

**GULF & SOUTH ATLANTIC REGIONAL PANEL
ON AQUATIC INVASIVE SPECIES
MINUTES**

Wednesday, November 30, 2022 – Thursday, December 1, 2022

On Wednesday, November 30, 2022, Chairman **Peter Kingsley-Smith** 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
Robert Bourgeois, LDWF, Baton Rouge, LA
Wesley Daniel, USGS, Gainesville, FL (via GoTo Meeting)
Pam Fuller, At-Large Member, High Springs, FL
Leslie Hartman, TPWD, Palacios, TX
Julie Holling, SC DNR, West Columbia, SC (via GoTo Meeting)
Charles Jacoby, At-Large Member, Palatka, FL (via GoTo Meeting)
Michael Kendrick, SC DNR MRRI, Charleston, SC
Peter Kingsley-Smith, SC DNR, Charleston, SC
Jon Lane, USACE, Jacksonville, FL
Jessica Marchant, AL DCNR, Dauphin Island, AL
Monica McGarrity, TPWD, Austin, TX
Robert McMahon, UT Arlington, Arlington, TX
Jim Page, GA DNR, Waycross, GA (via GoTo Meeting)
Michael Pursley, MS DMR, Biloxi, MS
Matt Phillips, FL 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

Kelly Gestring, FWC, Davie, FL
Cayla Morningstar, USGS, Gainesville, FL
Susan Pasko, USFWS, Falls Church, VA (Via GoTo Meeting)
Christian Walker, LSU, Baton Rouge, LA
Quenton Fontenot, NSU, Thibodaux, LA
Ryan Jones, MS DWFP, Jackson, MS
Joshua Bauer, USACE, Jacksonville, FL
Daniel Hill, LDWF, Lafayette, LA
Michael Massimi, BTNEP, Thibodaux LA
Eve Kendrick, Charleston Charter School for Math & Science, Charleston, SC
Greg Moyer, Fish & Wildlife Service, Region 3 (via GoTo Meeting)
Angie Rodgers, Fish & Wildlife Service (via GoTo Meeting)

Public Comment

Chairman **Peter Kingsley-Smith** provided the opportunity for public comment. No public comments were received.

Adoption of Agenda

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

Approval of Minutes

The minutes of the June 28-29, 2022 meeting were presented for approval.

A motion to adopt the minutes was made. The motion was seconded, and the motion passed.

Overview of the Louisiana Aquatic Invasive Species Program

Rob Bourgeois gave a PowerPoint presentation entitled “Louisiana Aquatic Invasive Species Program”. Invasive species found in Louisiana include apple snails, invasive carp, tiger shrimp, and aquarium releases.

Apple snail sightings increase after flood events. Flooded water bodies that connect lead to the spread. There is currently no method of control. The sighting locations are recorded. **Rob** told of an incident that happened where someone collected apple snails from Texas, and brought them back to eat. He has a pond on his property, and decided to stock the pond with apple snails. He was reported to LDWF by his neighbors, and paid a \$25.00 fine. Due to this event, legislative attention was focused on the apple snail situation, and there will hopefully be legislation passed to instill stiffer fines for possession.

Shocking in brackish water for tiger shrimp is being done. Two have been caught this year. Few sighting reports are received from shrimpers. It is unknown if this is from the shrimpers keeping the shrimp and not reporting them, or if the population has greatly diminished.

Two species of Rio Grande cichlids are in the lake at City Park in New Orleans. They are spreading to the Terrebonne area. Reports are occasionally received, but there is not much that can be done. It is hard to say if they are doing much damage. They occur next to bass and bluegill. Fishing tournaments have been held for Rio Grande cichlid. One team landed over 100 fish.

An Asian swamp eel was discovered in a hyacinth bed in Bayou St. John. Very few have been seen, though. It is believed that the young-of-year were using hyacinth as nurseries, but hyacinth control has been successful, so this is probably affecting their populations. One eel previously discovered in a two-mile body of water has not moved from the area.

A piranha was captured in a University lake. This was an aquarium release. A tilapia population in the same lake was killed by a freeze.

A photo of a peacock bass was received that had supposedly been caught by a citizen in Bayou St. John by City Park. The fish was returned to the water body by the citizen. After further investigation at the sight, the sighting was confirmed.

Several species of invasive carps are found in the Three Rivers Area. Sampling efforts include bighead carp, silver carp, glass carp, and black carp were all caught. A black carp, which eat mollusks, was caught by a biologist in the Biloxi/Louisiana marsh. Larval tows were done in 2013 and 2014. Most invasive carp were confined to rivers. Larval tows were done again in 2019. The “hot-spot” for invasive carp was the Three Rivers Area. In 2020, an invasive carp partnership was developed. The partnership focuses on invasive carp research and control in the Mississippi River Basin, and receives \$25 million annually for the Louisiana part of the Lower Mississippi River sub-basin and the Arkansas, White, and Red Rivers sub-basin. Approximately \$1 million is received annually in each sub-basin and cooperative/competitive grants. Partnering with other states and organizations is encouraged.

Currently, larval tows are underway, in partnership with Dr. Quenton Fontenot at Nicholls State University. There is a mix of old and new stations, with focus south of the Intercoastal Waterway.

Telemetry projects are currently ongoing, in partnership with Dr. Mike Dance at LSU, which focuses on the movement between basins and in coastal Louisiana. There are 40 receivers, and 200 tags.

Beginning in January 2022, several projects were begun. These include: Carp used as fertilizer for coastal restoration (NSU); carp used as catfish feed (LUMCON); surveying commercial fishermen and wholesalers to further understand the obstacles to increased harvest; and impacts of carp on native fish condition and abundance.

Funded projects beginning in January 2023 include: Carp used as rainbow trout feed (LUMCON); impacts of carp on native fish condition and abundance (LSU); impacts to the lower trophic levels of the food web in Atchafalaya River Basin (NSU); telemetry in the Atchafalaya River Basin (LSU); testing of gear to aid removal of invasive carp by commercial fishermen (LDWF).

Future areas of interest include: Telemetry in the Red River; direct impacts to native fish using mesocosms; development of alternative uses for carp; increase commercial harvest; age and growth of the invasive carp in Louisiana; population assessment of invasive carp.

Tracking Large-scale Movement of Invasive Carp in Louisiana

Christian Walker gave a PowerPoint presentation entitled “Tracking Large-scale Movement of Invasive Carp in Louisiana”. There are four species of invasive carp in the U.S. These species were introduced for aquaculture. They escaped through flooding, and can outcompete native fishes for basal resources. Bighead carp, silver carp, and black carp are found in/or the Arkansas, White, and Red Rivers sub-basin, and/or the lower Mississippi River sub-basin.

A tracking project for invasive carp is under way, with the objectives being: 1) Identifying key corridors and waterways that facilitate carp movement; 2) Examining the potential of coastal estuaries as habitat for invasive carp; 3) Characterizing seasonal patterns of distribution and movement of invasive carp.

A common way to track invasive fish species is through the use of acoustic telemetry. There are two components – a transmitter which is uniquely coded, and then surgically implanted into the fish. The transmitter emits a ping which is picked up by receivers stationed throughout the area

of interest. The locations of the receivers are important, depending on if the study is large-scale or fine-scale. Three major areas were used for placing the receivers: 40 receivers were placed in the Calcasieu-Mermentau basin zone; 120 receivers were placed in the Atchafalaya-Vermillion basin zone; and 40 receivers were placed in the Central Louisiana coastal-Lake Pontchartrain basin zone. The receivers are deployed on hard structures, such as channel markers or old pilings. Downloads are ongoing every three months. There have been 167 fish tagged – 26 in the west Calcasieu-Mermentau basin zone; 100 in the central Atchafalaya-Vermillion basin zone; 41 in the eastern central Louisiana coastal basin zone. Additional fish will be tagged in the future.

The majority of fish caught are very large – above 800mm in length. Small fish under 500mm have rarely been observed. Males are slightly smaller in length than females. The most detections were found in the Atchafalaya-Vermillion basin.

A generalized additive model (GAM) was run, which is a semi-parametric extension of GLM. It is effective for dealing with non-linear data (typical in ecology). Seasonal movement will be characterized. This exploratory analysis showed that during most of the year, the fish do not move a lot, and peak in early April. Spawning movements up the Atchafalaya River coincided with rising water levels. There is evidence that silver carp can enter low salinity estuaries. Movement through estuaries may facilitate the spread of invasive carp into previously uninhabited water bodies.

Future work will involve expanded telemetry array to cover areas up stream on the Atchafalaya River to better capture the extent of seasonal migrations. Movement data in relation to environmental predictors (temperature, water level, etc.) will be examined. An additional 63 carp will be tagged in 2022 and 2023.

Identifying Invasive Carp Spawning Locations Through Statewide Larval Fish Surveys

Quenton Fontenot gave a Power Point presentation entitled “Identifying Invasive Carp Spawning Locations Through Statewide Larval Fish Surveys”. Invasive carp have the potential to alter river ecology. Finding the location of preferred spawning habitats may aid in future eradication efforts. In 2013-14, a LDWF statewide larval fish survey was done by inland fisheries personnel. Larvae were identified and enumerated. The larvae were identified to at least a family. Cyprinids were delineated as *not invasive carp* or as *invasive carp* (silver, bighead, and black all combined).

The 2013 sample locations were in the Gulf Intracoastal Waterway and the Bonnet Carre’ Spillway. A total of 63 sites were sampled, and three subsamples were taken per site for May, June, and July. Total samples were 567. In 2014, 61 sites were sampled, and three subsamples were taken per site for April, May, and June. Total samples were 549. Larvae were fairly prevalent in the Atchafalaya, Mississippi, Ouachita, and Red River systems. Larvae were not found east of the Mississippi River or west of the Red/Atchafalaya Rivers, but it was confirmed that invasive carp are reproducing in Louisiana.

In 2019, sampling was done in May and June. A total of 273 samples were collected. Larvae were still contained to the Atchafalaya/Mississippi/Red River systems. Same for 2021 collections.

No samples were collected beyond the Atchafalaya/Mississippi/Ouachita/Red River systems for 2013, 2014, 2019, or 2021. Samples for 2022 are currently being sorted and identified.

For samples that contained at least one invasive carp, the calculated number of individuals collected per minute (CPUE) and the calculated mean (\pm SE) CPUE for each month for each year was used. These calculations were used as a measure of relative abundance.

In 2013 and 2014, the peak abundance of invasive carp occurred in May. In 2019, the relative abundance dropped off. However, in 2021, invasive carp started showing up in sampling in April, and increased in May. In May, one sample from Butte LaRose yielded thousands of fish larvae. The peak abundance occurred in June. Invasive carp larvae numbers as part of the total statewide catch for 2013, 2014, and 2019 was around 13% of the total catch. The percentage jumped up to 41.6% in 2021.

Yearly flood pulses could determine increases of invasive carp larvae numbers. The carp produce best when the flood pulse is normal. In 2022, the flood pulse was normal, so the total number of invasive carp larvae will likely be high. The flood pulse might influence the abundance estimation.

Overview of the Louisiana Aquatic Plant Control Program

Daniel Hill gave a Power Point presentation entitled “Louisiana: Invasive Aquatic Plant Management”. Daniel spoke on several invasive plant species. Giant Salvinia is native to Southeast Brazil, and probably entered the U.S. through the water garden trade. It establishes rapidly, and spreads by fragmentation. Under favorable natural conditions, its biomass can double in about one week to 10 days. It is a freshwater species, and does not tolerate brackish or marine environments.

Water hyacinth is native to South America, and was first introduced at the 1884 Cotton Exposition in New Orleans, LA. It is a problem in most of the frost-free regions of the world. It establishes rapidly by producing stolons or “daughter” plants. Under favorable natural conditions, its biomass can double in 14 days. It is a freshwater species.

These invasive plants displace all other floating vegetation, native and nonnative. Once dense mats are formed, virtually all sunlight is blocked, killing submerged vegetation. They cause reduced oxygen levels, making large expanses unusable. They can serve as vectors for other invasives, such as Cuban bulrush and apple snails.

The economic impacts are numerous. They limit boating access for fishing, hunting, and recreational activities. They decrease property value, and there are costs associated with control efforts. Their presence reduces tourism such as swamp tours, and the aesthetic appearance of lakes.

These plants are dispersed via boats, dumping in water bodies, and hitchhiking on aquatic animals. Issues in Louisiana such as the large number of freshwater systems, swamps, connected waterbodies, a large number of boaters, and a subtropical climate all contribute to the spread.

Since 2012, thousands of acres of aquatic plants have been treated by LDWF. In 2021, 25,817 acres were treated. Various control methods are used to combat the spread. LDWF spray crews use chemical control for maintenance in small areas. Contract chemical application is done by using boats and by aerial. Mechanical controls consist of containment booms that limit plant movement, and is a containment for herbicide application. Containment booms are at Saline Lake and Turkey Creek Lake. Drawdowns are also done. Drawdowns target shoreline plants, and

affects the entire waterbody. This method also removes large quantities at a low cost. Giant Salvinia weevils are used as biological control. They have been reared and released since 2008. Over 3,700,000 have been stocked. Unfortunately, they have low winter survival in northern Louisiana. There is a failure to establish in temperate regions. There is a species of giant Salvinia weevil from temperate distribution of their native range that are possibly more cold tolerant than populations from Louisiana.

There is a restricted herbicide waiver application area. From April 1 – September 15th, commercial aerial and ground applicators must obtain a waiver for applications in all marked parishes for any herbicides containing, but not limited to, 2,4-D, Dicamba and picloram. From March 1 – June 15th, commercial aerial and ground applicators shall not make applications of restricted herbicides in the area between the Mississippi River and U.S. Highway 61 in the parishes of St. James and St. John the Baptist. January 1 – December 31st, commercial aerial and ground applicators shall not make applications of restricted herbicides.

LSU weevil research on biological control with *Cyrtobagous salviniae* has seen variable success. However, winter mortality of adults, and limited reproduction due to freezing temperatures is a limiting factor. There is failure to establish north of 32° N in the U.S. Finding a population of *Cyrtobagous salviniae* adapted to survive freezing temperatures would be the ideal solution.

Other species-specific biological control methods are water hyacinth weevils, mites, and moths. Two species of water hyacinth weevils are stocked from South America: *Neochetina bruchi*, and *Neochetina eichhorniae*. These weevils suppress growth and reproduction. The adults feed on the leaves, and the larvae burrow into the stem. Water hyacinth mites (*Orthogalumna terebrantis*) are native to the U.S. and feed on both water hyacinth and the native pickerelweed. They can be an effective control agent when combined with weevils. Water hyacinth moths (*Niphograpta albiguttalis*) are from South America and first stocked in Florida in the 1970s, and are now found throughout the Gulf Coast. The larvae feed on buoyant stems, and can destroy new buds.

Current and future research include: LSU AgCenter – Herbicide/surfactant trial; giant Salvinia weevil production of Brazilian and Argentinian ecotypes; Army Corps of Engineers – Giant Salvinia weevil production and weevil population monitoring; University of Louisiana at Lafayette – Biodiesel, methane, hydrogen, and commercial glues.

Public awareness education for invasive aquatic plants is being used by distributing information on invasive aquatic plants and how to prevent their spread .

Eight Years of Invasive Giant Applesnail (*Pomacea maculata*) Control in the Pascagoula River – Successes, Challenges, and Lessons Learned

Mike Pursley gave a Power Point presentation entitled “Eight Years of Invasive Giant Applesnail (*Pomacea maculata*) Control in the Pascagoula River – Successes, Challenges, and Lessons Learned”. These freshwater snails from South America are the perfect invader. It is believed that they were introduced as a pet release. They are tolerant of salinity up to 7 ppt, and survive in water 35 to 100 degrees F. They burrow into sediment to escape winter temperatures. The snails lay approximately 2,500 eggs in masses. The egg masses are produced every two weeks, and the eggs hatch in 10 to 14 days. The snails mature in 60 to 80 days. The snails are spread naturally, and are transported by other species.

Giant applesnails strip marshes of vegetation, and change a plant community to algal-based. They are a carrier of the rat lungworm parasite. They are a predator of amphibian eggs. Louisiana crawfish farmers are losing crawfish production. Unfortunately, there are limited control options. Since 2002, giant applesnail sightings have increased substantially. Egg masses were first seen in 2014. The egg masses can be difficult to reach due to the snails laying eggs on almost any vertical surface above the waterline. Prior Mississippi infestations were on isolated bodies of water.

The initial response from 2014 – 2018 was to monitor the extent of the infestation, find suitable ways to destroy the egg masses, remove as many snails as possible, destroy egg masses before they hatched, hand counters used to keep track of daily activity, try to keep the population from spreading, and hope for cold weather or predation.

One mechanical destruction device consists of a paint roller extension handle, with a stainless steel grill brush attached. After egg masses are located, they are smashed with the device, and then scraped off the object they are attached to. A newer lightweight version consists of PVC pipe with the brush attached. Floats are attached to prevent gear loss while kayaking. There is a small dip net with a float to capture snails, and a bucket for snail collection. This is great for volunteer crews such as kayak and canoe crews. From 2018 – 2022, The Gulf Corps have volunteered in removing egg masses. Volunteers preferred canoes over kayaks for egg mass control. Boats are better for spotting and removing live snails due to their higher observation point.

In 2021-2022, improved field data collections were made possible with ArcGIS QuickCapture. There is a free downloadable app for users, and is easily configurable for any type of project. Data can be downloaded in a variety of formats, and the dashboard provides a convenient overview of projects. Data can be uploaded remotely, and there is real-time monitoring of activity. Surveyed tracks and action taken are also part of the system. Data results showed that 4.3k snails were captured by hand, 22.6k snails were captured by trap, and 37.8k egg masses were destroyed. Total shoreline length observed was 5.9k miles. In 2022, over 2,500 pounds of applesnails were removed.

Applesnails tend to inhabit areas with low water flow. Snail trapping has been improved by using a modified crawfish trap with enlarged openings and an extended neck. Commercial crawfish bait was used, and up to 35 snails were caught per trap. The majority of snails captured were in September 2022, with over 6,000 snails captured. Unfortunately, the \$30.00 traps tend to get stolen. In 2022, limpkins arrived and began consuming the snails.

Future plans include continuing improvement equipment and baits; continuing the project for another year to see the effects of increased trapping; adding more volunteer snail hunters in more places; and a broader monitoring for early detection of new infestations.

Reporting Exotic/Invasive Species in South Carolina – Combining Esri Technology with EDDMapS to Create a Collaborative Tracking Solution

Joe Lemeris gave a Power Point presentation entitled “Reporting Exotic/Invasive Species in South Carolina – Combining Esri Technology with EDDMapS to Create a Collaborative Tracking Solution”. The South Carolina Department of Natural Resources programs - Wildlife & Freshwater Fisheries; Land, Water, & Conservation; Marine Resources; Law Enforcement; and Office of Media & Outreach, all have some involvement with non-native species management or

education. Each agency has collected data through its own program, such as Survey123 (organizational datasets using GIS) and iNaturalist. Some data is shared with national datasets, such as USGS NAS.

The SCDNR Injurious/Invasive Wildlife Working Group first met in 2020. It brought together staff from all divisions within the SCDNR. The group focused on a solution to develop an overarching nonnative reporting database across taxa. EDDMapS staff regularly attended the meetings to answer questions about functionality. The EDDMapS Early Detection and Distribution Mapping System makes invasive species mapping easy. It uses real-time tracking of invasive species, and pest occurrences. It uses local and national distribution maps, and electronic early detection reporting tools. It has a library of identification and management information. The criteria for the SCDNR was met by EDDMapS. 1.) Must be connected/branded as a SCDNR-oriented product. EDDMapS interface is continent-wide, but embedded features are available for specific states. 2.) Must allow for any nonnative species to be reported. EDDMapS maintains a list of all regulated and emerging nonnative plants, insects, fungi/diseases and wildlife. 3.) Must be able to support submissions by the public. EDDMapS interface requires a login; embedded feature contains a workaround for public use. 4.) Must allow for data verification. Users from state agencies can be assigned as verifiers to confirm/follow up with questionable records. 5.) Ability to pull from external records preferred. There are regular updates from the iNaturalist database, with more APIs anticipated in the future.

The South Carolina Department of Natural Resources has integrated with ArcGIS Hub for rapid deployment. These reporting tools were designed for the public to report their sightings of potentially invasive or exotic species in the state in an effort to protect South Carolina's natural resources. A variety of resources related to nonnative species in SC are available by clicking on a link to learn more information. There is also a SCDNR Reviewer application available. SCDNR staff who are not verifiers can view records in a web application using the EDDMapS REST service, and visit the original record page. Other invasives datasets are also included (USFS invasive plants, USGS NAS, etc.)

Future developments will include multiple unique social media posts that will feature the site over the course of several months, and SCDNR featuring a new site on the landing page (dnr.sc.gov). SCDNR verifiers have already begun working through existing records for release. This tool should allow for better communication and rapid response to invasive threats across divisions as new observations are submitted.

Determining the Distribution of the Non-native Blue Land Crab, *Cardisoma quahumi*, in South Carolina Using a Public Sightings Database

Elizabeth Underwood Scott gave a Power Point presentation entitled “Revisiting the Non-native Range of the Blue Land Crab, *Cardisoma quahumi*, in the Southeastern United States”. The blue land crab is found along the Atlantic coast, from Brazil to South Florida, and throughout the Caribbean, Bahamas, and the Gulf of Mexico. Distribution is confined by water temperature and salinity requirements of larvae. It is a semi-terrestrial crab that is one of four species in the genus *Cardisoma*.

The potential negative impacts from these crabs include extensive burrowing that can destabilize sediment; destroying crops, lawns, gardens, parks, and golf courses; their large migrations on land across roads; and pools of water in their burrows can provide breeding grounds for mosquitoes.

There have been sporadic historical reports from 1997 to 2020. There was an influx of reports in summer 2022. The first report of *C. quahumi* in the United States was in 1919 in Key West, Florida. After that, reports were received from additional cities in Florida, as well as Texas, South Carolina, and Louisiana. In 2021, reports were received from Perdido Key, Florida, and Fernandina Beach, Florida.

South Carolina Department of Natural Resources designed an online reporting form for reporting *C. quahumi* on the South Carolina coast. Photos of the crabs can also be uploaded. From September – November 2022, 100 total reports have been received. From Savannah to Myrtle Beach, there have been 66 confirmed sightings of *C. quahumi*. These crabs are concentrated in the Charleston area. Habitats include: roads/driveways/sidewalks; estuaries; forests; ditches; beaches; garages; and lawns. Submitting photos is very important, as photos of common species such as ghost crabs, fiddler crabs, mud crabs, and stone crabs have all been submitted. *C. quahumi* is widely distributed and established in South Carolina in a variety of habitats. Their means of introduction could have been human mediated introduction, or range expansion.

The habitat of *C. quahumi* is near estuaries and riverbanks in urban areas. They dig extensive burrows 3-5” wide, and 6’ deep in firm, muddy areas. They can tolerate freshwater and saltwater. Males are typically larger than females, and both sexes have one larger claw. Sexes can be differentiated based on the shape and size of the abdominal apron. Adult males are usually blue-gray. Females can be blue-gray or white/ash-gray, and juveniles are dark brown, orange, or purple. Adults reach six inches across the carapace. The crabs live in individual burrows, and multiple life stages are in one area. They feed on fruits and vegetables, but also insects, carrion, and feces. They are most active at night and after large rains. Humans eat the crabs.

C. quahumi play an important role in shaping coastal forests, especially mangroves through leaf litter processing, soil aeration, and the creation of carbon-rich soil microhabitats. They affect tree recruitment by preferential feeding. Their burrows provide habitat for anthropods and other species. Potential impacts include: shoreline destabilization, native species, and habitat overlap with species of conservation concern.

Determining physiological tolerances such as salinity and temperature and regional differences in tolerances can help predict their potential future expansion.

Effective Scientific Communication on Invasive Species

Leslie Hartman gave a Power Point presentation entitled “Action! Improved Communication Techniques to Convert Invasive Species Science to Policy”. **Leslie** pointed out that the general public still does not understand the importance of invasive species management. Human values, more than science and technology, change public perceptions. Science communication needs to be improved so that the message is absorbed by the general public. A paper was published in the *Journal of Environmental Management* on the role of trust in public attitudes toward invasive species management on Guam. It stated that “perceptions of managers’ trustworthiness, communication with managers, and positive personal experiences with managers were related to positive attitudes about management and support for existing initiatives, indicating the important role of trust and engagement for invasive species management”. A paper was published in the *Journal of Environmental Management* on trajectories across scientific and public salience of invasive alien species. Studying thirteen invasive alien species in the Netherlands, the article reconstructed the development of their public and scientific salience – the attention they attracted and the knowledge about them. Knowing the scientific and public salience of the species

clarified why the actions to deal with them differed even though from an ecological perspective, they warranted similar attention. While these papers are fine for communication between scientists, it would be difficult to use this scientific verbiage with the general public to discuss the importance of invasive alien species management.

Leslie stressed that presentations should be given to the general public that are informative, but presented in a way that they are able to understand from their point of view. If the general public is engaged, they will most likely help with something they are passionate about so they can feel they are part of the solution to a problem. A simple, unifying, introductory, ordinary description relatable to the public, causing them to consider what is at stake, why they should care, and what will be lost, will cause an emotional response that would prompt action on their part. Using non-scientific language to explain the problem and its repercussions will be easier for the general public to understand.

Update on New Introductions

Cayla Morningstar gave a Power Point presentation entitled “USGS Nonindigenous Aquatic Species (NAS) Fall Update: New Species Occurrences in the Gulf States”. The USGS Nonindigenous Aquatic Species Database has 1,390 tracked species, and 683,010 total records. Data is received from museum collections, researchers, state and federal agencies, other databases, scientific literature, and public sightings reports. The most popular page is the zebra mussel page. Data from eDNA will be forthcoming. There are 1,120 NAS email subscribers. The NAS Alert System provides information on new species occurrences in the United States.

For June 23 – November 28, 2022, there were nine NAS alerts for nine species. Australian Redclaw Crayfish are now found in Texas. Freshwater jellyfish are in San Antonio, TX. A lungfish, new to the United States, was found in San Antonio, TX and removed, so it is considered a failed introduction. A black carp was found in Drum Bay in New Orleans, LA. Red swamp crayfish were found in a church retention pond in Jacksonville, FL. Eradication efforts are under way. Two tire track eels, a new species to the U.S., were found in Miami, FL. Rice patty herb, a popular aquarium plant, was found in Orlando, FL. A new occurrence of apple snail was found in SC. Blue land crabs are now found throughout SC. These crabs are not currently being tracked, but if the need arises, they will be.

On the NAS Flood and Storm Tracker (FaST) Map, the Initial map for Hurricane Ian is now available. The map was updated 10/06/22. Click on a drainage in the map or select a species, and the highlighted species in the list are considered likely to disperse via floods, and cause environmental or economic impacts. Over 50 species were predicted to potentially move between drainages with flood water.

A new publication was released on an eradicated population of snakehead on the Gulf Coast of Florida. In June 2020, adult and juvenile specimens were captured in a pond that connects during high water to a small stream within the Manatee River-Tampa Bay Basin. The pond site is 250km from the only other wild snakehead population in the U.S. and is considered a separate introduction and not the result of natural dispersal. In 2020-2021, several hundred snakehead were removed from the pond by nets and electrofishing. Surveys suggested that the population had not spread to nearby waters. In May 2021, the pond was treated with rotenone, and 48 more specimens were recovered. No additional snakeheads have been sighted since the piscicide operation, although verification of eradication will require monitoring of the watershed.

In December 2022, a Fish Slam/Fish Chat Bioblitz will be held in Dade County, Florida. This event will uncover new species and discover population spread, foster collaboration, spread awareness, and ensure important specimens enter museums. The event also records other nonnative species such as plants and invertebrates, helps managers sample areas they might not have time or manpower to sample, and often includes “Fish-Chat”, a small conference-like forum to share research, management efforts, ask questions, and foster collaboration.

An Invertebrate & Plant Horizon Scan for the U.S. is being developed. These scans are like a risk assessment of what invasive species may be coming into the U.S. A list will be built using information from the LEMIS list, CABI, USFWS risk summary, and journal articles. Scoring will be done using an arrival potential/climate match, impactfulness, and spread potential. Ranking will be done by putting high scoring species on a watchlist which will be given to managers, and ports of entry. Collaborators with invasive invertebrate and plant expertise will be needed for scoring and ranking terrestrial and aquatic species. Cayla told the panel members that if anyone was interested in being a collaborator to contact her.

The National Management and Control Plan for the New Zealand Mudsail (*Potamopyrgus antipodarum*) published in 2007 by the USFWS is being updated. The NAS will be the repository for the current distribution and future reports. This will be important for states like the Southeast, where the mudsnail are not yet present, and provide awareness for how to prevent them from invading their state.

Using Genetic Approaches to Investigate Pathways of Dispersal of the Red Swamp Crayfish

Michael Kendrick gave a Power Point presentation entitled “Investigating Dispersal Pathways of the Invasive Red Swamp Crayfish”. Red swamp crayfish (*Procambarus clarkii*) harm natural resources, and causes expenditures of \$26.8 billion per year for losses of goods, services, and production, and costs of management. They displace native species, reduce macrophyte density, and are a vector for parasites and disease. They are dispersed globally via aquaculture, bait, and the aquarium trade. They also are dispersed by natural dispersal via the Waccamaw and Little Pee Dee Rivers. There is a potential longitudinal pattern of gene flow, and few introduction points. Another dispersal mechanism is via anthropogenic dispersal. Variability is unrelated to watersheds.

Understanding their ecology is important for developing effective management strategies. Objectives for management include documenting the spread, inferring dispersal patterns through the development of molecular tools for genomic sequencing, and assessing impacts on native crayfishes. Other objectives include compiling historical crayfish data, collecting new data, and sampling from creeks, rivers, streams, roadside ditches, and swamps. Their spread has been documented since the 1900s.

From 2018-2021, SC DNR biologists surveyed 156 locations in the Little Pee Dee, Waccamaw, and Winyah river basins to investigate the distribution and abundance of crayfish in the Pee Dee River basin. Red swamp crayfish was recorded at 84 of the 156 sampled sites. Native crayfish numbers (*P. braswelli/chacei* and *P. pearsei*) were significantly lower when red swamp crayfish were present.

Genetic testing results showed a highly structured genetic landscape between the three river basins. It is unclear if the genetic lineages are the result of independent introductions related to

farming and reflect the diversity of potential source populations, or if these populations, after likely being established prior to the 1970s, have diverged due to a lack of gene flow/dispersal. The relative lack of population genetic structure in the Little Pee Dee and Waccamaw as compared to the Winyah region suggests that natural dispersal is likely an important factor leading to the recent spread. There is no evidence that the native crayfish are hybridizing with the red swamp crayfish.

Giant Salvinia Treatment and Eradication at Ross Barnett Reservoir in Mississippi

Ryan Jones gave a Power Point presentation entitled “Collaborative Agency Efforts to Contain and Eradicate Giant Salvinia from Ross Barnett Reservoir”. The Ross Barnett Reservoir, which was impounded in 1962, is part of the Pearl River Water Supply District, and consists of 33,000 acres that is used as water supply for Jackson, and for recreation. The Mississippi Department of Wildlife, Fisheries, and Parks has overseen the reservoir’s plant management since 2013. Plants managed include hydrilla, water hyacinth, alligatorweed, and Cuban bulrush.

On June 26, 2018, giant salvinia was discovered in Pelahatchie Bay during a hydrilla survey, but MDWFP was able to keep it contained. Unfortunately, by August 2018, giant salvinia had spread into other areas. In August 2018, a mixture of diquat/surfactant and Sonar One was used to kill all foliage in the areas. After that, a mixture of glyphosate\diquat\surfactant was used. Containment is a priority to prevent the spread into the reservoir. The Pearl River Valley Water Supply District’s engineer was contacted about placing containment booms in the reservoir to help prevent the spread. MDWFP purchased the booms and placed them in infested locations. In October 2018, a contact at the US Army Corp of Engineers suggested changing the chemical mixture to glyphosate\flumioxazin\surfactant. Also in October 2018, a contact at the MS State University Geosystems Research Institute suggested closing the boat ramps immediately. The Pearl River Valley Water Supply District declared a state of emergency on October 17, 2018, and Pelahatchie Bay was closed to recreational boating.

In November 2018, a drawdown of 1.5 feet was done in Pelahatchie Bay, along with aerial chemical applications. In February 2019, a forester with the Pearl River Valley Water Supply District was contacted about possibly burning the areas where the vegetation had been treated, because when the dead vegetation was cleared, giant Salvinia was discovered underneath, still alive and green. In February and March 2019, the areas were burned using a drip torch and flamethrower. Unfortunately, giant Salvinia was still present in areas, so flumioxazin was then applied in April 2019 to the soil and root balls of previously infested areas, along with containment boom maintenance. Native vegetation is regenerating.

A buttonbush slough was also discovered, so the Pearl River Valley Water Supply District’s Director was contacted about providing manpower to cut down the buttonbush and remove it, which was accomplished in May 2019. The area was also sprayed with flumioxazin.

On May 14, 2019, a controlled opening was done, and all boats had to go through a cleaning process.

In October 2019, Ross Barnett Reservoir was returned to full pool, and intensive surveys were begun. Located within an area of water hyacinth, giant salvinia was found alive and thriving. A 2,800-foot boom was deployed to prevent spread, along with aggressive herbicide treatments, and flumioxazin injections underneath the giant salvinia mats along the shoreline. New colonies of giant Salvinia were found in Palahatchie Bay.

In January 2020, a 2.5-foot drawdown was done. Burning was also done, but with limited success due to constant precipitation. Surveys continued. Comprehensive shoreline surveys done from March to July 2020 revealed no new colonies. Unfortunately, another patch was found. In August 2020, a 700-foot boom was deployed, and aggressive herbicide treatments were begun. Boat and foot surveys were also done. In 2021, comprehensive monthly boat and foot surveys were done. No giant *Salvinia* was found. Currently, all containment booms have been removed, and full recreational access was restored on December 1, 2021. Intensive monthly surveys will continue.

The public relations department at the Pearl River Valley Water Supply District issued press releases and published newsletters about giant *salvinia*. Local news stations gave onsite interviews and did live Facebook posts to provide information about the invasion problem. A “Clean, Drain, Dry” campaign was designed that included signs and handouts at boat ramps, television air-time to inform the public, placing cleaning stations at boat ramps, and the implementation of mandatory boat and trailer checks for sportfish tournaments.

Update on USGS ANS Projects

Wes Daniel reported that there are projects to develop the institutional architecture for a national EDRR framework in FY22. Most of the projects have a 4-5-year timeframe for completion.

Horizon scans will be conducted to develop Watch Lists to consider potentially invasive species not yet found in the U.S., and determine the extent of potential habitats in the US. A Transportation Pathway Horizon Scan has already been done.

Hot Spot analyses will be conducted to identify invasion hotspots. A major source of invasion is due to humans moving invasive species around.

To increase EDRR capacity for terrestrial plants, a target analysis is done, along with targeted species surveillance, and information planning/technology/and training. An online Invasive Species Habitat Tool (INHABIT) is being created to provide information on invasive species, which can predict species abundance, and not just suitability of invasive species. It includes watchlist species that are not yet known to occur in the U.S.

Molecular detection tools at points of entry are being developed. This will aid in detection of hitchhiker invasive species, such as zebra mussels found in moss balls used in the aquarium trade, and other organisms being shipped into the U.S.

A genetic material repository and sharing network will be developed, which will focus on high quality DNA collection. Samples will be stored in freezers, and they will be available for use by agencies interested in eDNA.

A natural resource manager’s eDNA toolbox is being developed. This will be a dashboard interface to help managers interested in eDNA with questions they may have.

A Rapid eDNA Assessment & Deployment Initiative Network is being developed. The eDNA will be collected at strategic locations. The USGS Streamgage System is being utilized for this.

A National EDRR Information System is being developed. The data hub will be a platform for finding, querying, and sharing large data through flexible data analysis and visualization tools.

This will benefit stakeholders such as policy-makers and lawmakers, regulatory agencies, land and resource managers, private industry, protected-area managers, private landowners, and other USG partners. The information needs for the National EDRR Information System include: spatial prioritization for targeted action; a national policy; EDRR network users and customized alerts; jurisdictional based data sharing; training and outreach; and automated reports.

Aquatic Nuisance Species Task Force Update

Susan Pasko gave an update on the Aquatic Nuisance Species Task Force. The ANS Task Force held a meeting in May. The Task Force approved the revised “Minnesota Aquatic Nuisance Species Management Plan”. Action items included: 1.) Distribute the Framework for Determining the Need for an Aquatic Invasive Species Control and Management Plan to ANSTF members and regional panels. 2.) The FWS, USGS, and Department of the Interior will consider recording a webinar presentation on the National Early Detection Rapid Response Framework that can be shared with the regional panels and other interested audiences. 3.) Provide an update on activities related to stony coral tissue loss disease. A session on this topic will be included on the agenda for the Fall 2022 ANSTF meeting. 4.) The Prevention Subcommittee will facilitate a discussion to encourage the use and adoption of the guidelines to prevent AIS transport by wildland fire operations. 5.) Discuss with regional panels and industry the evolution of boat design to determine if the Boating Ad-Hoc Committee should be reestablished.

The Priority Work Elements for the ANSTF Prevention Subcommittee in 2022 include: Assessing new ANS introductions to determine where prevention measures may have been lacking or ineffective or resulted from gaps in authority; evaluating seaplanes as a potential pathway for ANS, and identifying mitigation measures; the Organisms in Trade Hitchhikers Workgroup was established. Upcoming work elements include: Determining if the Boating Ad-Hoc Committee should be reestablished to the Boating Partnership Subcommittee in response to the evolution of boat designs and their ability to transfer AIS; Facilitating a discussion to encourage the use of and adoption of the guidelines to prevent AIS transport by wildland fire operations.

The Priority Work Elements for the ANSTF EDRR Subcommittee in 2022 include: Facilitating monitoring efforts to detect and report new sightings of ANS by developing a plan for capacity-building in NAS to meet stakeholder needs, and developing ANS horizon scanning and watch lists; facilitating the development of capacities to respond rapidly to new invasions by modernizing and enhancing the ANSTF Experts Database, and developing a model rapid response funding process.

The Priority Work Elements for the ANSTF Control Subcommittee in 2022 include: Coordinating the development and implementation of ANS management and control plans through plan revisions of the European green crab and New Zealand mudsnail, and a decision-making Process for Approval to develop new species control and management plans; Identifying gaps in available control and restoration measures and encourage innovation by communicating the gap and measures that are needed to address gaps in control measures.

The Priority Work Elements for the ANSTF Research Subcommittee in 2022 include: Establishing ANS Task Force research priorities and identifying prospective partners through the National AIS Priority Research List approved in November 2021; Facilitating activities that support priority ANS research needs by promoting the annual priority research list; Tracking and disseminating study results to incorporate into ANS management decisions and activities by

surveying the AIS community for current/planned AIS research that aligned with priorities, and developing a process to update the National AIS Priority Research List.

The Priority Work Elements for the ANSTF Outreach Subcommittee include: Evaluating ANS communication, education, and outreach efforts to ensure they are consistent and effective by conducting an assessment of national campaigns that target outdoor recreational users; Developing processes to share information and consistently implementing ANS outreach strategies by populating the Stop Aquatic Hitchhikers portal to serve as a national clearinghouse for education, outreach, and marketing materials, and establishing an ANS Outreach Community of Practice.

Cindy Williams asked if the Task Force has a timeline for states to update their state plans. **Susan** stated that the guidelines for developing and revising state plans states the recommended timeframe is five years; however, the Task Force understands that revising a state plan can be a major undertaking, so there is no mandatory timeframe for revising a state plan.

Public Comment

Chairman **Peter Kingsley-Smith** provided the opportunity for public comment. No public comments were received.

The meeting recessed at 4:45 p.m.

Thursday, December 1, 2022

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

Utilizing the Invasive Species Traveling Trunk in a High School Science Class

Eve Kendrick, a teacher from the Charleston Charter School for Math and Science in Charleston, SC gave a Power Point presentation entitled “Utilizing the Invasive Species Traveling Trunk in a High School Science Class”. Eve informed the panel that the traveling trunk was well organized, and contained a vast amount of visual aids to help teach the students about invasive species. Packing the items back into the trunk for return shipment was easily accomplished. The instruction manual was also appreciated.

Eve provided a basic introduction of invasive species to her AP Biology students. Invasive species are covered in some biology classes in middle school, so some students had knowledge of them. Using hands-on items from the trunk helped the students to identify different invasive species, and understand more about the impact from them. The trunk sparked a lot of meaningful conversations between the students. The students were most interested in the animals rather than the plants. The nutria pelt was very popular. The python skin helped some students who feared snakes overcome their anxiety by holding the snake skin and feeling its texture. The snake skin was also very popular with all of the students. This experience inspired conversation between the students about what they knew from online searches about the invasive snakes, and whether the information was accurate.

Eve wants to use the trunk again for her AP biology students for the second semester so that she can expand on the lesson, and to push them into understanding more about invasive species in general. Allowing the students to actually interact with the items in the trunk is very beneficial,

as it promotes critical thinking and problem solving. Several weeks after having the traveling trunk in the classroom, students were still talking about the trunk.

Peter asked Eve about how the panel could go about getting the word out to more teachers about utilizing the traveling trunk. She stated that one way would be to go through teacher professional groups such as the NSTA (National Science Teachers Association), the National Association of Biology Teachers, having a display table at teacher conferences, and contacting county liaisons.

Dennis asked Eve if she had any suggestions on how to improve the traveling trunk. Eve stated that one of the issues was that most newer laptops no longer have DVD players, and the trunk has Power Point presentations on DVDs. Eve had to search for an older laptop in order to play the DVDs. **James** stated that he will replace all of the DVDs with jump drives for all the trunks. He also stated that a science curriculum worksheet will also be added to the trunks in the future. An invasive species poster that teachers can keep in their classroom after returning the trunk will also be created. Having a lesson plan or activity would also be extremely beneficial, and they could be refined to benefit the needs of the students. Eve also suggested having more specimens, and a graph that the students could analyze.

James stated that the company where the fish species were purchased from for the traveling trunk has other species available for purchase, such as snakehead and tilapia. **Peter** suggested that geographically tailoring the trunks with invasive species that are of highest concern to a particular region would be advantageous.

Discussion of ANSTF Recommendations

Two Motions were made at the last GSARP meeting to present to the Aquatic Nuisance Species Task Force.

Motion #1: Since invasive carp have now been found in the Tombigbee River basin, the Gulf and South Atlantic Regional Panel on Aquatic Invasive Species recommends that the Aquatic Nuisance Species Task Force urges the USFWS and/or MICRA to take the necessary steps needed in terms of legislation and national plans to allow the use of invasive carp funding in the Tombigbee and Mobile River Basins.

James stated that after further looking into this, the Water Resource Development Act of 2022 has passed the House and Senate, and has the Tombigbee River listed in there now as available for funding. **Jon Lane** stated that the USACE received half a million dollars last year, and will receive the same amount this year. There is no project yet - only a planning phase. Steps are in place to use invasive carp funding in the Tombigbee and Mobile River Basins for invasive carp.

Greg Moyer, Fish & Wildlife Service, Region 3, stated that there is base funding for invasive carp in the Mississippi River Basin. That funding comes with legislative direction to be used in the Mississippi River Basin, including the six sub-basin groups defined within the MICRA Partnership, and there has been a history of projects funded through the Tennessee Tombigbee River Sub Basin Partnership that go into the Tombigbee Waterway. So, funding is already being used for projects that are at least in the upper portion of that, but there is a limit to where those funds would go. They are given the legislative direction that it is for the Mississippi River Basin sub-basins. There is also separate funding specific to the USACE and their work on deterrence in the Tennessee and Cumberland River sub-basins. That funding is separate from the services funding line.

Angie Rodgers, Fish & Wildlife Service, and the Project Leader for the Lower Mississippi River Fish & Wildlife Conservation office in Tupelo, MS said that their office is heavily involved in the invasive carp work in their region, and has been for a number of years. Based on the appropriation language from 2020, funding will be used within the Mississippi River Basin for the USACE to work with FWS and other partners to develop a pilot deterrent program. The program would place priority on the Tennessee and Cumberland Rivers. Draft wording for 2022 states that it also includes the Tombigbee Waterway. There is an authorization for 2024 for \$25million, but that amount has not been appropriated. The Nashville District is the lead on that particular effort, and they are moving forward with it. The Mobile District is also involved in the \$500,000 funding. They are working together to develop a program management plan that will outline the way that they would approach deterrence within that system.

Cindy added that they are not authorized to spend any specific funding in the Tennessee-Tombigbee at the moment of the current service funding, or in the Mobile River. The FWS does not currently have available funding needed to do the additional work. The FWS cannot lobby, so it is up to state partners to talk to congressional staff to obtain additional funds.

Greg pointed out that if the FWS did receive additional funds, the appropriations would have to specify that they are to be used in a different sub-basin, because right now the legislative direction for invasive carp funding is to be used in the Mississippi River Basin. It will require both authorization and appropriations to expand into the Mobile River Basin in the end. He also suggested to communicate to the FWS if there is an interest in implementing invasive carp actions in the Mobile drainage. While there may not be current authorization or appropriations, and the service isn't able to lobby for that, they are able to talk about the facts of needs and interest from their state partners in implementing action. They can also raise awareness of the needs and interests there, without specifically making a request for additional funding for that sub-basin.

James suggested adding this discussion to the Panel's update to the Task Force at the next Task Force meeting, and to talk about how there is concern throughout the region of all coastal watersheds and the potential spread of these carp into Mississippi coastal rivers.

Dennis made a Motion that the Gulf and South Atlantic Regional Panel on Aquatic Invasive Species does not urge the USFWS to bring to the Aquatic Species Task Force any recommendation regarding legislation and funding to allow the use of invasive carp funding in the Tennessee and Mobile River basins at this time. The Motion was seconded by Pam Fuller. The Motion passed.

Motion #2: The Gulf and South Atlantic Regional Panel on Aquatic Invasive Species hereby recommends that the Aquatic Nuisance Species Task Force urges Congress to amend NMANPCA so that Puerto Rico, the U.S. Virgin Islands, and all U.S. territories and possessions are eligible to receive aquatic invasive species management plan funding. The Motion passed unanimously.

James stated that looking through the full Act, all of the territories are listed under Title 3, under *Wetlands*. Though they are listed in the Act under Title 3 where all U.S. territories are basically classified as coastal states under that section of the Act where they can receive the wetlands funds that any other coastal state can receive through the USACE, they are specifically not listed in the state plan under the Invasive Species Title of the Act to receive state plan funding, since

they are not states. All of the territories were included in part of the Act, but were not put into that section. This was possibly done on purpose, and not as an oversight. If funding is received, it goes through the USACE. In overall general purpose of this, the Task Force will most likely not urge to reopen that legislation. **Jon Lane** pointed out that there is a different mechanism for funding Puerto Rico and the U.S. Virgin Islands through the USACE's Aquatic Plant Control Program. They can receive funding for aquatic invasive species projects, but there is not enough internal support right now to write a plan.

Dennis suggested that a statement to the ANSTF be put in a GSARP report that when NMANPCA comes up for reauthorization, to keep in mind that it is the desire of the GSARP to design the legislation to allow Puerto Rico, the U.S. Virgin Islands, and all U.S. territories and possessions to be eligible to receive funding.

Dennis made a Motion to retract Recommendation #2. The Motion was seconded by Pam Fuller. The Motion passed.

Monica McGarrity suggested that on Motion #2, it should also be stated that there is a need for potential additional funding to accompany adding those territories to the list of entities eligible for the ANS plan funding. Funding has increased in recent years, but the more ways it is divided reduces all of the individual funding amounts. **James** stated that hopefully a request can be added that the total funding amount be increased.

Discussion of GSARP Outreach Material

Dennis Riecke spoke on the idea of a Power Point presentation as one of the GSARP's outreach materials. Panel members have a need to periodically give a public presentation, either to Commissioners, staff members, at an agency lecture series, etc. A Power Point presentation would be beneficial, and could also be designed for use by teachers, the general public, etc. **Dennis** suggested developing a standard Power Point template that all the members could use, which could also be personally customized at the end of the presentation. It could also be posted on numerous websites. He shared a Power Point presentation template with the panel that he created on invasive species with statistics, information, etc. **Dennis** pointed out that it needs to be determined who the audience will be, what information will be conveyed, what the format should be, and how it will be distributed. **Peter** stated that geographically tailoring the trunks is a good idea. **Leslie** said that depending on who the audience will be, the wording should be modified to be scientific or non-scientific (on an 8th grade level). She offered her assistance for developing material. **Robert** suggested that perhaps there should be two different presentations – one for the general public, and one for the scientific community.

There is also a brochure template that could be designed to be state-specific. **Dennis** has the template for the brochure.

Dennis asked for volunteers to help develop the Power Point presentation and brochure. Several panel members expressed interest in participating. **Dennis** will put together outlines, and then send to **James Ballard** to circulate among the panel members for input.

Region 4 USFWS/Small Grants Program

Cindy Williams reported that there is no longer enough funding to keep the Small Grants Program going, so **Cindy** and **James** worked together to create a new five-year grant. It was awarded in August in the amount of \$55,000 to start, but hopefully more funds will be added

going forward. Since that time, doing the forecasting of what is going on in the department with the strategic plan for invasive species, and the early detection/rapid response nationally-coordinated program starting to get some traction, they are not seeing the ability to continue to divert their regional funding to support the Small Grants Program going forward.

Cindy has begun the de-obligation process, and the funding will be returned to the USFWS's program. If she had waited until next year in the hope that more funding would be added, then they would lose the ability to get those funds back into the program, and the funds would go straight to the Treasury and be divided accordingly. It is hoped that the program can continue in the future, but that does not appear to be the case. As the Early Detection/Rapid Response Program is rolling out, state partners will be relied on to work with the USFWS and others, depending on where a new outbreak is discovered. It will not happen this year, but it has been getting traction for several years. Hopefully, some additional funding will be given to the service to begin implementing it from their fish and wildlife conservation offices to start doing some on-the-ground work with their state partners to assist with what they are doing with their state management plans. There will be a meeting next week of the regional coordinators, and hopefully they will get a better direction.

James Ballard reported that they are finishing up the last few small grants that are active.

The Commission, in partnership with MS Department of Marine Resources, held year-long lionfish tournaments for the last couple of years, but participation dwindled to only a few divers. Lionfish were not seen during most of the dives. The tournament has been put on hold. If lionfish populations rise through DMR regular dive surveys, the tournament will be reinstated.

The NOAA's Restore Science Program has invasive species as one of their priorities going into future restoration plans for Restore funding. They present to the Commission regularly, since the Commission is currently running one of their programs for them, so if any more movement happens on the invasive species side under Restore, **James** will keep the panel members updated. At this time, they are working on putting that into the next Restoration Plan, so the timeframe is at least a year before they are at project level for it.

State Reports/ Members Forum

Alabama

Jessica Marchant reported that red lionfish have successfully colonized the Gulf of Mexico waters. The first confirmed report was documented in June 2011 by a spear fisherman who collected one from an oil/gas platform approximately 43 miles south of Dauphin Island. Lionfish abundance in the gulf has increased since then. Alabama Marine Resources Division received a grant from Gulf States Marine Fisheries Commission in December 2012 to monitor reef communities in the Gulf of Mexico, dispatch red lionfish when encountered during SCUBA surveys, increase public awareness of the lionfish invasion, and streamline the general coordination between state agencies, federal agencies, and the public. Eighteen dive surveys were completed by AMRD personnel during 2013. Additional funding was secured from GSMFC to continue monitoring in 2014, and continue increasing public awareness. AMRD personnel conducted SCUBA surveys at 18 reef sites in 2014. Beginning in 2016, spearfishing tournaments were held to specifically target red lionfish. Tournaments were held in 2016, 2018, and 2019. Over 2,000 lionfish were removed overall. On September 7, 2022, ALMRD caught a juvenile red lionfish while trawling in Perdido Bay with a 16' otter trawl. It measured 60

millimeters in total length. It was placed in a live well on the vessel, and then taken back to the lab and kept alive for future educational purposes at outreach events. The capture of this juvenile red lionfish is notable, as few individuals have been reported in the Perdido System. The rate of population growth has changed over time. During the first several years of the invasion, population growth of red lionfish increased substantially from year to year. However, the rate of population growth during the previous few years has reduced such that it seems the population has plateaued to a stable state.

The most recent confirmed capture of an Asian tiger shrimp in Mobile Bay occurred in June 2021. The specimen was caught in a crab trap. Staff collected the shrimp, froze it, and it was retained at the Dauphin Island Sea Lab. In July 2022, the lab contacted AMRD to report the capture, and to confirm its identification. Although validated reports have been received, evidence suggests that the Asian tiger shrimp has become established in Alabama's waters.

Australian spotted jellyfish have been documented in Alabama's coastal waters. Prey of Australian spotted jellyfish include early life history stages of many commercially and recreationally important finfish. The temporal/spatial distribution of Australian spotted jellyfish could drastically increase finfish larvae/egg mortality rates if spawning events coincide with swarm activities.

The bocourt swimming crab, also documented in Alabama's coastal waters, could compete for resources of the native blue crab. A single crab was collected in November 2016 in a commercial crab trap during an ADCNR/MRD onboard fisheries observation trip. The exact location was caught is unknown, but the general location of capture is south of Lillian Bridge and north of Ross Point in Perdido Bay. This is the first observation of a bocourt swimming crab since the first observation in 2007.

The latest nonnative species observed in Alabama's waters was a single crescent grunter. The specimen was collected in February 2021. The specimen was collected from a pond at the Dauphin Island Airport, and is currently in quarantine at the Dauphin Island Estuarium. It will be displayed for outreach purposes to educate the public on the problems associated with invasive species.

In July 2016, an Amazon red tail catfish was collected from a recreational crab trap at a private dock on the Bon Secour River.

Florida

Kelly Gestring reported that the 7th Annual 2022 Lionfish Challenge kicked off on May 20th and ended on September 6, 2022. A record-setting 707 people from 25 states registered for the Lionfish Challenge. During 676 trips, 197 divers submitted lionfish that were collected. A total of 25,299 lionfish were removed from state waters, which is the highest number collected since 2018.

During this reporting period, one report was received of an Asian tiger prawn through EDDMapS from Volusia County in July 2022.

Two reports were received (one through EDDMapS, and one through the IveGot1 hotline) of green mussels. All reports were from areas with known populations of green mussels.

Freshwater report:

Bullseye snakehead have recently expanded their range into Lake Ida in Palm Beach County. Biologists from FWC and NOAA are collaborating on a multi-pronged project to compare movement, diet overlap, and habitat utilization of bullseye snakehead, butterfly peacock bass, and largemouth bass. Collection of stomach content data by gastric lavage from the three species began in July 2020, and concluded in June 2022. A total of 1,259 largemouth bass, 1,036 butterfly peacock bass, and 502 bullseye snakehead were collected. Of these collections, 816 largemouth bass, 544 butterfly peacock bass, and 311 bullseye snakehead contained identifiable prey items in their stomachs. The top three prey items for largemouth bass by number were fish, crustaceans, and crayfish. The top three prey items for butterfly peacock bass by number were fish, crustaceans, and aquatic insects. The top three prey items for bullseye snakehead by number were amphibians, crustaceans, and fish. Results indicate that butterfly peacock bass are highly piscivorous, largemouth bass are primarily piscivorous but consume other prey items, especially at a smaller size, and bullseye snakehead are extremely opportunistic at all sizes but particularly in larger fish. Further data analysis is being conducted to compare the diet trends between these three species.

An EDDMapS report of red swamp crayfish was received in August 2022 from a location near Jacksonville, Florida. A collection trip positively identified the crayfish. Red swamp crayfish are native to the Escambia River basin in western peninsular Florida, but this site is over 300 miles from their native range. These crayfish are considered highly invasive, and the site is near habitats occupied by the state-threatened Black Creek crayfish, a species already under stress from a native crayfish species that has been transplanted into the Black Creek drainage basin. The site has a series of drain lines connected to a retention pond. The red swamp crayfish were first spotted in one of the access wells of the drainage system, and were also trapped from the retention pond. It is unclear why they were released at this site, or who released them.

Trapping and surveying of waterbodies near the site were initiated to define the geographic range of these crayfish, and a team was formed to formulate an Early Detection Rapid Response plan to address this invasion. The trapping results suggested that the crayfish were restricted to the retention pond and associated drain lines at this single site, so the decision was made to treat the site with copper sulfate to eradicate the population. During planning, red swamp crayfish were removed from the drain lines and pond by hand netting and crayfish traps baited with wet cat food. A concentrated solution of copper sulfate was sprayed over the surface of the pond and into the drain lines at each intersection with the expectation of reaching a copper concentration of 4 ppm. The pond and drain lines were monitored daily, and trapping new water bodies in the area continued. It appeared the treatment worked to some degree in the drain lines, as dead and dying red swamp crayfish were recovered on day 5, but so were live ones. Live red swamp crayfish were observed in night surveys of the pond. Water analyses showed concentrations of copper well below the target concentration of 4 ppm in the pond and drain lines, but since they were collected 48 hours after the initial treatment, it is unknown how quickly the copper concentrations dropped. Trapping in the pond, dipping red swamp crayfish from the drain lines, digging up and filling in burrows, and trapping in surrounding water bodies continued after the treatment. Catch rates of red swamp crayfish in the pond were as high as 4.0 RSC/trap night, indicating many of the crayfish were relatively unaffected by the copper treatment.

A second copper sulfates treatment was undertaken after Hurricane Ian left the state in October 2022. The amount of copper sulfate applied to the pond was doubled. This time, the copper was sprayed onto the shallow areas, and injected into deeper water areas by using a weighted hose.

Two sections of drain line were partially plugged, and the copper solution was sprayed into the drain lines at 10 access points. Well water was added to the two partially plugged sections until approximately three inches of standing water was present. The plugs remained in these sections until removed three days later. There was a noticeable difference between treatments, with the second being more effective. Live red swamp crayfish continued to be found in burrows, and collected during nighttime netting from the pond. None of the red swamp crayfish collected from the drain lines were alive, except for four live ones removed from the main drain line closest to the pond. To date, over 200 adult red swamp crayfish have been removed from this site, with an unknown number of dead and not recovered from the pond. Pyrethrin, a commonly used insecticide, is an effective means of removing red swamp crayfish, but is not labeled for use in aquatic systems. Exemptions have been obtained for this pond, and a treatment is scheduled for December. Trapping and digging up burrows will continue to reduce the number of red swamp crayfish until pyrethrin treatment is applied.

In May 2022, two adult tire track eels were collected from a Cape Coral canal as part of a multi-agency Fish Slam event. A follow-up survey conducted in July 2022 did not yield any additional specimens.

A Fish Slam is tentatively scheduled for December 7-8, 2022. The focus of this Fish Slam will be waterbodies in Miami-Dade and Broward counties to look for nonnative fish species in areas not frequented by biologists.

A Fish Chat meeting will be held in conjunction with the Fish Slam in December 2022. This collaborative effort is an opportunity for biologists to provide updates on current work, proposed work, and discuss topics of interest.

Kelly announced that **Kristen Sommers** is no longer with the USFWS. She is now employed with the US Fish & Wildlife Service.

Jon Lane added that a study was done at Florida International University on Asian swamp eels in the Everglades National Park. The eels have been in the Everglades for over 10 years. Native crayfishes and other species have been decimated by the eels. Gambusia have been reduced by 50%. **Jon** has been working with FWC and USGS partners on monitoring restored areas in the Picayune Strand area. The plan was to restore sheet flow of water that had previously been unsuccessfully plugged, which created canals. In these canals, electroshocking showed 98% invasives. **Jon** will work with the project management team for Everglades restoration to come up with solutions.

Georgia

Jim Page reported that in early 2022, the GADNR conducted a review and update of Board Rule 391-4-8 (Wild Animals) in The Official Code of Georgia Annotated (O.C.G.A.), which identifies laws within Georgia, including providing regulatory authority to certain entities for establishing rules and regulations within the state. Much of this regulatory authority is provided to the Board of Natural Resources. These rules “maintain and supplement the list of wild animals requiring a license, insurance, or both to prohibit certain species. Based on that review, the GADNR recommended some updates to the Board regarding adding certain species to the Prohibited list; Inherently Dangerous Wild Animals Requiring License/Insured; and Wild Animals Requiring a License list, which were all approved by the Board in October 2022, and will go into effect in November 2022. Several animals were also added to the Prohibited list.

Since the introduction of flathead catfish into the Satilla River in the 1990s, the impact on native redbreast sunfish has been significant. In an effort to reduce their impact on redbreast and other native fish, GADNR staff initiated efforts to remove flathead catfish on a part-time basis in 1996, and full-time beginning in 2007 to control their population. Removal efforts for 2022 began in May, and 2,266 flatheads were removed. Staff remain committed to conducting removals annually as much as possible, despite seeing a lower total number of fish as compared to recent years.

GADNR staff also continue to remove blue catfish from the Satilla River, which occurs simultaneously during flathead removals. A tremendous surge in the number of blue catfish was seen in 2022, with 1,552 blue catfish were removed from the river.

Thorough eradication efforts were done in October 2019 to prevent the spread of Northern snakehead found in Gwinnett County. GADNR staff continue to monitor this site and nearby downstream waters to ensure they were eradicated. Since 2020, GADNR staff have teamed with USFWS staff to conduct eDNA sampling in waters adjacent to the discovery site. Sampling efforts in 2021 indicated two positive hits for snakehead eDNA, though follow-up sampling in 2022 found no positive hits. Monitoring of nearby waters will continue.

Triploid grass carp continue to be purchased and used by the GADNR, particularly for control of weeds at ponds located on GADNR fish hatcheries. They are also utilized at other facilities, including for long-term pond maintenance at ponds located on GADNR state park lakes and federal properties. GADNR is assisting the USFWS with stocking Banks Lake National Wildlife Refuge to aid in control of *Cabomba spp.* and other vegetation. Thus far, 1,155 grass carp have been stocked into the refuge.

Asian mystery snails were captured at Lake Acworth in Cobb County, and Lake Oconee in Putnam County. Multiple reports were received by private citizens in June and September 2022.

An apple snail was captured in Lake Worth in Dougherty County. Multiple reports were provided by private citizens in June and September 2022.

A brown hoplo was captured in Little Spanish Creek in Camden County. The report was submitted by a private citizen, and the fish was kept.

White perch were captured in Clarks Hill Lake and Lake Hartwell. Reports were provided by GADNR staff. Fish continue to be observed during standardized sampling.

A vessel owner contacted GADNR in July 2022 prior to launching his boat into Lake Lanier to inquire about suspicious mussels attached to his motor. He had recently purchased the boat from a dealer in Michigan and trailered it to Georgia. GADNR staff responded and found the boat to have several zebra mussels attached to the motor and stern. All mussels appeared to be dead, but the boat was thoroughly decontaminated as a precaution.

Commercial fishermen continue to periodically report catches of Asian tiger shrimp in Georgia waters, though such incidences remain low. Reports continue to be provided through the new reporting tool on the GADNR-WRD website. Tiger shrimp occurrences will continue to be monitored. GADNR staff may potentially intercept tiger shrimp during fishery-independent standardized sampling conducted monthly at over 35 sites coast-wide by the GADNR Coastal

Resources Division. A single tiger shrimp was captured in these surveys in Sapelo Sound. Abundance of tiger shrimp in Georgia's sampled waters are low.

Additional updates to the GADNR Aquatic Nuisance Species web page on the website continue. The reporting tool continues to be used by the public as a way of informing GADNR of new discoveries.

Two new ANS signs have been developed and installed at boat ramps/public access sites around Georgia to inform the public about how they can help prevent ANS introductions. Signs have also been provided to GA Power to install at their ramps.

Staff have begun setting up ANS display tables at various locations to help educate the public about ANS in Georgia, and how they can help. The displays have proven very successful, and staff continue to seek new locations to set up the displays.

GADNR staff have provided ANS rack cards to GADNR Law Enforcement for distribution to all participants taking Boater Education classes across the state. This will provide ANS information to boaters to educate them on how they can help prevent transporting ANS.

Staff is partnering with the USFWS and Pacific States Marine Fisheries Commission to offer trainings pertaining to ANS. In May 2022, Watercraft Inspection/Decon Training and Hazard Analysis Critical Control Point Training were conducted.

Visits to schools and other educational outlets continues to be a priority. Over 1,300 students and adults have been spoken to at 17 schools/civic groups during this reporting period. Nine of these included talks utilizing the Traveling Trunk, which continues to be a valuable tool provided by GSARP.

Staff continue to utilize the ANS education trailer at various outreach events. This educational tool has been a great addition in efforts to teach children about ANS.

Louisiana

Rob Bourgeois reported that a report of a peacock bass was seen by LDWF biologists on Facebook. The fisherman was contacted by the LDWF ANS Coordinator. The fish was caught in Bayou St. John but thrown back into the water by the fisherman. The fisherman met a biologist at the location where he caught the fish. LDWF electro-fished the area, but did not find the fish. Based on the description of how the fish was hooked, it had a low chance of surviving. The area will be checked periodically. Due to the climate match for the fish being low for that part of LA, it was felt that it could not become established.

Public reports of apple snails slowed from the normal pace in previous years. Drought conditions early in the reporting period had kept the public reports at low levels, but southern LA entered a rainy period that resulted in a sudden increase in reports. In October, a report was received of apple snails in a pond 20 miles further north than the nearest reported sighting. It was learned that the neighbor of the person reporting it had released the snails into the pond. He had eaten some and wanted a source of them closer to his home. LDWF Enforcement investigated the incident and issued appropriate tickets to the individual.

In 2020, LDWF began two projects funded through USFWS's Lower Mississippi River Invasive Carp Partnership and the Atchafalaya, Red, and White Rivers Invasive Carp Partnership. These two projects should assist LDWF in locating breeding areas and in identifying potential locations for carp barriers. LDWF has tagged approximately 155 invasive carp to help increase the understanding of the movement of the carp in south LA.

One interesting finding of the carp telemetry study was that one silver carp that spent December and January in NW Vermillion Bay, until it showed back up on the receiver array 125 km away in the Atchafalaya River. It appears to be migrating upstream as would be expected for the spring reproductive period. This confirmed suspicions that invasive carp can use coastal waters to move between river basins.

In 2021, LDWF began four partnership-funded projects to investigate the developing markets for invasive carp, investigate obstacles inhibiting commercial fishermen from harvesting invasive carp, and study the impacts of invasive carp on native commercially important fish. Early results from the survey of fishermen and wholesale dealers indicate that the commercial harvest can increase if markets are available for the fish.

For fiscal year 2022, LDWF has additional studies to expand the telemetry project, develop commercial markets for carp, help define the exact breeding periods of the carp, continue studying impacts on native fisheries, and investigate the effectiveness of commercial gill nets in off-channel habitats. These projects will begin in January 2023.

Asian swamp eels were found in Bayou St. John in New Orleans in June 2019. LDWF and a college professor continue to monitor and sample the population. Two small eels were found in samples collected in September 2020. No eels were found from September 2020 to May 2022. Only one eel has been reported thus far in 2022, and it was caught by an angler and confirmed via photograph. This eel was caught at the original site where the swamp eels were first detected. LDWF sampled in August 2022 and did not find any swamp eels. A more intensive survey is being discussed for spring 2023 to ascertain the status and range of the species.

LDWF continued with control of invasive aquatic weeds, using a variety of techniques. Aquatic plant control plans were developed for 74 different water bodies during the reporting period. In 2021, 25,271 acres of nuisance vegetation were treated. Giant salvinia continues to be the most problematic invasive plant in LA. Herbicides were applied to over 20,000 acres during that time. Additionally, 15,000 acres of water hyacinth were treated across the state as well. LDWF uses chemical, physical (booms and drawdowns), and biological (insects and grass carps) approaches to control aquatic plants. In 2021, LDWF had an Aquatic Plant Control Program budget of \$3,200, 000, of which over 50% of that was spent on giant salvinia alone for monitoring, treatment, and research.

A project was initiated where observations from members of the public are filtered on iNaturalist to produce a list of all invasive species reported. The LDWF ANS coordinator looks for new invasive species, as well as any range extensions using this list of species and locations. Any observations of interest may generate a site visit to determine if the report is accurate. Thus far, no data has yielded any confirmed new invasive species.

Mississippi

Freshwater report:

Dennis Riecke reported that they received a report of eels at an Asian fish market. After an investigation, it was discovered that they were Asian swamp eels, and the eels were confiscated. The case went to court, and the man selling them was convicted.

Eight new invasive carp grants have been received. Nine projects are under way.

Several studies funded by ANS funds are being done. **Kristina Alexander** with the Mississippi-Alabama Sea Grant Consortium, and a member of the GSARP panel, did a survey for MS DWFP on people's knowledge of invasive species, where they get their information from, and if it caused the person to change their behavior. The project is finished, and the final report is being printed.

The MS DWFP received a \$30,000 grant for contract spraying in several oxbow lakes, public waterbodies, Horseshoe Lake, etc.

MS DWFP will receive updated aquatic plant identification control sheets that have photographs and comments on the ecological value of the plants in terms of what species of wildlife eat them use them, etc. These will be beneficial to pond owners, as there is information on which/how much chemicals to use for invasive plant control. The sheets have been reviewed by **Dennis** and several others, and will next be internally reviewed at Mississippi State University. It will then be published by the Agricultural Extension Service. The sheets will be in a book format. The book will be available online.

In the long-standing effort to accomplish contract harvesting of invasive carp in the Mississippi River and the Yazoo River basin, carp processing firms have been used to process the carp. However, it was decided that MS DWFP will purchase a boat and nets, and hire two contract workers to harvest invasive carp. Several businesses have expressed interest in DWFP's 18-cent reimbursement per pound for invasive carp. A bait company in Maine has expressed interest in using the carp as lobster bait. A stone crab fishery in Florida is also interested in using the carp as bait. Several crawfish farmers in Louisiana are also interested in using the carp as bait.

Ryan Jones reported that ANS funding was received last year for contract spraying that was used for Horseshoe Lake, which consists of 600 acres of oxbow lakes, with 400 acres of water hyacinth. There was no access to the water hyacinth, so a ramp was installed. A boom was installed to work in zones. In the spring, chemical spraying will be done in a 100-acre zone, but there are also cypress trees there, so caution will be taken not to kill those trees.

Several lakes on the Tennessee-Tombigbee waterway on the Mississippi side were reported to be infested with giant salvinia. A site visit to a lake in Aberdeen resulted in finding 20 acres of giant salvinia covering a boat ramp. A boom will be installed to protect the ramp so that boats cannot push the salvinia further into the water system. Chemical treatments were also done.

Near Hattiesburg, a site visit to private land resulted in finding giant salvinia in a watershed on the Leaf River. The infestation had been there for quite some time. Flushing events have most likely resulted in its spread all down the river into oxbow lakes. Through a program called Fire on the Forty, prescribed fire burns will hopefully be done on the area.

Saltwater report:

Mike Pursley reported that MDMR crews continue control efforts against the Pascagoula River giant apple snail infestation. Over 1,600 pounds of snails and thousands of egg masses were removed from the river.

Three aerial photo surveys totaling 280 miles were conducted for early detection of AIS in difficult-to-access areas and to help monitor treatment efforts.

A program of integrated pest management and spot herbicide application (66 boat missions) was used to control populations of common salvinia, giant salvinia, alligator weed, torpedo grass, Eurasian watermilfoil, and water hyacinth.

Spot helicopter herbicide application to *Phragmites* was applied to 111 acres on Deer Island.

One report of a non-native *Penaeus monodon* caught at the mouth of the Pascagoula River was received and reported to the NAS database.

Limpkins that are native to Florida have been officially spotted for the first time in Pascagoula River. They appear to be feeding on giant applesnails. It is not known if they moved in from Louisiana or Florida.

Articles about water hyacinth and giant applesnails were published in Coastal Markers, the quarterly magazine of the Mississippi Department of Marine Resources.

The MDMR continues to serve on the Mississippi Aquatic Invasive Species Council, the Mississippi Cooperative Weed Management Area, and the Pascagoula River Alliance.

South Carolina

Julie Holling reported that since the last GSARP meeting, SCDNR has treated or arranged the treatment of many rivers, creeks, reservoirs, and lakes. Plants treated include alligator weed, water hyacinth, water primrose, hydrilla, fanwort, tussock, duckweed, spatterdock, crested floating heart, milfoil, and phragmites.

Staff will be doing community outreach at the Southeastern Wildlife Expo in February in Charleston, and at the Palmetto Sportsmen's Classic in March in Columbia.

SCDNR and the USGS continue to receive reports of island apple snails from the public. The majority of the observations have been in areas where island apple snails were previously documented by SCDNR MRRI's Shellfish Research Section staff; however, the SCDNR received one observation of island apple snails near the Santee Cooper resort on Lake Marion, SC, which would represent a new location for these snails. Staff verified these observations and collected egg samples for future genetic analysis. Staff also received two recent reports of island apple snails on the Waccamaw River in Socastee, SC. Staff previously found island apple snails in this area in 2016. Reports from Lake Marion and the Waccamaw River have been sent to the USGS for documentation in the NAS database, along with additional reports from members of the public. SCDNR staff have also been in contact with and provided information to US Fish and Wildlife staff conducting research on the link between gastropods (including the non-native island apple snail) and limpkins in SC. **Julie** later added an update during the meeting regarding the report of a new population of apple snails in Lake Marion. She recently learned that this

population of apple snails have actually been there for approximately 10 years, and have not moved.

The red swamp crayfish, *Procambarus clarkii*, which is invasive to South Carolina, is nested within the subgenus *Scapulicambarus*, which it shares with only four other species, including the native eastern red swamp crayfish, *Procambarus troglodytes*, which is the species most closely related to *P. clarkii*. The eastern red swamp crayfish, *P. troglodytes* is the most abundant native crayfish species in South Carolina where much of its range overlaps with known locations of invasive *P. clarkii*. Hybridization is common among crayfish species; however, the majority of the research to assess hybridization of non-native crayfish with native species has focused on the genus *Faxonius*, with little data currently available for hybridization within the genus *Procambarus*. Researchers at the SCDNR MRRI have been applying molecular tools to test whether hybridization is occurring within wild populations of the *Scapulicambarus* subgenus of crayfish. Baited minnow traps and dip netting were the primary techniques used to locate *P. clarkii* and *P. troglodytes*. Microsatellite markers were used to genotype *P. clarkii*, *P. troglodytes*, and any potential hybrids collected in the field. The resulting genotypes were subjected to the model-based Bayesian clustering methods implemented in STRUCTURE to estimate and visualize potential shared ancestry that would be expected if hybridization is occurring between these two species. A total of 259 samples, 127 *P. clarkii* and 132 *P. troglodytes*, are included in the final STRUCTURE analysis estimating shared ancestry between the two species. These analyses are nearing finalization, but remain ongoing.

White spot syndrome virus (WSSV) is highly pathogenic, infects many crustacean species, and was recently associated with both wild and farmed red swamp crayfish, *Procambarus clarkii* in Louisiana. Since LA exports live *P. clarkii* to South Carolina, the potential presence of WSSV in these specimens raises concerns over WSSV threats to commercially-and recreationally-important native crustacean species in SC, such as the white shrimp and blue crab that are known to be susceptible to WSSV. Researchers are conducting experimental trials to investigate the potential pathways of WSSV transmission from *P. clarkii* to estuarine crustaceans. These trials will focus on the relationships between environmental conditions and WSSV transmission dynamics, including the rate of initial transmission, infection intensity, and mortality rate.

Michael Kendrick added that white spot syndrome virus can be a large problem for aquaculture of this species. Distribution of live crawfish throughout the southeast could be a pathway for spreading white spot syndrome virus. Lab trials are being done to understand the transmission of white spot syndrome virus from non-native red swamp crayfish to native white shrimp and/or blue crab that may be in environmentally relevant context in terms of temperature and salinity. It is hopeful that each of those variables can be manipulated in terms of understanding whether or not higher or lower salinities or temperatures may facilitate transmission of the virus from the non-native species to native crustaceans. Field work will be done next week to continue collecting more specimens for the project.

Commercial and recreational crabbers have increasingly reported the occurrence of invasive portunid crabs in South Carolina. This includes the Indo-Pacific swimming crab, *Charybdis hellerii* and the bocourt swimming crab, *Callinectes bocourti*. To manage any potential ecological and fisheries impacts, researchers with SCDNR MRRI's Shellfish Research Section are interested in understanding the distribution and occurrences of these invasive portunid species. During the current reporting period, SCDNR's Environmental Research Section staff collected one *Charybdis hellerii* during sampling near the Folly River, SC. A second *C. hellerii*

was caught by a commercial shrimper near Fripp Island, SC., but the crab was not kept. A tissue sample was collected from the one specimen and sent for genetic analysis. Staff will continue to accept specimens from commercial and recreational crabbers.

Portunid crabs are often difficult to identify at the juvenile stage, leading to a lack of life history information for many portunid species in this age class. Therefore, researchers at the MRRI are using a combination of morphological and genetic approaches to facilitate greater taxonomic resolution for juvenile portunid species. Specimens were collected and retained from the SCDNR Estuarine Trawl Survey, which includes 26 statewide sampling locations. Sampling for this project has been completed, resulting in the collection of over 700 juvenile portunids from the *Callinectes*, *Arenaeus*, and *Achelous* genera. Genetic samples have been sent for analysis and the genetically verified identifications will be used to develop a guide to increase the accuracy of native and non-native portunid identifications in the field.

Michael added that genetic sampling is ongoing, and should be done soon. A “field guide” of juvenile portunids for both native and non-native species in South Carolina and the southeast will then be created.

The Crustacean Research and Monitoring Section is currently working on a new project to better understand the distribution of the non-native blue land crab, *Cardisoma guanhumi*, in South Carolina. In September, staff received multiple reports of the species from the public. With help of staff at the Natural Heritage Program, a public sightings database for the species was created. A press release was issued to encourage the public to report any sightings to the new database. To date, there have been 60 confirmed reports of blue land crabs in SC, ranging from Beaufort to Myrtle Beach. The blue land crab is semi-terrestrial and native along the Atlantic coast of the Americas, from Brazil to Southern Florida, and throughout the Caribbean, Gulf of Mexico, and the Bahamas. It is not known whether the species arrived here through natural expansion or human-mediated sources or what/if any impact the blue land crab may have on ecosystems in SC. Adult blue land crabs live in terrestrial habitats, sometimes as far as five miles from the nearest coastal waterway, and dig burrows up to six feet deep. They are considered pests in some areas due to their extensive burrowing. Adults can vary in color from blue/purple to ash-gray, while juveniles are typically orange/dark brown. CRMS staff hope to gain a better understanding of the distribution and extent of this species in coastal SC through data collected by the public reporting website.

Jon Lane added that the APC (Aquatic Plant Control) Program is not being utilized in the southeast very well, but he has heard that a 50/50 cost-share agreement has been entered into with Santee Cooper. **Jon** stated it should be expanded beyond Santee Cooper, because if they are doing the agreement specifically with them, it does not make sense if there are other opportunities throughout the state. **Jon** will enquire who is behind that, and ensure that the agreement gets made in a broader scope.

Jon also reported that, in North Carolina, the USACE worked with **Rob Emens** and Rob Richardson of North Carolina State University last year on a rapid response of a salvinia molesta infestation at Richardson Pond, located near Tabor City in Columbus County on private land. The pond is a small private tributary in a river system, A drip treatment, along with other treatments, were done; however, no follow-up on the infestation was done. Unfortunately, the salvinia has returned in the pond.

Texas

Monica McGarrity reported that since the last GSARP meeting, zebra mussels have been detected in only one new water body in Texas – Diversion Lake. This is a private access lake located downstream of an infested water body, so downstream dispersal into this water body was inevitable. Lake Walter E. Long was also upgraded to fully infested status following the finding of settled adult mussels. Previously, only larvae had been detected. The quagga mussel situation at Lake Amistad on the Rio Grande continues to be monitored by the NPS in collaboration with TPWD. Since the spring/summer 2021 detection of quagga mussel larvae and eDNA, there have been no additional eDNA/larvae detections and settled mussels have not been found.

TPWD continues to work with Oklahoma Department of Wildlife Conservation, Arkansas Game and Fish Commission, Auburn University, and Texas Tech University to assess the population status of invasive bigheaded carp (bighead and silver) in the Lower Red River Basin across the tri-state area. A ~\$1M grant was recently obtained to continue the population assessment for a third year and to conduct a two-year telemetry study. To date, bigheaded carps have been found in the Red River upstream to Denison Dam below Lake Texoma and in all tributaries, but, thus far, successful reproduction has not been documented.

Giant salvinia continues to be the most problematic aquatic invasive plant in Texas. It is present in 25 reservoirs and seven river systems. Early detection and rapid response efforts continue, and a new introduction was recently extirpated at Lake Pinkston. Treatment of a recurrence found at Lake Gilmer is ongoing. Biological control using giant salvinia weevils continues to show success, and the weevils are being used as part of the IPM strategy on 15 water bodies, with a total of 353,638 weevils released in fiscal year 2022. Self-sustaining weevil populations are now present at J.D. Murphree WMA lakes, Toledo Bend Reservoir, Sheldon Lake, Lake Naconiche, Lake Nacogdoches, and Lake Raven. Herbicide treatments using penoxsulam/flumioxazin are also used to control giant salvinia on 31 water bodies, with nearly 15,000 acres treated in fiscal year 2022.

Water hyacinth also continues to be problematic, and is present in 58 reservoirs and all major rivers across the state. In fiscal year 2022, nearly 3,500 acres of water hyacinth were treated with herbicides on 30 water bodies.

Crested floating heart is currently found in four water bodies and yellow floating heart in two water bodies. Yellow floating heart is also present on the Louisiana side of Toledo Bend Reservoir on the state border. Treatment using ProcellaCOR has been highly effective, and infestations have been significantly reduced on most water bodies.

Because hydrilla in many cases provides much-needed fish habitat in aging reservoirs in Texas with minimal littoral zones, treatments of this species are limited to addressing access issues at swimming areas, campsites, along shorelines where it has become problematic for lakefront landowners for access, boat ramps, and boat lanes unless coverage exceeds 40%. Control strategies include herbicides and triploid grass carp. In fiscal year 2022, 170 acres of hydrilla were treated across nine water bodies.

Giant reed control is ongoing in central Texas, and has expanded to include the Pedernales, Blanco, Guadalupe, Medina, Nueces, and Llano Rivers and San Felipe Creek. Control is implemented on nearly 400 private and public properties across these basins in collaboration with the landowners.

In collaboration with the USFWS, saltcedar control on the Upper Brazos River in critical habitat for smalleye and sharpnose shiners continues to be a priority. To date, over 20,000 acres have been treated across approximately 150 primarily private properties.

Watershed-scale elephant ear control on the Llano River continues, with over 50 river miles in monitoring or active management status. In 2022, survey and treatment efforts were hindered by severe drought, with only one treatment event conducted.

Australian redclaw crayfish were reported to TPWD from an apartment pond in the Brownsville, TX area by researchers from the University of Texas Rio Grande Valley. It was later discovered that an earlier, unreported sighting had been documented at the same site on iNaturalist in 2013. Surveys in July found a single ARC at an additional site a few miles away. A press release was issued to solicit reports from the public, resulting in additional confirmed reports from residents in the surrounding area, including one in the Rio Grande. Control efforts would likely not be feasible, since they have been found at numerous sites, and because of the connectedness of the waterways in this area.

The Texas Parks and Wildlife Commission adopted recent rule changes that ensure that commercial facilities (e.g., aquarium stores) are not eligible for exotic species zoological display permits following interest by such entities in these permits. Although such entities may intend to comply with regulations prohibiting sale under permits, enforcement would be difficult, and display of these species in aquarium stores could generate interest among aquarium hobbyists in obtaining them illegally, and not consistent with the goals and objectives of the department to prevent introductions.

TPWD is currently supporting four AIS research projects through their biennial AIS grant program: 1.) *Near real-time detection and monitoring of invasive mussel species in Texas waterways*. This project seeks to test a novel and efficient AI process to more quickly detect and enumerate zebra mussel veligers, refine the technology, and explore spatiotemporal variability of veliger presence and density over time in the study areas. The study will also implement this technology to augment early detection monitoring in Texas. 2.) *Assessing the population dynamics and body condition of zebra mussels within and between two Texas water bodies with different population trajectories: Lakes Belton and Stillhouse Hollow*. This study seeks to better understand population dynamics in two lakes with different population trends in conjunction with food availability and water quality parameters. This study will evaluate potential explanations for population declines that will have implications for predicting ecological and economic impacts of zebra mussels in infected waters, and aid in guiding mitigation strategies. 3.) *Using remote sensing to map *arundo donax* populations in native fish conservation areas throughout Texas to better understand causal factors of invasion and set management Priorities*. This study will test and develop the use of remote sensing technology sensing technology to identify infested areas and areas where infestation is increasing as well as examining landscape factors influencing infestations and identify areas at high risk of impacts. This technology will be applied to native fish conservation areas across the state to aid in prioritizing areas for future control efforts. 4.) *Assessing abundance, sex ratio, and space use by suckermouth armored catfish to enhance control efforts*. This study seeks to assess seasonal abundance of this species in the San Marcos River, as well as assess movement and population sex ratios, and test potential new control augmentation techniques. Results of this study will aid in guiding and enhancing the efforts of ongoing removal efforts.

Leslie Hartman reported that reports of lionfish along the coast are still being received, and one report of Asian tiger shrimp was received.

Invasive species funding will be used for TPWD to assist the Flower Garden Banks with their lionfish removal program.

Region 4 USFWS/Small Grants Program

Cindy Williams stated that they got through all of the grants on time this year. They are anticipating some increases from Early Detection/Rapid Response, but the amounts are not known at this time.

University/Research

Robert McMahon reported that he is working with Jason Lockland from Belton Junior College on a TPWD-funded grant to look at Lake Waco and Lake Stillhouse Hollow, which are about 50 miles south of Waco. These two lakes sit on exactly the same limestone escarpment, and have very similar physical characteristics such as depth and calcium levels. The difference is that Lake Waco got infested with zebra mussels in 2013, and Lake Stillhouse Hollow got infested with zebra mussels in 2016. Population dynamics are being studied to see why zebra mussel populations grow extensively in the first few years, but then decline. These two zebra mussel population dynamics are being compared. A written report will be finalized in December.

Robert and **Monica McGarrity** are still working on a risk assessment for zebra mussels in Texas lakes that have boat ramps. There are over 100 lakes. **Robert** and a graduate student published a large paper in the biological bulletin on a six-year study of population dynamics of zebra mussels in three Texas lakes. **Robert** can send the study to the panel members if they email him.

Dennis asked **Robert** if it is speculated that the extensive growth and then decline cycle of zebra mussel populations in Florida was related to hot water temperatures. **Robert** pointed out that in Texas, zebra mussel population dynamics are different than anywhere else in the world. **Robert** believes that the extensive growth and then decline cycle of zebra mussel populations are due to the very hot water temperatures (30°C in August). In Europe and the northern United States, these hot water temperatures would kill zebra mussels almost immediately. Terminal tolerance tests on Texas mussels showed that they have upper thermal limits of at least 32°C, which allows them to survive through. The interesting fact is that the larger the mussels get, the less tolerant of temperature they become. Whereas zebra mussels live from two to six years in more northern climates, Texas zebra mussels only live for a year or less. This has never changed in over 10 years of studies. There are two generations of zebra mussels – one in the spring, and one in the fall. As summer temperatures get very high, there is no settlement of young, which is probably because young larval mussels cannot tolerate the high temperatures. There are larvae in the water, but they do not develop into a pediveliger, which can settle. When the water temperatures cool off in the fall, there is a fall settlement. Then, both generations grow through into the next year. In August and September when the water is once again hot, these adults die. However, the growth rates of the zebra mussels in warm Texas waters is phenomenal, compared to anywhere else. They reach full adult size within a matter of months instead of a year or two. Mussels born in the spring are reproducing by the fall, and all mussels are reproducing by the following spring. What that means is that even though they have attenuating life cycles, the zebra mussels mature so early that there is a rapid buildup of populations initially. Zebra mussels produce thousands of

larvae per individual. It is troubling in that it was thought that the southern United States was too warm for zebra mussels, but studies have proven that invasion is possible. However, the waters from east Texas to the coast do not have enough calcium to support zebra mussels. They have very high calcium requirements compared to any other freshwater bivalve. They cannot tolerate below 12 milligrams per liter of calcium.

There was a population of zebra mussels in Lake Ray Roberts that were everywhere at first, but now have disappeared. That is in part because the pH for some reason went down below seven, and the mussels cannot tolerate that.

At-Large Member

Pam Fuller spoke on her membership on the U.S. Fish & Wildlife Service's Theodore Roosevelt Genius Prize Advisory Council. The Council's six advisory boards are used by all different branches of the government when an agency cannot come up with a solution to a problem after consulting with their own experts. Experts in various fields outside of the agency are used to find solutions. The Theodore Roosevelt Genius Prize Competitions engage the public to help address six issues: preventing wildlife poaching and trafficking, promoting wildlife conservation, managing invasive species, protecting endangered species, managing nonlethal human-wildlife conflict, and reducing human-predator conflict. **Pam** is a member of two of the boards – promoting wildlife conservation, and invasive species (Co-Chairman). A prize competition was done last year that was focused on control. The winner developed a smart-trapping system for the live capture and monitoring of invasive reptiles. Artificial intelligence is used in the traps to tell whether it should be set or not, depending on what enters the traps. The trap can be released remotely instead of someone having to go out into the field to release it. Another potential addition to the traps is to dispatch the animal, drop it into something, and then reset the trap to save time going out into the field and resetting the traps. **Pam** and her group are now working on coming up with their next problem statement for the next competition that will be announced in February. They are looking for feedback on topics that are important, but a solution could not be found that their agency, group, etc. is looking for. **Pam** told the panel members that if they have some particular problem that they think might be valuable to get input from the public that would be helpful, they can contact her. **James** has her contact information.

Pam also stated that she is working part-time for the Smithsonian Institution as a research associate. Funding was received from the U.S. Fish and Wildlife Service to do screenings to identify potential next pandemic vectors. They are going through the past five years of all animals that have been imported. **Pam** is looking at rectifying the taxonomy for thousands of species of animals. Research will then be done on which diseases they can carry and transmit to humans. Groups of experts in those diseases will be used to help advise **Pam** and her colleagues, and then the scale of the importation and the risk of the disease will be looked at. This information will be used to inform the U.S. Fish and Wildlife Service, who will look at that information for potential Lacey Act listings.

Pam is involved in two projects with co-author Annie Simpson of USGS. The first is the U.S. Register of Introduced and Invasive Species, which is a list of all nonnative species to either the lower 48 states, Hawaii, or Alaska that have been established. This can be a helpful reference. The other project is the publication of the Federal EDRR Database Dataset, which will be coming out in the next few weeks.

Other Business

Membership

Ballard discussed having a federal representative on the panel. In the past, representatives from the Navy and Coast Guard were on the panel. **James** will contact those two agencies for potential members. **Leslie** stated that a representative from the FDA was on the panel in the past. **James** is hoping to add a representative from the US Forest Service. **Peter** pointed out that issues with ballast water as a pathway for invasive species are important, and a representative from the EPA, etc. would be beneficial. **Leslie** suggested a non-federal representative from the ACOE and NMFS would be helpful. **Peter** suggested adding an Education and Outreach representative who works with school-age children, maybe as an At-Large Member or a non-standing seat. **James** informed the panel members that Kristina Alexander will no longer be serving on the panel as a representative for Sea Grant, so that seat is available. **Leslie** stated that she has a Sea Grant agent in mind who she can contact to see if she is interested. **James** stated that those who are interested in serving on the panel can submit their resume for consideration. **Dennis** asked **James** to confirm that the GSARP's SOP states that if a panel member fails to attend a certain number of meetings, that person can be voted off the panel. **James** confirmed that in the GSARP's SOP, it does state that there is an attendance requirement, but for standing members, the procedure is to go back to the agency and ask if they have a representative who could hold the seat, and is able to attend.

Next Meeting, Time and Place

The location of the next meeting will be in Jekyll Island, Georgia.
The date will be in April 2023.

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 3:30 p.m.

Action Item:

James stated that he will replace all of the DVDs with jump drives for all of the traveling trunks.

Action Item:

Dennis will put together an outline for a GSARP brochure and PowerPoint presentation, and then send to James Ballard to circulate among the panel members for input.

Action Item:

James will contact the Navy and Coast Guard to see if they have a potential candidate for the GSARP.