc. who could be beneficial to the panel, then non-standing seats can be filled. **Hartman** stated that she would like to search for an economist to serve on the panel. Also, an active member of the Coast Guard.

Ballard stated that the panel membership could be added to the January 2019 conference call. Members can email their information for nominations to James before the conference call, and he will share it with the full panel for review.

Hartman requested that an honorarium be created for Herb Kumpf for the Traveling Trunk. The members agreed, and ideas will be discussed.

The Chairman again provided the opportunity for public comment. No comments were received.

Wednesday, October 31, 2018

The meeting reconvened at 8:30 a.m. The Chairman again provided the opportunity for public comment. No comments were received.

Discussion about the Panel's Website Redesign

Ballard stated that not much has changed with the new website since the last meeting. Website content needs to be reviewed to see if it is still relevant. **Neilson** spoke on the USGS spatial query map that was added to the GSARP website. It is preloaded with a polygon that defines the GSARP region. Some of the search fields include species, genus, state, county, drainage name, year, status, pathway, freshwater/marine, exotic/transplant, etc. A polygon can be drawn on the map that will show invasive species in the region selected. The area can be zoomed in on that shows individual colored dots of clustered specimen records. Records of species coordinate with a dot color. Clicking on the species link brings up detailed information about that species. Data can be downloaded.

Ballard reminded the panel that at the last meeting, it was suggested that a database of research reports and publications be added to the website. **Ballard** asked the members to send them to him so they can be added to the database. It was also suggested that state ANS management plans be put on the website. **Ballard** will put the management plans into a database on the site.

Pasko stated that it would be helpful to the Task Force if the management plans were on the website so that the Task Force could link to the database. There was also a suggestion to provide links to various state's websites for their invasive species lists. **Ballard** asked that those lists be provided to him. Another suggestion was a top 10 priority list of the highest invasive species of each state, and compiling them into ranks from highest to lowest. **Ballard** needs a prioritized list from each state. **Ballard** asked **Williams** if final FWS reports for the small grants program research could be put onto the website. **Williams** stated that since GSMFC administers the grants, there would not be a problem with putting the reports on the website. She is administering the grants that are for federal agencies. Those reports could be put on the website as well. One of the things that FWS has asked **Williams** to do is that if there is reporting that is not going to contribute to some sort of literature-reviewed publication, then they want to see those. Their science committee is trying to get a grip on everything that is not published that may contain very good information that their managers could use for a variety of different reasons, depending on what the issue is. If it is peer-reviewed literature, then they can find it, but if not, they want to see those. **Fuller** agreed that it would be a good idea, due to the fact that when FWS gives USGS a grant to deliver a product, USGS is not allowed to post it. **Williams** will send the reports to **Ballard** and he will post them.

The panel's website redesign will be a topic of discussion on the January conference call.

Region 4 USFWS/Small Grants Program

Williams reported that $154,235 has been awarded in 2018 for the small grants program. Requests for 2019 funding will be submitted in January or February 2019, assuming there is a budget by then. In the past, grants were modified. They have up to five years to continue to add funding. With the new approval, it was assumed that the time for state grants would be increased, so they issued all new state grants in 2018, with the exception of Mississippi. What poses a challenge is that at the end of the five-year period, a new grant must be done. FY18 was the last year that FWS could fund the existing grant with GSMFC for the small grants program. A new grant must now be done for FY19.

Ballard reported that from 2014 to 2016, 26 projects have been funded, for a total of $556,000. In 2018, seven projects are being funded – one with the USGS, which **Williams** will be administering. The other six projects are with universities, which **Ballard** will be administering through GSMFC. Most will end in 2020.

Aquatic Nuisance Species Task Force Update

Susan Pasko reported that there are 43 approved state ANS management plans – 40 state, and three interstate. The Task Force is chartered under the Federal Advisory Committee Act (FACA), which provides the ANSTF with its core structure, and ensures an open and public forum for its activities. FACA requirements are: FACA database on the internet is maintained from which advisory committee information may be obtained; quarterly membership updates are provided; all ex-officio members are cleared through the Department of the Interior vetting process; public notice of all ANS Task Force meetings and applicable documents are provided; the ANS Task Force charter is renewed every two years.

On June 12-14, 2018, the ANS Task Force held a meeting in Silver Spring, MD. The focus was on strategic planning. Pasko provided the panel members with copies of an outline of the Guiding Principles and Goals, as identified during the June 2018 ANS Task Force meeting. Also discussed were the USGS NAS, Asian carp, ballast water, and Habitattitude. The Goals Team identified priorities and strategies to further advance the Task Force mission. On October 15, 2018, a teleconference was held, and members discussed the refined list of goals, objectives, and strategies. An outline was distributed on October 24, 2018. A draft plan is anticipated for mid-November.

The next ANS Task Force Meeting will be held December 12-14, 2018 in Falls Church, VA. The content of the draft ANS Task Force Strategic Plan for 2019-2014 will be discussed. Also planned will be drafting the ANS Task Force report to Congress for 2016-2017, drafting bylaws and committee structure, and holding break-out sessions to refine and prioritize outputs under the new Strategic Plan. Future meetings will be held in May (regional location) and November (Washington, D.C.)

Pasko provided the panel members with copies of an outline of the Strategic Plan for 2019-2024. The six Strategic Goals are: Coordination; Prevention; Early Detection/Rapid Response; Control/Restoration; Research; Outreach and Education. Under each goal, there are three objectives that provide detail about how each goal will be accomplished. Each objective has a list of strategies that will be completed. Pasko encouraged the panel members to review it and provide feedback to her.

Ballard emailed a Word document out to the panel members that provided a summary of what the Task Force is considering in terms of their next five-year strategic plan.

State Reports/ Members Forum

Alabama

The latest invasive observed in Alabama's marine waters was an Amazon Red Tail Catfish in July 2016. The specimen was collected in a recreational crab trap at a private dock on the Bon Secour River.

Asian Tiger shrimp continue to be of heightened concern. From 2006-2009, their distribution was primarily restricted to Alabama's southern inshore waters. However, its distribution extended to northern Mobile Bay and into Perdido and Wolf Bays in 2011. These confirmed reports indicate that Asian Tiger Shrimp occurs within all of Alabama's primary estuary basins. Fewer validated reports were received in recent years from commercial shrimpers, but AL MRD personnel communications with commercial shrimpers indicate a significant abundance of tiger shrimp within Alabama waters.

Red Lionfish have successfully colonized the Gulf of Mexico waters offshore of Alabama. Two spearfishing tournaments have recently been held to specifically target red lionfish. A weekend-long tournament, "Lions on the Line", was held at FloraBama during 2016. A total of 1,662 lionfish were harvested. A summer-long tournament, "Alabama Lionfish Challenge", was held

from May 26, 2018 – September 3, 2018. The recreational division harvested 540 lionfish, and the commercial division harvested 278 lbs. of lionfish.

Florida

Gestring reported that the 4th Annual Lionfish Removal and Awareness Day was held May 19-20, 2018 in Pensacola, FL. Over 2,000 people attended the event. Visitors got to taste lionfish, watch fillet demonstrations, participate in family-friendly games, and much more. Over 15,000 lionfish were removed from Florida waters. In 2018, participating divers in 19 derbies held around the state removed over 18,000 lionfish during these events. From 2014 – 2018, 95,000 lionfish have been removed from Florida waters.

The Lionfish Challenge began May 19, 2018 and ran through September 3, 2018. Recreational and commercial divers compete for prizes for removing the most lionfish. Participants qualify for prizes based on the number and weight of lionfish removed. The title of "Lionfish King" or "Lionfish Queen" is given to the recreational and commercial diver removing the most weight of lionfish. Over 28,000 lionfish were removed by 132 recreational divers, and 23 commercial divers.

In 2018, the FWC launched a new contest featuring tagged lionfish. FWC staff tagged and released these lionfish on 50 randomly selected public artificial reefs in depths of 80-120 feet. Divers who remove a tagged lionfish can win valuable prizes, including GoPro cameras and Engle coolers, or cash awards ranging from $500 to $5,000. As of September 1st, 27 divers have submitted 56 tagged lionfish.

Two new state records for heaviest lionfish collected by pole spear were set as of September 4, 2018. The new Atlantic record weighed in at 3.10 pounds, and the new Gulf record weighed in at 3.38 pounds.

A Lionfish Risk Screening study has been completed. The primary goal of the study was to evaluate the risk of invasion of lionfish in the genera *Dendrochirus*, *Parapterois*, and *Pterois* (excluding red and common lionfish) using the Aquatic Species Invasiveness Screening Kit (AS-ISK). University of Florida researchers completed bio-profiles for 19 lionfish species, and the AS-ISK risk screening tool was applied to 14 species of ornamental lionfish. The risks of lionfish in the ornamental trade are low, with the exceptions of *P. rusellii*, *P. lunulata*, and *D. brachypterus*. Elevated invasion risk was identified for these three species. The FWC will use results from these risk screens to determine the most appropriate management strategies to mitigate potential impacts from this group of fish.

A Marine Fish Risk Screening has been completed for Pomacentrids (damselfish). Damselfish are one of the most important marine ornamental fish groups. Over four million of these fish are imported annually into the U.S., representing approximately 40% of all marine ornamental fish imports. In July 2018, the FWC's NFWP executed a 1-year contract with UF to produce bioprofiles for the top nine species based on trade volume, plus Spiny Chromis and Regal Demoiselle. Regal Demoiselle is established in the western Gulf of Mexico, and is spreading east towards waters off the Florida Panhandle. The Regal Demoiselle represents the only other established marine fish in the tropical western Atlantic besides lionfish.

In November 2016, the FWC partnered with Fishbrain AB, the world's largest free-to-useapp for anglers, to collect information on nonnative freshwater fish. To date, the FWC has received over 3,000 nonnative fish reports.

The 9th Annual Everglades Cooperative Invasive Species Management Area (CISMA) Nonnative Fish Round-Up was held April 27-28, 2018, 2018. This event utilizes anglers to gather distribution information, and promotes the consumptive use of nonnative freshwater fish. Anglers caught 1,826 fish (18 species). No new nonnative species were caught.

From April and August 2018, FWC's NFWP staff served as weigh masters for three Catch, Keep and Kill Bullseye Snakehead tournaments. A total of 126 anglers participated in the tournaments, catching 368 bullseye snakehead.
Bioprofiles and Fish Invasiveness Screening Kit (FISK) v2 risk screening were completed for five species of large nonnative catfish found in the aquarium trade: Goonch catfish, redtail catfish, spotted sorubim, barred sorubim, and tiger sorubim. The FISK scores ranged from 3 for redtail catfish to a high of 9 for spotted sorubim. Based on the FISK v2 calibrated value, all species fell in the medium risk category.

A recent federal court ruling increased the risk of invasive "injurious" species being brought into Florida through interstate transport. To determine the level of risk associated with these species, risk screenings will be conducted on 10 freshwater fish species: Crucian carp; Largescale carp; Prussian carp; Wels catfish; Eurasian minnow; Stone moroko; European perch; Roach; Amur sleeper; and zander. A single species of salmonid (Atlantic salmon) will also be evaluated. The Florida Department of Agriculture and Consumer Services has recently begun to issue authorizations to certified facilities to possess, culture and sell Alligator gar if they originated from outside Florida.

African clawed frogs were discovered in the Riverview area east of Tampa in 2013-2014. Several attempts have been made to eradicate them from ponds in this area, but all were unsuccessful. The ponds were treated with hydrated lime. Surveys were conducted on 117 additional water bodies and 11 new ACF infested ponds were discovered. Management strategies have shifted to removal using trapping with b-style minnow traps. These traps have resulted in the removal of 20,441 tadpoles and metamorphs. The FWC has contracted with the University of Central Florida to study disease ecology, populations genetics and environmental detection of DNA to understand potential impacts of the ACF population in the Tampa Bay area.

The 1st International Snakehead Symposium was held July 18-19, 2018in Alexandria, VA. Presentations on distribution, biology/ecology, monitoring/response, and management/control were given. The consumptive use of Northern snakehead was emphasized as the hotel chef prepared and served four different dishes to attendees.
Python Removal Permits (PRPs) again comprised most of the permits issued during the March/April 2018 through August 2018 period. A total of 50 PRPs were issued.

The 2018 Lionfish Summit was held in October 2018. Three main themes were discussed: Policy & Regulations; Control Efforts/Research & Monitoring; Education & Outreach. A discussion on the findings will be provided in the April GSARP report.

The next Nonnative Fish Slam is scheduled for November 2018, and will focus on the L-67A/L-29 canals to sample for bullseye snakehead, based on a positive eDNA finding in urban canal systems in Miami-Dade and Broward Counties.

The FWC is hosting a series of five workshops to gather public input on proposed changes to rules relating to nonnative species.

Phillips reported that they are continuing to deal with water hyacinth and water lettuce in South Florida with rising waters in Lake Okeechobee, and increases in the hydrilla population on the Harris Chain in central Florida. These have been the two largest expenditures this past year. Small populations of *Salvinia molesta* and *Azolla pinnata* in several locations around the state continue to be treated. Exotic *Sceleria* and *luziola* are being treated wherever they are found.

A population of *Egeria najas* in central Florida was successfully treated, and no live plants have been seen following the treatment. Follow-up monitoring will be done to ensure complete eradication has occurred.

A management exercise with in-house staff and cooperators was recently completed to provide an educational and working document to partners as a "base of knowledge" on some of the more common plants that are treated in the aquatics program. **Matt** provided copies of the working draft from the effort for review, and asked for feedback from the members.

Georgia

Page reported on the Satilla River Flathead Catfish Removal Project. During the current 2018 sampling season (May-October), 4,124 flathead catfish have thus far been removed. Since 2007, more than 71,862 flathead catfish have been removed. It appears that a high-water period from 2012 until 2014 helped the flathead population rebound, but continued removal efforts have since resulted in reduced catch per effort (CPE), TL, and biomass caught. In 2018, the river has remained flooded, and now CPE has increased.

An angler in Charlton County caught a Brown Haplo in the St. Mary's River on 9/24/18. Unfortunately, the fish was released back into the river.

In 2011, seven Blue Catfish were caught during sampling in the Satilla River. In 2014, two were caught in creel. There was an explosion in recruitment in 2016, with 225 harvested. In 2017, 379 fish were caught. Continued monitoring and removal of this species will occur, along with flathead catfish removal efforts.

In February, an occurrence of Giant Salvinia was positively identified after a concerned citizen brought in a plant to the Richmond Hill hatchery. It came from a Tattanal County pond, but the citizen refused to reveal the location out of fear of retaliation by the property owner. A total of 32 ponds were checked in Tattanal and Toombs County, but the pond has not been located.

The traveling trunk was used at the Blackshear Elementary 4H Day in November 2017. Approximately 250 students and 20 adults viewed the trunk. The python skin was a big hit.

Mississippi

Freshwater report:

Riecke reported that in Ross Barnett Reservoir, 604 acres of Water Hyacinth, Cuban Bulrush, Giant Cutgrass, and Alligator Weed were chemically treated. To limit the spread of Giant Salvinia in Ross Barnett Reservoir, containment booms were deployed, and nets placed in Pelahatchie Bay to prevent boating access in this area. In Pelahatchie Bay, Hydrilla and Giant Salvinia were chemically treated.

Four one-acre rotenone sampling fish population assessments were conducted to assess the effect of Silver and Bighead Carp on native fish density, biomass, and population composition.
A Vemco receiver was deployed in Pickwick Lake in the Tennessee-Tombigbee Waterway to track tagged Silver Carp.

Funding requests were submitted to the USFWS to use federal ANS funds for contract fishing to remove Asian Carp from Pickwick Lake; invasive aquatic plant identification and treatment sheets; invasive aquatic plant surveys of public waters.

A new occurrence of Giant Salvinia was found in Pickwick Lake and the Pelahatchie Bay.

The Stop Aquatic Hitchhikers brochure will be revised to include more species that are present in Mississippi.

Fishing bait regulations will be composed to specify what bait can be legally sold, possessed and transported and used in Mississippi.

An EDRR monitoring program comprised of state and federal personnel who sample aquatic species in Mississippi public waterways on a routine basis will be established.

A revision to the *Mississippi State Management Plan for Aquatic Invasive Species* is being worked on.

MDEQ personnel generated a map of where 50 Northern Snakehead awareness and reporting signs were posted at Mississippi and Yazoo River Basin boat ramps.

Saltwater report:

Pursley reported that a program of integrated pest management and spot herbicide application was used to treat populations of common salvinia, giant salvinia, alligator weed and water hyacinth. Salvinia weevils that have consistently helped to reduce giant salvinia population levels since 2009 do not appear to have survived the winter of 2017.

In an ongoing effort to control an infestation of giant applesnail from the Pascagoula River, 8,507 giant applesnail egg masses were destroyed, and 333 live snails were removed from the

river. The snails were first discovered in 2014. After two river flooding events, giant applesnails have recently been detected in a previously un-infested area upstream of the current location. Control efforts have been initiated.

Two monitoring stations for early detection of Cuban treefrog were established. Areas at or near campgrounds were chosen for monitoring, as the Cuban treefrog has been observed to hitchhike on recreational vehicles. No frogs have been detected to date.

Invasive species seminars were presented at two USM-sponsored teacher-education workshops and at a conference hosted by the MS Urban Forest Council.

The Mississippi Department of Marine Resources, along with the Gulf States Marine Fisheries Commission and US Fish & Wildlife Service, hosted the first Jimmy Sanders Memorial Lionfish Challenge from May 26 – September 3, 2018. Twenty-nine fish were reported by six anglers. Sponsors provided monthly prizes for Overall First, Second and Third Place for most lionfish entered. Entry was free.

North Carolina

Flora reported that there have been at least five new infestations of yellow floating heart. Several infestations are already being managed across the state. One small infestation in Cumberland County was treated with herbicides in September. The source of the infestation is believed to be from a large koi pond in a yard uphill from the lake. That pond was also treated with herbicide. Three farm ponds in Moore and Lee County have been reported to NCDA as being infested with yellow floating heart. A fall 2018 herbicide treatment is planned. Another site was discovered in Lake James in Burke and McDowell County. Hand removal was attempted by volunteers on the lake. The result was minimally successful, and NCDA will be monitoring progress. In Macon County, an infestation was found at a commercial nursery specializing in aquatic plants. The owner was made aware that it is illegal to possess the plants. Even if they are not selling them to the public. An eradication plan was made, and progress will be monitored.

The 2018 work plan for the Aquatic Weed Control Program includes 60 projects across the state. Total available funding is $500,000 for FY 2017-2018.

In Lake Waccamaw, 2018 marked the sixth consecutive year of a large-scale herbicide treatment with fluridone. Hydrilla growth has been completely suppressed by the treatments, and there is no evidence of new tuber production.

A large section of the Eno River was treated with fluridone in 2015-2016 to control hydrilla. The treatment was expanded to 22 miles in 2017, and a repeat of that treatment occurred in 2018. Four consecutive years of treatment has resulted with significant control of hydrilla growth, with minimal to no impact to non-target plant and animal species.

Lake Norman is once again infested with hydrilla. The first infestation was in 2002. An aggressive grass carp release quickly reversed hydrilla, and by 2004 it was completely suppressed. In 2017, hydrilla was seen in a different part of the lake. A survey was done in the fall of 2017, and it was estimated that there was ~500 acres of hydrilla isolated to one are of the

lake. In spring 2018, 10,200 grass carp were released. As of September 2018, hydrilla is impacting several marinas, and causing concern within the community.

Mystery snails were documented at Lock & Dam 1 on the Cape Fear River in May 2018. This is the first record in a mainstem river in that basin. They were collected by NC Wildlife Resources Commission biologists.

A Florida gar was captured by an angler in the Cape Fear River near Lillington, NC in July 2018. Since the Florida gar's natural range extends from the Savannah River, SC through peninsular Florida, and north and west to the Ochlockonee River, it is assumed that the gar was an unintentional/illegal release.

Hydrilla was documented in the Deep River (Cape Fear Basin) by researchers from NC State University.
In 2017, there were no reports of tiger shrimp. In 2018, tiger shrimp seem to be abundant in NC. Reports have been received for the 2018 season. Three fishermen have reported tiger shrimp in catches. One fisherman brought four shrimp to DMF staff, and stated that he caught at least 10 tiger shrimp so far this year. In 2012, tiger shrimp was added as a code in the state trip ticket program.

Blue catfish ranges in NC have been expanding over the years, and commercial landings have been increasing. The NC Wildlife Federation is concerned with expansion in NC, especially into the lower Pamlico and Neuse Rivers. The NC Division of Marine Fisheries has partnered with SeaGrant and NC Wildlife Resource Commission in monitoring blue catfish in the state.

Flathead catfish appear to be moving upstream in several watersheds in the Tar River and Neuse River basins, and are likely cause for the decline of the Carolina Madtom. Recent analysis shows that the Carolina Madtom is below detectability levels in areas with known flathead catfish populations. The US Fish & Wildlife Service Sport Restoration Grant has funded a non-native catfish project in the Cape Fear which will begin in 2017. The study will look at habitat and prey selection of flathead catfish.

A redtail catfish was caught in the Chowan River by a commercial fisherman. The fish weighed over 40 pounds. This was likely an isolated incident due to escapement or releasement from captivity.

Discussion and meetings have begun to place more interest and energy into phragmite mapping and control. An action plan was developed in an effort to enhance, promote, and restore living shorelines. A workshop will be held in 2019 on Restoring America's Estuaries.

With a new administration, conversation has been renewed on the status of the NC Aquatic Nuisance Species Management Plan that was drafted in 2014-2015. The group that authored the plan (steering committee) reconvened in July. The document is being reviewed/edited. The group intends to gain support from state agencies, and ultimately have the Governor submit it to ANSTF.

South Carolina

Kingsley-Smith reported that the South Carolina DNR Crustacean Research and Monitoring Section recently received funding from the USFWS State and Interstate Aquatic Nuisance Species Management Plan Program (SIANSMP), in part to conduct a research project entitled "Assessment of the current distribution of the island apple snail *Pomacea maculata*, in West Ashley and its potential to invade the estuarine habitats of the Ashley River, South Carolina". Biologists will re-survey a system of stormwater ponds in a suburban neighborhood in Wes Ashley, SC, which was previously surveyed by SC DNR biologists in 2015. Since then multiple hurricanes, tropical storms, and an extreme cold weather event in January 2018 have occurred in the area that could have impacted the distribution and abundance of the *P. maculata* populations at the location. This neighborhood is located less than two miles from the Ashley River, so assessing the potential risk of the island apple snails to invade this river is very important.

In October 2018, four stormwater ponds in the West Ashley area were surveyed. All ponds surveyed contained established populations of island apple snails. A total of 360 adults and 1,939 egg clutches were counted across the four ponds. This indicates increases in abundance estimates in all four ponds, compared to the surveys conducted in 2015. Field surveys for the project will continue through fall 2018 and spring/summer 2019.

Manuscripts on the island apple snail, derived from the College of Charleston M.S. research conducted by Elizabeth Underwood, have been submitted for publication: Salinity tolerance of invasive island apple snail, *Pomacea maculata*, hatchlings in South Carolina, USA. *Journal of Shellfish Research* (in review); Population genetic structure and diversity of the invasive island apple snail, *Pomacea maculata*, in South Carolina and Georgia, USA. *Journal of Shellfish Research* (in review).

The SC DNR Crustacean Research and Monitoring Section recently received funding from the USFWS SIANSMP, as well as a 3-year award from the USFWS State Wildlife Grant Program, to address questions related to the recent spread of *Procambarus clarkii* in the state, impacts of *P. clarkii* on native crayfish species, and dispersal patterns of *P. clarkii* in the northeastern part of the state in the Waccamaw and Pee Dee River drainages. Surveys in the coastal plain of South Carolina and North Carolina by South Carolina DNR biologists show multiple new records of *P. clarkia* in areas where native crayfish species and priority conservation species such as the Waccamaw crayfish were previously observed. Researchers are concerned that *P. clarkii* is displacing native crayfish species throughout this region. As part of the USFWS State Wildlife Grant-funded project, SC DNR researchers will seek to better understand the potential dispersal pathways leading to the recent expansion of *P. clarkii*. Population genetic structure, both within and among watersheds that have been invaded by *P. clarkii*, will be investigated using microsatellite genotyping techniques. Genetic Microsatellite markers have been shown to be highly effective at distinguishing human transport from post-introduction dispersal events in *P. clarkii*.

Two nonnative species of crayfish, *Faxonius virilis* and *Faxonius rusticus* are currently established in North Carolina only a few miles from the North Carolina-South Carolina border in the Broad River and Catawba River watersheds, but have not previously been reported in South Carolina. In July 2018, SC DNR biologists, in collaboration with the Catawba Indian Nation,

surveyed a region of the Catawba River located on the Catawba Indian Nation Reservation and collected specimens of *Faxonius virilis*, confirming the presence of this invasive species for the first time in South Carolina. With recently acquired funding, SC DNR biologists will survey stream wetland, and lake habitats in the Broad and Catawba River watersheds, near the North Carolina/North Carolina border, for both *Faxonius virilis* and *F. rusticus* to gain a better understanding of the current distribution of these species and their potential impacts on native species. The Catawba Indian Nation will also continue to be engaged to help them monitor their reservation lands for the invasive species of crayfish.

The redeye bass (Bartram's Bass) in the Savannah Basin is one of three priority species included in the National Fish and Wildlife Foundation's Native Black Bass Initiative (NBBI). They have been listed as a species of highest concern in SC DNR's State Wildlife Action Plan. This listing is primarily due to the effects of hybridization with the Alabama Bass, which was introduced into the reservoir systems in the Savannah River basin in the 1980s. Since then, hybridization between the two species in the reservoirs has been documented in the field and confirmed by genetic analysis. In recent years, SC DNR biologists have captured Alabama Bass and hybrid individuals in riverine habitats upstream of the reservoirs, while pure *M. coosae* individuals are increasingly confined to smaller rivers. Previous work by the SC DNR has documented that *M. coosae* populations are diminishing due to introgression with *M. henshalli*. The SC DNR Marine Resources Research Institute's Population Genetics Team is collaborating with SC DNR Wildlife and Freshwater Fisheries and Clemson University staff and students to address issues to fill knowledge gaps, and inform management decisions aimed at securing self-sustaining pure populations of *M. coosae*. Snorkel surveys were performed in eight tributaries to the upper Savannah during summers of 2017 and 2018 to quantify nesting microhabitat use of redeye bass, and egg samples were collected for quantitative PCR genetic analysis at 160 detected nests. Genetic analyses of eggs and individuals have been completed from 50 of these sites, and revealed that *M. coosae* were present at 33 sites, with hybrids present at 21. During the past summer, the SC DNR Marine Resources Research Institute's Population Genetics Team has been collaborating with FL WRC staff to transition from the use of hydrolysis probes to microsatellite-based identification of hybridization in these species. Work on the optimization and testing of the marker panel in the lab is ongoing, and anticipated to be completed early next spring.

Researchers at the SC DNR Marine Resources Research Institute (MRRI) remain interested in improving understanding of the invasion of the South Atlantic Bight, and the Gulf of Mexico by the Asian Tiger Shrimp (*P. monodon*). Levels of reporting and concern over this species continue to decline since their peak in 2011. The total number of reports to date from South Carolina is 456 specimens. The size range is from 61 to 330 mm TL. The cold weather in January 2018 may have negatively affected *P. monodon* in SC waters, given its Indo-West Pacific native range. The first tiger shrimp report in 2018 did not occur until July 11th. The first seven reports all consisted of reports of single individual tiger shrimp caught aboard small vessels or from the shore, with locations ranging from Georgetown, SC to Hilton Head, SC. Only five of those specimens were donated to the SC DNR. The most recent and only commercial report consisted of eight tiger shrimp caught off Cape Romain and Bulls Bay, SC. One of the shrimp appeared to exceed the typical size range (250-280 mm TL) of these offshore-derived specimens collected by commercial shrimp trawlers.

A manuscript entitled 'Development of a qPCR tool for the environmental detection of *Anguillicoloides crassus*, an invasive pathogenic parasite in the American eel, *Anguilla rostrata*' was submitted to the journal *Management of Biological Invasions* for hopeful publication. This will be a very useful early detection field tool.

Texas

McGarrity reported that at the January 2019 TPW Commission Meeting, staff will request permission to publish proposed rule changes in the Texas Register for review as a full repeal and replace. Full repeal is required due to reorganization of sections and substantive changes related to tilapia. Other changes to be proposed include addition of injurious Lacey-listed fish/shellfish to the prohibited list. Current regulations regarding tilapia aquaculture allow possession, transport, and pond stocking of Mozambique tilapia without a permit. Sale of any tilapia and culture of blue, Nile, or hybrids requires a permit. A spatial conservation assessment was conducted to help inform potential directions for regulatory review and revision. The assessment considered potential impacts and habitat degradation, historical records of tilapia distribution, tilapia climate match, and potential economic losses of conservation actions and tradeoffs between priorities. A 'conservation zone' was identified, and implementation of regulations to minimize potential for impacts will be proposed.

Monitoring for early detection of zebra mussels continues. Currently, approximately 30 lakes and five rivers are being monitored for early detection and others for population dynamics.

Several projects, made possible by increased funding, are being expanded to support conservation of imperiled fishes. These projects manage and control arundo in the Texas Hill Country, saltcedar control in the Upper Brazos River Basin, and Elephant Ear in the North and South Llano River.

Continuing efforts are being made to reach out to marinas, and develop partnerships to encourage marinas to act as gatekeepers to prevent movement and introduction of zebra/quagga mussels. New outreach materials are being developed. These efforts are being included in the overarching outreach campaign.

University/Research

McMahon reported that they have stopped doing actual research for a while, and are preparing papers. Three papers will come out on zebra mussels. Other papers will come out over the next few years.

Port Authority

Carangelo stated that **t**he favorable news is that large compliance in the fleet, particularly the tank ship fleet, have installed ballast water treatment systems. The systems are complex, and require substantial training and on-board expertise to ensure the systems operate correctly. There have been a series of non-compliance issues associated with operations. The industry realizes that it needs to be better on ship operator and sea farer training on these issues. Progress is slowly being made.

Other Business

Next Meeting Time and Place

Suggestions for the location of the next meeting in Florida were Fort Lauderdale or Miami. The date will be in the first part of April.

Public Comment

The Chairman provided the opportunity for public comment. There was none.

A Motion was made to adjourn the meeting, and the Motion was approved. There being no further business, the meeting adjourned at 12:00 p.m.