AQUATIC INVASIVE SPECIES IN THE SOUTHEAST MEETING
MINUTES
Wednesday, October 2, 2013 & Thursday, October 3, 2013
Raleigh, NC

On Wednesday, October 2, 2013 Chairman **Hartman** 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
Tim Bonvechio, GA DNR, Waycross, GA
Rick Burris, MS DMR, Biloxi, MS
Paul Carangelo, Port Authority, Corpus Christi, TX
Earl Chilton, TPWD, Austin, TX
Rob Emens, NC DENR, Raleigh, NC
Kelly Gestring,FL FWC, Tallahassee, FL
Lisa Gonzalez, HARC, The Woodlands, TX
Leslie Hartman, TPWD, Palacios, TX
Peter Kingsley-Smith, SC DNR, Charleston, NC
David Knott, At-Large Member, Charleston, SC
Roberto Mendoza, University of Nuevo Leon, Nuevo Leon, Mexico
Craig Newton, AL DCNR, Dauphin Island, AL
Chris Page, SC DNR, Columbia, SC
Don Schmitz, FWC, Tallahassee, FL
John Teem, FL DOA, Tallahassee, FL
Linda Walters, UCF, Orlando, FL

Staff
Ali Catchot, GSMFC, Ocean Springs, MS

Others
Lad Akins, REEF, Key Largo, FL
Todd Ewing, NC WRE, Valdese, NC
Kelly Gestring, FL FWCC, Boynton Beach, FL
Stephanie Green, Oregon State University, Corvallis, OR
Rick Iverson, NCDA & CS, Raleigh, NC
Monica McGarrity, TPWD, Austin, TX
Harley Myler, Lamar University, Beaumont, TX
Brian Piper, Sam Houston State University, Huntsville, TX

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

Adoption of Agenda

After a minor change, a motion to adopt the amended agenda was made, and passed unanimously.

Introduction to the NC Aquatic Weed Control Program

Emens gave a PowerPoint Presentation entitled "NC Aquatic Weed Control Program". The AWC Program assists local governments burdened with aquatic weed infestations. The program's objectives are to provide financial assistance through cost-sharing arrangements, and to provide technical assistance via site assessments, offering management recommendations, and drafting management plans. The program's philosophy is that, by addressing localized outbreaks, the economic and environmental impacts these species impose can be mitigated in the long run.

The North Carolina Department of Natural Resources recognizes specific plants as "Noxious Aquatic Weeds". All species are listed on the Federal Noxious Weed list. Additional plants on the list are alligatorweed, water hyacinth, parrotfeather, brittle naiad, and phragmites. These are the plants the Aquatic weed Control Program focuses their effort on and that qualify for financial assistance.

Hydrilla is a federally listed weed. It is the state's most costly aquatic plant to control. Management costs exceed $1,000.000 per year.

Triploid grass carp are being used as a cost-effective management tool for hydrilla. Through public funds, over 8,000 grass carp were released into Lake Gaston in 2012, and over 4,000 were released into other reservoirs.

Creeping Water Primrose is classified a "noxious" by NCDENR and NCDA. It is illegal to culture, transport, or sell.

Survey and Approach to Management of Hydrilla in Lake Waccamaw

Rob Richardson was unable to attend the meeting. **Emens** gave Dr. Richardson's PowerPoint Presentation entitled "An Overview of Hydrilla in Lake Waccamaw". Hydrilla is the #1 aquatic weed in the United States.

Management methods include using prevention, physical/mechanical management, and biological/chemical control. Hand removal is the most common management form, but is highly labor intensive and inefficient. Plants may reproduce as fast as they are removed. The environment can be modified to create less favorable conditions. Techniques include liming, pond dyes, benthic barriers, fertilization, and water level manipulation. Water drawdowns are effective on many species, is very inexpensive, and stimulates germination or sprouting of native plant species. However, impacts on other organisms/human uses are not known, it is not very selective, and water control structure is needed. Mechanical techniques are only short-term control, they may actually spread problems, are expensive, and may destroy fishing structure. Cutting/harvesting provides direct relief, immediate efficacy, and is moderately expensive. However, it only provides short-term control, is not selective, is slow, and may aid the spread of some species like hydrilla. Other control methods include classical biological control (insects), grass carp, diver-operated suction harvesters, rotovating, and dredging.

The advantages of classical biological control are permanence; low maintenance costs; no chemical residues; minimal environmental damage; desirable species usually unaffected; usually perceived by the public as acceptable.

The disadvantages of classical biological control are effective control may require several growing seasons; initial costs are relatively high; biological control agents are susceptible to a wide variety of human and environmental interferences.

Grass Carp is the main hydrilla control method in NC ponds. They are not desired in many lakes due to feeding on native vegetation and resulting environmental impacts.

Control of monoecious hydrilla using insects has not been successful to date.

Aquatic herbicides are applied to the water. The EPA considers this to be a "food use". Historically, Fluridone is the most-used herbicide for hydrilla management. It is a slow-acting systemic herbicide that can kill whole plants. Only ~5ppb is required for hydrilla control. However, it is difficult to use in flowing water, and resistance is now developing in Florida.

Contact herbicides burn back foliage, and has no effect on roots. It is especially useful for small areas around boat landings and docks. However, multiple treatments must be applied each year. Since copper may be toxic to mollusks, it is likely not an option for Lake Waccamaw.

In late summer 2011, hydrilla was found in Cayuga Lake, NY. The lake is a natural, glacial lake with important native submersed plants. The marina and boating access was promptly closed. In fall 2011, a contact herbicide treatment was done. In 2012, a fluoride herbicide treatment was done. The eradication program has been effective so far, with minimal impact outside of treatment area.

Overview of Other Aquatic Nuisance Species Activities in North Carolina

Ewing reported that Japanese knotweed has been a problem in western NC. Roundup is being used as a control effort.

Chinese and Japanese mystery snails have been found in reservoirs since 2006-2007. Funding has not been available to treat them.

Possession of bighead or silver carp is now prohibited.

An attempt is being made to rewrite statutes regarding the possession of certain exotic crayfish species, and they are also working on ways to reduce crayfish introductions by bait buckets.

A study is being done to see what affect non-native tilapia have on native tilapia and sportfish.

Robotics for Species Collection and Environmental Monitoring

Harley Myler gave a PowerPoint Presentation entitled "Robotics for Species Collection and Environmental Monitoring". Robotics is a potential solution to many problems in biology.

Invasive species vary widely, and eradication or mitigation efforts have focused on chemical, biological, and physical means using either traps or human hunters. Chemical and biological methods are problematic and costly. Unintended side effects can be worse than the species of concern. Traps and human methods are costly and not useable for a large group of species. Environmental monitoring is expensive, time consuming, and lacks precision. Satellite and weather station data is too coarse, and time delays may be significant. A floating robot can easily collect data on water salinity, dissolved oxygen, temperature, conductivity, depth profiles, turbidity, and other parameters. Marine robots are solar powered and hunt at night, quiescent on surface during the day, recharging batteries. They communicate at the surface and geolocates. They are propelled using jet or caudal fin. Though they are slow, they are quiet, and there is a low chance of entanglement. The robot shoots a dart at the lionfish, and records the event.

Robotics has promise for invasive species remediation, and environmental monitoring. Technological advances have made these assertions plausible. The greatest challenge is engineer-biologist interface.

The Economics of Invasive Species

Brian Piper gave a PowerPoint Presentation entitled "The Economic Impacts of Invasive Species". It is estimated that the negative effects of non-native species are now $120 billion. This includes direct loss, and cost of control. However, also to be considered are indirect costs, the cost of potential extinction of native species, and the important distinctions between loss and control costs.

A project is underway to estimate the potential impacts of the Red-Streaked Leafhopper on sugarcane in Louisiana and Texas. There are approximately 400,000 acres of sugarcane in Louisiana, generating a direct impact of about $975,000,000.

Piper recommended that predictions of effects rather than estimates of actual loss should be provided; estimates of secondary and tertiary impacts should be provided; a model of a dynamic cost/benefit relationship should be created; and documentation that is trusted by funding bodies should be provided.

Future needs include data on where the invasive species is; data on how the species spreads; an estimates of the potential unit impacts; and software.

Aquarium Species Scorecard

Gonzalez gave a PowerPoint Presentation entitled "Aquarium Species Scorecard". The project goal is to develop an invasion potential scorecard for aquarium fishes integrating social and ecological information. Goals: Availability potential – Identify social and market networks for aquarium species exchange. Release potential – Identify factors that drive aquarium species to be released by aquarium owners. Survival/reproduction potential – Determine regional potential of survival and successful reproduction. Phase I was completed in 2011.

Factors affecting release potential are purchasing fish and getting information from "big box" stores and not being connected into the aquarium community.

Factors decreasing release potential are using local fish stores for information and being a serious aquarist involved in the social network.

The objectives for Phase II are to use results from the previous study by Weeks et al. 2011 to develop scorecard questions; conduct literature search of traditional risk assessments and invasion potential criteria to review questions and weighting criteria; develop a preliminary scoring system for the scorecard and test on selected species.

The scorecard differs from other traditional risk assessments. It is species and pathway specific, and includes aquarium fishes only. It does not assess impacts. It is species and pathway specific, and includes aquarium fishes only. It incorporates the ecological and social drivers of aquarium species invasion.

Applying the scorecard is done by having a score for each section rather than overall. There are multiple combinations of "scores" for a species. Each score combination results in a different Outreach/Communication/Management target and message.

The next steps are to refine the questions and weighting using input from a September 19th stakeholder meeting, and test the scorecard on seven selected species.

Phase III will test species of concern suggested by TPWD and aquarium industry stakeholders; refine scorecard application strategy; automate scorecard; train others to use the scorecard.

Functional Eradication as a Framework for Marine Invasive Species Control

Stephanie Green gave a PowerPoint Presentation entitled "Functional Eradication as a Framework for Invasive Lionfish Control". Lionfish abundance has increased rapidly. The abundance of relative predator fish has decreased. There has been a 65% reduction in prey biomass over two years.

Complete eradication of lionfish is unlikely. Population suppression is a way of controlling the lionfish invasion. The goal is to make the most effective use of limited resources for control. Minimizing ecological impacts in priority areas, such as juvenile fish habitats, and marine protected areas, is important in planning control.

A two-year lionfish removal experiment is being done in Eleuthera, Bahamas. Lionfish are removed monthly to maintain four treatment groups. The native fish community is surveyed every six months. A lionfish removal project is being done in the Florida Keys, and St. Croix, USVI. Between 2007 and 2010, there has been a 95% reduction in fish biomass on Bahamian reef fishes.

Tools to achieve lionfish control include diver removal, traps, and derbies. Re-colonization happens rapidly.

Population control of invasive species can best be achieved through eradication. Eradication is successful when there is a restricted geographic range, a small population size, the occupied

habitats are readily accessible, and the invader is easily removed. Two new approaches to invasive species management are numerical eradication, and 'functional' eradication.

Update on REEF'S AIS Activities

Akins gave a PowerPoint Presentation entitled "REEF Lionfish Update". Lionfish reproduce at an early age, and spawn in pairs. The lionfish releases two buoyant egg balls. There are over 30,000 eggs per spawn.

Invasion factors include faster growth, less competition, genetic vigor, fewer parasites, and prey naiveté.

Local control can be effective. Collection and handling is also being done recreationally with hook and line, and in traps as by-catch. Nets and spears are very effective in collecting lionfish. Divers can remove over 100 fish per dive.

REEF has been conducting monthly workshops to engage divers and teach them how to handle and collect lionfish. Collecting and handling workshops were held in several Southeast cities. Topics covered include current research, removal tools, impacts, background of the invasion, biology and ecology, collecting and handling, and use of fish. REEF has created a video tutorial on how to filet a lionfish.

Lionfish derbies have been held for five years. The 5th Annual lionfish Derby Series was held in Curacao, the Bahamas, Ft. Lauderdale, Palm Beach, Jacksonville, and Key Largo. Over 5,000 lionfish were removed. The derbies increase awareness and can provide outreach, training for removers, media interest, samples for research, tasting opportunities, and lionfish removals.

A derby effectiveness study was done in Green Turtle Cay, Bahamas and Key Largo, Florida. Shoreline edges, patch reefs, artificial structures, and seagrass blowouts were all studied. Lionfish Derby participants were given surveys to fill out. The derby reduced the local lionfish population by 69%.

Lionfish tagging results found that lionfish exhibit high site fidelity, and will spend up to seven months at the same site. They experience rapid growth, and the growth rate is inversely related to size. Bigger fish grow slower. Some fish do move. It is believed that the shallow-water lionfish are not reproducing as quickly as deep-water lionfish.

Lionfish are increasing in numbers as by-catch in the Florida Keys commercial spiny lobster fishery. Correlations show that when lionfish are present in traps, lobster catch rates are lower. The mean total length of lionfish increases with depth and temporally during the fishing season. Catch rates of lionfish increase with depth.

Large predator fish will not feed on lionfish, even when they are hungry. Sharks will also not eat lionfish. Tests are being done by some divers to see if some large predator fish can be "trained" to eat lionfish. This has proven not to be a good idea due to the dangers to divers, and scientists not wanting predator fish "trained" to approach divers. In an isolated incident, a Trumpet Fish was found with a lionfish in its stomach.

Management agencies are beginning to change their opinions on the lionfish problem. A guide for managers entitled "Strategies and Practices for Invasive Lionfish Control" was created.

The Gulf and Caribbean Fisheries Institute will hold its 6th Annual GCFI Lionfish Session in November in Corpus Christi, Texas. There will also be a special concurrent lionfish market session.

The 1st Florida FWC Lionfish Summit will be held in Cocoa Beach, Florida on October 22nd - 24th. The focus will be to help identify creative solutions to the management of lionfish in Florida.

REEF published "The Lionfish Cookbook", which has many recipes and color photographs.

Ongoing Research on Sessite, Non-native Species in Coastal Waters of the Southeastern United States

Walters gave a PowerPoint Presentation entitled "Non-native, Marine Invertebrates along Coastlines of the Southeastern United States".

Oyster reef research and restoration have been ongoing in the Indian River Lagoon from 2000 – present. From 2006 – 2011, 82 locations were monitored and checked twice per year. *Perna viridis* (Asian green mussel), *mytella charruana* (Charru mussel), and *megabalanus coccopoma* (titan barnacle) are non-natives found attached to live oysters in the Indian River Lagoon.

Maximum range consists of 82 locations from Charleston, SC to Jupiter, FL spanning 894 km that were checked twice per year from 2006-2001.

A study was done to investigate whether *perna viridis* and *mytella charruana* preferentially settle on substrates commonly used in man-made structures such as plexiglass, tile, wood and rock, or on natural substrates like the shells of oysters. Frames containing a mixture of these six substrates were deployed at two locations in Florida. After a one-month settlement, both species preferentially recruited to natural substrates. These results suggest that man-made hard substrates will likely not affect expansion of these two species by providing preferred settlement sites. However, man-made substrates could still provide better locations for survival.

Studies have found that starvation triggers sex reversal. The sex ratio of mussels collected from different locations and maintained in the laboratory with or without food changed under starvation conditions. This is the first study directly showing that food availability can trigger sex reversal in an adult bivalve. According to the data, this mussel species will likely continue to spread along the east coast of the US.

A study was done on *perna viridis* and *mytella charruana* to understand how salinity and temperature tolerances would affect their survival. The data indicated that they could invade a wide variety of saline environments with significant freshwater or saltwater input.

Studies done on the origination of *mytella charruana* showed that the invasion resulted from a combination of at least two populations, which combined to form higher levels of genetic diversity. It is suggested that one of these populations originated from the coast of South America.

The Pink barnacle (*Megabalanus coccopoma*), is a non-native species that originates from the tropical eastern Pacific coasts of Central and South America, and now occurs along the U.S. Atlantic coast and in the Gulf of Mexico.

NAISN Update and Preliminary Results of their State Funding Survey

Schmitz gave a PowerPoint Presentation on NAISN. NAISN is a consortium that uses a coordinated network to advance science-based understanding and enhance management of non-native invasive species. The overall goal of NAISN is to enhance existing invasive species management efforts in North America. There are 176 U.S. federal agencies/institutions with entities that have authority, and/or have divisions or programs pertaining to non-native and invasive species.

"Teach the Teacher" camps for science teachers have been held. The five-day camps cover aquatic, wetland, and upland invasive plants. Student lessons, teacher guides, activities, materials, and field experience are all provided. So far, 250 teachers have attended the camps. NAISN is looking to expand this effort.

NAISN's 5-year plan is to develop a CDC-type website, regional watch lists, standardize invasive species data, develop IT tools, showcase success, and national statistics.

For NAISIN's 2013 survey, more than 100 U.S. state agencies, and 10 Canadian provincial agencies were targeted. There were 23 responses, and data was useable on 11 states and 1 province. The data revealed that the highest percentage of invasive species activity is monitoring, followed by early detection, control, and education. The largest percentage of the state/province budgets is supported by direct appropriations. The invasive species activity that needs more attention is Prevention. Invasive species expenditures were the highest in Florida (over $40 million).

NAISN is developing an invasive species icon to be used for public awareness.

Public Comment

Hartman provided the opportunity for public comment. No comments were received.

The meeting recessed at 5:00 p.m.

Thursday, October 3, 2013

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

Update on Invasive Plants in Texas

Chilton gave a PowerPoint Presentation entitled "Invasive Exotic Aquatic and Wetland Species Update". To help control hydrilla in Lake Austin, triploid grass carp have been stocked.

Giant salvinia has spread from 1-23 water bodies in 14 years, and covers 6,000-15,000 acres.

In Toledo Bend and Caddo Lake, there is an estimated combined acreage of 13,000-15,000 acres of giant salvinia. Currently, there is $450,000 budgeted for FY2014. The cost to treat the current acreage (not the rest of the state) would range from $845,000-2,175,000.

Water hyacinth is present at approximately 40 public water bodies, and covers 6,000-14,000 acres and 14 watersheds.

Chinabery, giant reed, and elephant ear are present on the banks of the Llano River. Management options for elephant ear include chemical treatments, and mechanical removal. In June, 2012, 22 sites were treated. In November, 10 sites were treated.

The Texas program budget for FY2013 is $0.6 million. For FY2014 and FY2015, the budget will be $1.5 million.

Zebra mussels were confirmed in five public reservoirs: Texoma, Belton, Ray Roberts, Lewisville, and Bridgeport.

HB 1241 gives the Commission additional rule-making authority. It requires people leaving or approaching public water to drain from vessels all water resulting from immersion in public water. It allows inspection authority for these actions. It does not apply to salt water. Proposed changes will require water be drained from vessels leaving and approaching public water. It will apply to areas where boats can be launched. It includes live wells, bilges, and any other receptacles that come in contact with public water. Exceptions include: travel between access sites on the same water body during the same day; governmental activities and emergencies; marine sanitary systems; and commercially-purchased live bait. It allows application to water bodies not currently infested; encompasses current infestations; and applies to all public water bodies in listed counties. Impacts to anglers and boaters include: draining must occur before travel to or from access areas; live fish cannot be transported in water from water body where they were caught; live bait caught can only be used where it was caught; no off-site tournament weigh-ins if transporting live fish.

The next steps will be to use available resources to publicize the proposed changes, and to conduct public meetings in DFW-Texoma area.

Aquatic Nuisance Species Task Force Update

Ballard reported that the spring meeting was cancelled due to budget cuts and the sequestration. Instead, a webinar was held.

The fall meeting will be held November 6-7th in Silver Spring, MD.

National Invasive Lionfish Prevention and Management Plan Update

Ballard reported that they have gone through preliminary review of the draft. Ideally, the plan will be given to the Task Force before the November meeting.

Update on Ongoing Aquatic Invasive Species Activities in Mexico

Mendoza gave a PowerPoint Presentation entitled "Mexican Invasive Species Legislation". An amendment was done to Article 85 stating that as required for the protection of species, habitats, ecosystems, the economy or public health, the Minister of Environment should promote before the Ministry of Economy the implementation of regulative or restrictive measures to the exportation and importation of native or exotic flora and fauna, and must impose the necessary restrictions for their transit in the national territory. New for Article 27 Bis., is that the release or introduction of exotic invasive species in natural ecosystems is forbidden. The Ministry of Environment should determine the official list of exotic invasive species. The list should be reviewed and updated every three years, or before if there is enough information to include a new species. A specific regulation should be issued on the prevention of introduction of these species, and the management, control, and eradication of those exotic invasives which are already established in Mexico.

Mendoza spoke on Mexico's National Strategy. Strategic actions are to review, adequate, and develop the legal framework; develop scientific, technical, and institutional capabilities; foster coordination between and within the government, institutions, and society; promote education and public awareness; and generate sound knowledge for decision making. Strategic objectives are to prevent, detect, and reduce the introduction, establishment, and dispersal of invasive species; establish control and eradication programs of exotic invasive species to minimize or eliminate their negative impacts; inform society in an efficient way to promote responsibility in the prevention, control, and eradication of invasive species.

A project with the Global Environment Facility is being done. The project's objective is to safeguard globally significant biodiversity in vulnerable ecosystems by building capacity to prevent, detect, control, and manage IAS in Mexico. With a total project budget of $65,400,000, the project will begin in 2014, and end in late 2017/early 2018.

Incident Command System training will be held in October in Mexico City.

Overview of the "Consensus in the West" Meeting

Chilton gave a PowerPoint Presentation entitled "Consensus in the West".

The goals of the workshop were to develop consistent terminology, to exchange information, to refine programs, information exchange, refine programs, discuss commonalities, develop reciprocity, develop a legislative toolkit, discuss low risk procedures, paradigm shift if appropriate, shape new programs in the West, and boater consistency in the West/Outreach.

The workshop was divided into two groups: State AIS Coordinators, and lawyers and Attorney Generals. The AIS Coordinators developed a list of regulatory needs that consisted of Inspection Authority, Interdiction Authority, Impoundment Authority, Quarantine Authority, Ticketing

Authority, Disposal Authority, Data Collection Authority, and Decontamination Authority. The lawyers developed legislative and regulatory solutions for the needs.

Primary discussions were conducted. Reciprocity was discussed and whether boats from different waters should be handled differently; low versus high risk certifications; trust among states/jurisdictions. Classification of water-bodies were discussed: “unknown”, “uninfected”, “suspect”, “positive”, “infected”, “DNA”, “laboratory certification”, “veligers”, “adults”, “combinations/multiple confirmations”. Inspections were discussed: high-risk versus low-risk inspections, and classification by boat type versus water-body. Seals were discussed: locking devices, and simple paperwork.

A follow-up meeting is scheduled for spring 2014.

State Reports/Attendee Forum

Alabama

Newton reported that several invasive species have been documented in Alabama coastal waters. The Bocourt swimming crab, tessellated blenny, Australian spotted jellyfish, Asian green mussel, Asian tiger shrimp, and red lionfish have all been documented. The Asian tiger shrimp has been a species of concern since 2006 when they were first observed in Alabama's inshore waters. Captures have incrementally increased, and the tiger shrimp can now be found within all of Alabama's primary estuary basins. Unfortunately, the concern for *P. monodo*n has decreased within the commercial shrimping community, which has resulted in fewer validated reports. In 2012, 16 Asian tiger shrimp were validated by AMRD. In 2013, only three shrimp were validated. AMRD continues to focus on documenting occurrence, characterizing the population structure, and processing samples for genetic investigation.

Numerous unconfirmed reports of lionfish have been made to government agencies that indicate lionfish were rather abundant on the Trysler Grounds in 2011. Unconfirmed reports being made by SCUBA divers from 2012-2013 indicate lionfish are now more abundant than previous years

It appears that lionfish are now widespread throughout Alabama's artificial reef permit zone. After a lionfish rodeo in June and July 2012, 26 lionfish were donated to AMRD.

Given the lack of quality lionfish reporting from the public and specimen acquisition, AMRD pursued financial support to fund outreach efforts and monitoring associated with the lionfish invasion.

Florida

Schmitz reported that they are looking at herbicides specifically for hydrilla. They are also looking at grass-specific herbicides for aquatic plant control. **Schmitz** will give a full report on this subject at the spring meeting.

Several studies are near completion and **Schmitz** will be reporting on the results and future utilization.

Gestring reported that if the Water Resources Reform and Development Act gets passed, one of the elements of the bill is that activities preventing the spread and threat of aquatic invasive species will be eligible for funding under the Rivers and Harbors Act of 1958.

The Annual Standardized Electrofishing Survey for native and nonnative freshwater fish populations in southeast Florida urban canals. FWC has performed 207 surveys from 39 canals since 1997. A total of 2,963 fish were collected. Native fish comprised 65% of the total catch, and exotic fish were the remainder. Native sportfish comprised 85% of the native fish catch. Mayan cichlid, African jewelfish, spotted tilapia, and butterfly peacock comprised 83% of the non-native fish catch.

The catch rate this year of largemouth bass over 10" was 24% higher than in 2011, due primarily to exceptionally high catches of bass in the Palm Beach County canals. The 2012 composite catch rate of native bluegill and redear sunfish, and exotic Mayan cichlid and jaguar guapote bream was lower than in 2011, but within the range of values observed in these canals during the past 16 years.

As part of an ongoing study comparing selected life history attributes of bowfin and bullseye snakehead, stomach contents of these fish were analyzed. Preliminary findings of bowfish collected from several south Florida locations indicate fish, amphibians, and crayfish were the primary items found in 249 stomachs. Native fish were found in 27% of stomachs, and exotic fish were found in15% of stomachs. Bowfin consumed a variety of prey including water snakes, sirens, and frogs. Bullseye snakehead stomach contents were similar to bowfin. Fish, crayfish, and reptiles were the primary prey found in 142 stomachs. Frogs and aquatic insects were also found. Exotic fish were more commonly found in the stomachs than natives, and comprised 40% of the identified prey volume.

Jack Dempsey and croaking gouramis were collected from interconnected sites on several dates from locations centered at the Loxahatchee National Wildlife Refuge. Croaking gouramis had not been collected in over 15 years and were thought to be eradicated from Florida.

In May 2013, the Non-Native Fish Laboratory was closed after 42 years at the same location. Additional staff for non-native terrestrial species issues were hired via grants and legislative allotments. Regional wildlife assistance biologists respond to nuisance wildlife calls, and conduct site visits and outreach activities. ESC awarded a contract to UF to continue the Everglades Invasive Reptiles and Amphibian Monitoring Program, and to fund Early Detection and Rapid Response efforts.

FWC is concerned about potential ecological, economic, and social impacts that lionfish may have in Florida. They are hosting a 3-day Lionfish Summit in October. Research and management needs, the current status of lionfish in Florida, and strategies to develop will be addressed at the summit.

FWC passed an Executive Order in 2012 that was turned into rule in 2013 governing the catch of lionfish by divers to facilitate their removal. This rule allows SCUBA divers and snorkelers

using a handheld net, pole spears, Hawaiian slings, or any spearing device specifically designed and marketed towards lionfish to harvest them without a recreational fishing license.

FWC added lionfish questions to their recreational spiny lobster fishing survey in 2010 to capture additional information on distribution, abundance, and stakeholder opinions. In 2011 and 2012, over 50% of divers that fished for lobsters during the survey period observed lionfish and reported on locations. This information is being incorporated into outreach materials developed from the surveys.

An offshore monitoring program was initiated in 2008 by FWC using trawls, video and still cameras, and traps to gather data on Gulf Coast fishes on soft bottom and reef habitats. Lionfish have been photographed and collected from trawls are being sent to the GCRL for further processing. Two lionfish grants were given to FWC researchers.

Asian tiger prawns appear to be in low abundance along the Florida coast, but FWC has a species profile posted on their website, and a reporting process is in place. A tiger prawn was discovered in 2011 near Panama City. There was a recent report of a tiger prawn in Port Charlotte Harbor, which will likely result in an updated news release to increase public awareness.

The Burmese python has an established population in south Florida, primarily in the Florida everglades. FWC sponsored the month-long Python Challenge in January-February 2013 in an effort to raise awareness of the Burmese Python in Florida, and to assess the effectiveness of an award-based competition as a management tool for problematic non-native species. There were over 1,500 registrants, and 68 Burmese pythons were captured and given to the University of Florida for data collection. This is the largest number of pythons ever actively removed within that short of a time frame. A human-dimensions study was conducted regarding the python challenge, and the data will help managers assess the status of pythons on state lands and develop options for containing and controlling them. The results on the project will be published at a later date.

This year, 264 permits were issued for the possession of Conditional, Prohibited, or non-native species.

Five Non-native Pet Amnesty Program events were held during 2012-2013. A total of 321 animals were surrendered. Thirteen outreach events were attended to solicit adopters and promote the pet amnesty program. At these events, 346 people signed up to receive more information about the pet amnesty program.

FWC staff helped organize the annual Everglades Cooperative Invasive Species Management Area summit, and participated in the 4th Annual Exotic Fish Roundup.

Teem reported on the rat lungworm. Nonindigenous apple snails are currently spreading rapidly through the southeastern U.S. The snail serves as an intermediate host of the rat lungworm parasite, which can cause eosinophilic meningitis in humans who eat the infected snails. A PCR-based detection assay was used to test nonindigenous apple snails for the rat lungworm parasite in Texas, Mississippi, Florida, and Louisiana. Only apple snails obtained from the New Orleans,

Louisiana area tested positive for the parasite. These results provide the first evidence that rat lungworm does occur in nonindigenous apple snails in the southeastern U.S.

Recently, apple snails have been observed in the canals of New Orleans where they are reportedly harvested for consumption by various ethnic groups, putting those groups at potential risk for infection with the parasite. It is unknown whether other invasive snail species in the region are presently infected with rat lungworm.

There is another invasive snail species recently detected in the Miami area that could also serve as a new reservoir for the rat lungworm. The giant African land snail is a nonindigenous terrestrial snail discovered at multiple residential locations in the Miami area in September 2011. This snail serves as a reservoir for rat lungworm in other areas of the world where it has been introduced. Samples of giant African land snail were tested form various core areas where it has been found in the Miami area. Four infected snails were detected in one of these areas. The rat lungworm is therefore also established in Florida.

Rat lungworm was also detected from apple snail populations in separate drainage basins in Gretna, Louisiana and Mandeville, Louisiana. In 208, apple snails became established in a residential lake in Picayune, Mississippi, suggesting that it could serve as a new reservoir for the parasite at this location.

The study has shown that apple snail populations infected with rat lungworm are currently limited to Louisiana within the southeastern U.S. Detection of rat lungworm in Gretna and Mandeville confirms the establishment of the parasite in the region and indicates that apple snails have become a component of the mollusk reservoir for the parasite. There was no evidence to suggest widespread infection of apple snails in states other than Louisiana. All samples tested in Texas, Mississippi, and Florida tested negative for the parasite.

All indications are that nonindigenous mollusks are presently serving as reservoirs to allow rat lungworm to expand its range to other Gulf of Mexico states. Further research to define the human health risks associated with rat lungworm as a result of nonindigenous mollusk introductions in the region should include a regional survey of infection rates for both native and nonindigenous mollusk species in the southeastern U.S.

Georgia

Bonvechio reported on the Satillo River flathead catfish removal project. The significant increases of illegally introduced flathead catfish has caused declines in abundances of redbreast sunfish and bullhead catfish. In 1996, electrofishing was begun in an effort to negate the impacts on native fish populations. Despite these removal efforts, the number and size of flathead catfish had continued to increase. In 2006, the GA legislature appropriated funding for three new positions (reduced to two in FY2009). These personnel were assigned the task of reducing the flathead catfish population levels while searching for a long-term population control. For the 2013 sampling season, 2,600 flathead catfish have been removed. Since the implementation of the full-time flathead management program in 2007, more than 68,919 pounds of flathead catfish have been removed from the river in seven years. The size structure of the population and average length have both declined. Biomass per effort has declined from 57.1 kg/hr in 2007 to

12.1 kg/hr in 2013. The age structure was truncated by removal efforts. In 2007, 15% of the population was made up of age-1 and age-2 fish; 50% was made up of age-4 fish; 5% was made up of age-6 or older. In 2012, 70% of the fish were age-1 or 2; 24% was made up of age-3; 5% was made up of age-4 or better.

There appears to be a compensatory shift in sexual maturity due to over a decade of increased exploitation. Maintenance control and/or suppression of flathead catfish in the Satilla River is possible given the reported changes, but higher recruitment and earlier maturation was demonstrated. As a result, this will require intensive harvest to be maintained to prevent the flathead population from rebuilding within 2-5 years.

Five flathead catfish were collected in the Ochlockonee River in June 2013. Ages ranged from three to eight years of age. This is the first time flathead catfish have been documented to exist in the Ochlockonee River in Georgia. Three additional flatheads were collected on September 10th. These fish will be aged as well.

During 2011 sampling, the WRD removal crew documented the range expansion of the Blue Catfish in the Satilla River in Georgia. Seven catfish were recovered, and ages ranged from 3-5 years old. None were collected during sampling in 2012 and 2013.

Bonvechio stated that they are waiting on a report from UGA on the Kingsland/St. Mary's channeled apple snail project.

Chinese mystery snails have been found in the Chattahoochee Drainage, and are believed to occur in numerous water-bodies across the state.

Yellow Bass have been found in two reservoirs in the Coosa River drainage.

Alewife was discovered by WRD in April 2010 in Carter's Lake. Large numbers of established alewife have been collected since 2010.

Emerald Ash Borer has been confirmed by USDA-APHIS in Fulton and DeKalb Counties. Quarantine areas will be established in Georgia. A "Don't Move Firewood" marketing campaign will be promoted.

At the present time, the threat of Asian carp (bighead and silver) spreading into Georgia waters appears to be minimal. The most potential vector for the spread of Asian carp seems to be inter-basin transfer via angler bait bucket.

Louisiana

Bourgeois reported that there were no reports of tiger shrimp from November 2012 to July 2013. From august 1, 2013 to September 15, 2013, there have been approximately 50 confirmed reports of tiger shrimp. Many of these shrimp appear smaller than in previous years, and there is an early increase in the red stripe variant than in previous years. Two live tiger shrimp are currently being housed with a small white shrimp to observe if the tiger shrimp prey on the white shrimp.

Lionfish reports have stopped due to the diver program being discontinued. Dive clubs and spear fishermen have not reported any sightings. Outreach with these groups will be emphasized in the coming months to attempt increased reporting of lionfish.

As of September 2013, LDWF has treated 79,321 acres of nuisance aquatic weeds. Giant salvinia has been a major focus of aquatic plant control efforts in Louisiana since 2006. Herbicide applications, water fluctuation, and biological control are being used to keep giant salvinia coverage at a level that allows for recreational use of water-bodies. Giant salvinia coverage continues to grow at rates that are difficult to control, due to the passing of successive mild winters.

Weevil stocking efforts for giant salvinia have continued in 2013. Early spring weevil samples indicated that overwintering took place in several lakes in north Louisiana. This is encouraging because past winter survival in these water-bodies had been extremely poor, which made weevil control a non-factor. To date in 2013, 306,900 weevils have been stocked into those lakes.

Giant salvinia infestations in southern Louisiana appear to be decreasing in coverage. Three years following initial weevil releases, giant salvinia weevil stocking efforts have proven to be very successful, and their effect on the plant's reproduction and growth rate are evident.

Giant salvinia infestations have spread throughout the freshwater marsh in St. Bernard Parish. In fall 2012, weevils were stocked throughout the area, and efforts have continued in 2013.

Reports of apple snails in more of the canals in the New Orleans area and the upper Barataria Basin continue, which indicates either range expansion or improved reporting by the public. Several members of the public have begun removing eggs and killing adult apple snails when observed on their property. New reports of apple snails have occurred in City Park in New Orleans. Based on the small amount of egg masses, this appears to be a small infestation at this time.

A LDWF 2013 ANS grant to survey selected public urban ponds in Baton Rouge and Lafayette for the presence of ANS is under way.

LDWF received a USFWS grant to extend and expand the 2012 ANS grant for drift net sampling for Asian carp. The first summer of ichthyoplankton sampling is finished, and the samples are currently being analyzed to determine the presence, relative abundance, and distribution of Asian carp. The 2013-2014 grant will be used to expand sample site coverage and help further understand the species.

Increased efforts are being made for better public outreach/education of ANS. LDWF is posting brochures, links, and articles about ANS species/concerns on Facebook. The ANS Coordinator and other LDWF employees have broadened the effort to inform the public about reporting tiger shrimp. Posters asking for reports, traditional media outlets, and radio and television interviews have all been used. This has resulted in an increase in reporting, and in awareness from the public.

Revision of the state wildlife action plan is under way. The 'Introduced' and 'Exotic Species' section will be expanded in this version. Hopefully, this will result in an increase in state wildlife grants to provide needed research on ANS species.

Mississippi

Burris reported that eight confirmed sightings of Asian tiger shrimp were reported to the NAS database from specimens provided to MDMR by local fishermen. Frozen specimens are being collected for the NOAA-NMFS Tiger Shrimp Tissue Repository. An article about Asian tiger shrimp was published in MDMR's annual publication "Shrimping in the Sound" to alert citizens to the tiger shrimp infestation in coastal Mississippi waters, and to ask fishermen to report any sightings.

There were 43 field surveys done for early detection of AIS. No new aquatic plant or animal infestations were discovered during this period. Two aerial photo surveys were conducted for early detection of AIS, and to monitor ongoing control efforts.

Herbicide was applied to control giant salvinia in the Pascagoula River, common salvinia in Robinson Bayou, and a patch of phragmities on Deer Island.

Salvinia weevils were introduced into Robinson Bayou, Pascagoula River.

An "Aquatic Invasive Species Awareness Day" was held at the Audubon Pascagoula River Nature Center. Items from one of the GSARP Traveling Trunks of Invasive Species were exhibited as part of this educational outreach.

A lionfish outreach poster produced by the Mississippi Bight Lionfish Response Unit was distributed to local dive shops.

Asian tiger shrimp outreach posters in English and Vietnamese were adapted for use and placed at area shrimp boat docks to encourage reporting.

Riecke reported that hydrilla was reported in Lake Okhissa in Homochitto National Forest in September 2013.

A female capybara was killed in May 2013 by USFWS employees at St. Catherine National Wildlife Refuge.

In August 2013, Egeria was chemically treated in Ross Barnett Reservoir.

The ANS Task Force has approved the *Mississippi State Management Plan for Aquatic Invasive Species*.

A list of all Mississippi bait vendor locations is being compiled to compose a map to aid anglers and identify locations that will be sent live bait sale regulations for future promulgation.

In August and September 2013, fish kills of Asian carp were reported from several oxbow lakes in the Delta region. One silver carp from a kill in an oxbow lake in 2011 was killed by *Lactococcus lactis*.

A paper titled "*Lactococcosis* in Silver Carp *Hypophthalmichthys molitrix*" was accepted for publication in the Journal of Aquatic Animal Health. This is the first known occurrence of *Lactococcus lactis* in Silver Carp.

The North American Invasive Species Network Survey on the costs of controlling, monitoring, and managing ANS is being completed.

The "Stop Aquatic Hitchhikers" marketing campaign is ongoing.

Links to the MS River Basin Panel on Aquatic Nuisance Species, GSARP on Aquatic Invasive Species, Stop Aquatic Hitchhikers, and Habitattitude websites are on the Department website.

Activities specified in the *Mississippi State Management Plan for Aquatic Invasive Species* will be implemented.

Freshwater fishing bait regulations to specify what bait can be legally sold, possessed, transported and used in MS will be composed.

A list of approved, restricted, and prohibited species under the authority specified in MS Code 49-7-80 and as specified in the *Mississippi State Management Plan for Aquatic Invasive Species* will be adopted.

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

North Carolina

Emens reported that 34 tiger shrimp were reported to the NC DMF in 2012. Of those, 30 were confirmed either by picture or by receiving the specimens. Several will undergo genetic work by James Norris.

In 2013, five tiger shrimp were reported. Of those, three were confirmed.

Two species of nymphoides (floating heart water lily) were added to the noxious aquatic weed list. It is now illegal to culture, sell, transport, etc.

A code has been added to commercial record keeping that will track tiger shrimp catch/take by commercial operations. Less than 10 pounds have been reported to date.

The new budget for 2013-2014 funding for the aquatic weed control program provides $200,000 for aquatic plant control. The Division is limited to providing a maximum of 50% of total cost for aquatic weed projects, so local match is required.

Knott gave a PowerPoint Presentation entitled "Update on the Status of the Asian Tiger Shrimp". As of September 28, 2013, there have been 678 confirmed captures of Penaeus monodon on the Atlantic and Gulf coasts of the US. Since 2006, there have been 1,189 tiger shrimp captured from continental U.S. waters. In 2013, 196 Penaeus monodon have been reported. Recreational fishermen have caught 29% of the tiger shrimp using cast nets, crab pots, drop net, shrimp trap, seine net, or bait trawling; 71% were caught by commercial shrimp trawl.

The largest tiger shrimp captured in 2013 was 330 mm TL off Hunting Island, SC. Among adolescent and sub-adult shrimp, proportionately more red striped shrimp were caught in 2013 than in 2012. Some showed only a remnant of the stripe. In 2013, 43% of the tiger shrimp were caught in estuaries/sounds; 57% were caught offshore in ocean/Gulf waters.

South Carolina

Page provided the SC freshwater report. Work on invasive species sites was done on over 20 water-bodies.

Alligatorweed flea beetles and bio-control agents were released in the Little Pee Dee and Pee Dee region of the state for alligatorweed control.

The initial planning phase of a native plant transplanting effort on the Santee Cooper System has begun.

A grant with the Bunnelle Foundation for control of aquatic invasive species at Huntington Beach State Park was completed.

A meeting was held with SCDNR staff to compile information for the Rules and Regulations Committee and the new SCDNR app for smartphones and iPads.

Work is ongoing for the control of invasive plants growing in three prominent wood stork rookeries.

A meeting was held with reps from USFWS and the USACE to provide information for invasive species control of several species of concern on USACE spoil areas.

Cooperative work was continued with SCDNR Wildlife staff at Bonneau Ferry and Sandy Beach WMA for aquatic invasive species control and enhancement of waterfowl habitat. Approximately 60 acres of habitat enhancement work was accomplished at the sites.

Kingsley-Smith reported that the Marine Resources Research Institute (MRRI) of the SCDNR acquired State and Interstate Aquatic Nuisance Species Management Plan Program funds for FY2013 that are being used to implement targeted field sampling of fouling communities within the Ashepoo-Combahee-Edisto (ACE) Basin National Estuarine Research Reserve (NERR). Predominantly intertidal scrape samples were collected from April 24-June 5, 2013 at locations throughout the ACE Basin NERRS. Additionally, cinder blocks were deployed during that period and left in the field for three months to allow for the recruitment and growth of native and non-native invertebrates. Recovery of the blocks began in September 2013. Two samples from

each block will be removed and preserved for later examination and identification. An archived collection of all non-indigenous and invasive species found in the ACE Basin NERR will be maintained and entered into the catalogued collection of the SE Regional Taxonomic Center (SERTC) at MRRI.

The total number of Asian tiger shrimp reported from South Carolina in 2012 was 64. In 2011, 144 were reported. Researchers believe the reduction in reported numbers is due to reporter apathy and consumption and/or sale of collected tiger shrimp. The SCDNR recently released an updated press release to inform the public that the SCDNR was still interested in both reports and specimens. Low numbers of tiger shrimp are again being reported in 2013. As in 2011 and 2012, smaller shrimp of less than 7" total length are being collected from upstream habitats.

Efforts are continuing to coordinate reports from across the southeast and Gulf region. The goal is to address some of the many unanswered questions about the dynamics and implications of the invasion. Tissue samples are being sent to USGS geneticists, who are conducting microsatellite and single nucleotide polymorphism analyses to determine population structure of *P. monodon* within the region, and attempting to identify the geographic source of the tiger shrimp collected in coastal states in the southeast and Gulf region.

Researchers at the SCDNR have been studying the biology of the American eel since 2011, due to their drastic decline since 1980 and a 2011 petition to list the American eel as an endangered species. A great deal of this work has focused on the prevalence, intensity, and physiological consequences of the invasive nematode parasite, *Anguillicoloides crassus*. Mississippi State Management Plan for Aquatic Invasive Species. The results of the first year of the project (2011) have been presented at previous GSARP meetings, and a manuscript is currently in review for publication. The data from the 2011 study were used in support of a current State Wildlife Grant recently awarded to the SCDNR to assess eels caught in 2012 and 2013 from both estuarine and freshwater habitats.

For 2012 and 2013 thus far, *A. Crassus* has been calculated at 88%. In 2011, the prevalence was 45%, but this difference may be attributed to the lower sample size from the 2012-2013 survey.

Glass eels have been collected on a monthly basis since March 2013 to assess their length, ages, and *A. Crassus* infection and to determine when the eels become infected. Results have shown that infection was nearly zero in spring, until June when prevalence drastically escalated to 35%.

Researchers at the College of Charleston Grice Marine Laboratory continue to study the input to consumptive and detrital food webs of the Asian red alga, which has proliferated on estuarine mudflats throughout the SE US, including South Carolina and Georgia that historically were extremely low in seaweed biomass. At a regional scale, red alga is controlled in large part by the density and above ground height of the native decorator worm which decorates its tube with flotsam. Red alga is a conspicuous component of the materials that the worm uses. The invasion pathways of red alga are being tracked using microsatellite loci by investigating the relatedness of the species from invaded regions around the world. A great deal of genetic variation within certain invasive populations has been identified. It has been determined that the ultimate source of the U.S. East Coast invasion came from the Pacific coast of Japan. Further genotyping and

analysis is ongoing. Research has shown that abundances of native decorator worms are greater when invasive red alga is present.

Beginning in 2011, the Southeast Fishery-Independent Survey (SEFIS) took responsibility for sampling stations off the coasts of Georgia and Florida, while MARMAP/SEAMAP sampled off South Carolina and North Carolina. As of 2013, MARMAP and SEFIS are no longer using digital still cameras to sample on chevron traps. All cameras on traps are now video cameras. Lionfish are being recorded along with other priority species. Data acquisition is still ongoing. It is hoped that data on relative abundance of lionfish over recent years may be available from these efforts in 2014.

In July 2013, one blue land crab was observed in a burrow adjacent to a sidewalk on a street in Charleston. This is a circumequatorial species found throughout estuarine regions of the Caribbean, Central and South America, the Bahamas, and Puerto Rico. Within the U.S., it is limited to the Gulf of Mexico and coastal Florida. A return visit approximately two months later yielded no evidence of the crab or its burrow.

Texas

Hartman reported that there have not been any recent reports of tiger shrimp.

Reports of Australian jellyfish in Matagorda Bay have been confirmed.

A Texas congressman has shown an interest in marine invasives, with a particular interest in Asian tiger shrimp and lionfish.

Public Comment

Hartman 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 3:00 p.m.