GULF & SOUTH ATLANTIC REGIONAL PANEL
ON AQUATIC INVASIVE SPECIES
MINUTES
Wednesday, October 4 - Thursday, October 5, 2006
Charleston, South Carolina

Vice-Chairman Earl Chilton called the meeting to order at 9:00 am. The meeting began with introductions of the Panel members and guests. The following were in attendance:

Members
Diane Altsman, EPA/GOMP, Stennis Space Center, MS
Marilyn Barrett-O'Leary, Louisiana Sea Grant, Baton Rouge, LA
Paul Carangelo, Port of Corpus Christi Authority, Corpus Christi, TX
Earl Chilton, TPWD, Austin, TX
Steven de Kozlowski, SCDNR, Columbia, SC
Dale Diaz, MDMR, Biloxi, MS
Pam Fuller, U.S. Geological Survey, Gainesville, FL
Scott Hardin, FFWCC, Tallahassee, FL
Leslie Hartman, AL Marine Resources Division, Dauphin Island, AL
Ted Hendrickx, Georgia DNR, Social Circle, GA
Tom Jackson, NOAA/NMFS, Miami, FL
Chuck Jacoby, University of Florida/Florida Sea Grant, Gainesville, FL
Jim Lester, HARC, The Woodlands, TX
Jim Long, National Park Service, Atlanta, GA
Ronald R. Lukens, GSMFC, Ocean Springs, MS
Roberto Mendoza, Universidad Autónoma de Nuevo Leon, Mexico
Bob Pitman, USFWS, Albuquerque, NM
George Ramseur, Land Trust for the Mississippi Coastal Plain, Ocean Springs, MS
Steve Rider, Alabama Wildlife and Fisheries, Montgomery, AL
Dennis Riecke, MDWFP, Jackson, MS
Don Schmitz, FDEP, Tallahassee, FL
John Teem, FL Dept. of Agriculture and Consumer Services, Tallahassee, FL
Bruce Thompson, LSU Coastal Fisheries Institute, Baton Rouge, LA
Jay Troxel, USFWS, Atlanta, GA
David W. Yeager, Mobile Bay National Estuary Program, Mobile, AL

Staff
Nancy K. Marcellus, GSMFC, Ocean Springs, MS

Others
Charles E. Ashton, U.S. Army Corps of Engineers, Middleburg, FL
Jim Bean, BASF Corporation, Collierville, TN
Thomas H. Bliss, University of Georgia, Marine Extension Service, Savannah, GA
Susan M. Hennington, U.S. Army Corps of Engineers, New Orleans, LA
David Knott, SCDNR, Marine Resources Division, Charleston, SC

James A. Morris, Jr., NOAA/National Ocean Service, Beaufort, NC
Alan Power, University of Georgia, Marine Extension Service, Savannah, GA
Pamela J. Schofield, U.S. Geological Survey, Gainesville, FL
Jack Whetstone, Clemson University Baruch Institute
Susan B. Wilde, University of South Carolina/SCDNR

Welcoming comments were made by Mike McShane, Chairman of the South Carolina Department of Natural Resources Board of Commissioners.

Public Comment

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

Review and Adoption of Agenda

Due to logistical issues, Lukens asked that Wednesday 9:30 am agenda item "Directed Extinction of Exotic Fish Populations in the Wild Using a Fish Bearing Multiple Y Chromosomes - Teem" be swapped with Thursday 2:30 pm agenda item "Strategies for Improving Industry Involvement in Aquatic Invasive Species - Jim Bean, BASF". **Paul Carangelo made a motion to adopt the agenda with that change. Steve de Kozlowski seconded the motion and the agenda was adopted.**

Review and Approval of Minutes (4/5-6/06)

Bruce Thompson made a motion to approve the minutes from the April 5-6, 2006 meeting held in Atlanta, Georgia. Leslie Hartman seconded the motion and the minutes were approved.

Strategies for Expanding Industry Involvement in Aquatic Invasive Species Management Initiatives

Jim Bean, Environmental Resource Specialist with BASF Corporation in Collierville, Tennessee, gave a PowerPoint presentation.

His current involvement includes:
Vice Chairman, Mid-Atlantic Regional Panel
Board of Directors: Midwest Invasive Plant Network and Tennessee Exotic Pest Plant Council
National Invasive Weed Awareness Week planning and participation.

Why Partner with BASF?

- Growing market for BASF products
- Only manufacturer who sees the value of invasive species specialists

- Strong investment in service offerings
- Building landscape-level vision of the future of IS control
- Good corporate citizen

AIS: Today

- Good things are happening on the ground
- Lots of new research is being disseminated
- Animals get more attention than plants in many cases
- Lack of funding-level understanding of aquatic vs. terrestrial differentiation
- Congress does not necessarily fully understand and support AIS control initiatives
- Groups do not have a clear message and an attainable goal

What Can We Do?

- Need to build understanding of special aquatic species needs at funding level
- Need to build Congressional understanding and support
- Need to find a mechanism to gain non-agency participation in initiatives
- Increasing funding should be a top priority

Preparation: Audience

- Prior to planning, identify your audiences
  - Who are the people you need to engage?
  - What moves/influences them?
  - What do you want them to do?
- Then match messages
- Then plan your tactics

Preparation: Work the Plan

- Develop a top-down strategic plan based on identified audiences and your goals
- Design a few key initiatives and do them well, from start to finish
- Measure your results
- Expect to adapt as your measured results inform your process

Communications Points to Consider

- Use the Web wisely
- Keep your messages as simple and clear as possible
- Fewer words are often better
- Balance science communications against audience expertise (don't expect a Congressman to know what a rhizome is)

As You Succeed:

- Move past awareness campaigns to demonstration of your management methods
- Use the media to your advantage
- See communication of success as a way to influence your audiences
- Share your roadmap with other stakeholders
- Focus on coordination
- Serve as a facilitator of relationships and informational exchange
- Don't re-invent the wheel with your program or your communications
- Learn from others as you share with them

Building the Bridge to Industry:

- See them as an audience
  - Same analysis as any stakeholder
- Understand their motivation
  - They have to protect their bottom line
- Identify key players and approach the best fit first
  - Avoid creating conflict between competitors

Finding the Right Partner

- Understand who is already involved
  - Who can give you what you need and see a benefit on their end?
  - Who often partners with agency personnel?
  - Don't try to force something into existence
- Seek the most strategic partners
  - Chemical, biological, technical, service, research
  - Partners without excess "baggage"

Who is this Potential Partner?

- Understand their motivation before you start building the bridge
- Direct benefits to industry:
  - Sales, profit
  - Relationships with potential customers
  - Industry leadership
  - Corporate reputation

How Do I Meet Their Needs?

- Design projects to produce tangible, measurable results
- Open doors to new approaches for them
- Take as much risk as they take in the partnership

- Measure activities in ways that are meaningful to both of you
- Create clear opportunities for engagement
- Start small if possible to build trust
- Gear activities toward building a long-term relationship
- Go for what they know (i.e. don't ask a chemical manufacturer for a GPS demonstration)

Picking the Right Partner

- Develop your criteria before initial contact
- Apply criteria consistently throughout
- Eliminate candidates that are a poor match based on your evaluation
- Be realistic in your assessment
- Choose industry leaders when possible

Articulating Your Needs

- What do you want from your new partner?
  - Insight?
  - Funding?
  - On-the-ground support?
- Communicate it in a way that is meaningful to them
  - Keep their goals and motivations in mind
- Be honest and timely
- Seek areas of mutual interest and point them out
- Ask for input on the benefit to your potential partner
- Ask for real answers on their limitations up front (understand what it costs them)

Keep It Building

- Ask for comments
  - Gauge satisfaction
  - Find ways to increase involvement
  - Ideas of partners should be respected and evaluated
- Learn from interactions
- Move on if it doesn't work

Building the Bridge to Industry: Keep These In Mind

- Invite them to participate in a win-win
- Be up-front about your needs and goals
- Engage in activities that inspire and reward your new partners
- Give credit where credit is due
- Don't be afraid to get creative (i.e. taking training or in-kind contributions)

- Treat it as you would any stakeholder relationship
- Good communication throughout the process is absolutely necessary
- Evaluate progress constantly
- Measure results for both sides
- Find ways to grow and adapt

For more information: *james.bean@basf.com* or *www.vmanswers.com*.

Monitoring Nonindigenous Species in Southeastern Ports: Why, How, and the Lessons Learned

Alan Power from the University of Georgia Marine Extension Service in Savannah, Georgia gave a PowerPoint presentation to the Panel.

"Over two-thirds of recent, non-native species introductions in marine and coastal areas are likely due to ship-borne vectors."

Why?

- 21 billion gallons of foreign ballast water discharged in US waters each year (Globallast)
- 7000 different species being carried in ballast tanks worldwide (Globallast)
- Many hitchhikers are also transported on the hulls of these vessels
- Most marine nonindigenous introductions in SAB have been attributed to shipping activities
- Commercial ports represent a main entry point for many species introductions
- Estuarine nonindigenous species knowledge base behind those from terrestrial and freshwater systems
- Early detection important for effective response
- Knowledge of species distribution helps predict future spread
- Provide reference data for future assessments of change

How?

- Review literature of biotic surveys for mollusks, crustaceans, and polychaetes in the SAB region
- Integrate this data with GIS

  A total of 74 survey publications were consulted to construct a GIS database detailing 36,502 mapping points for 1,738 species

- Describe Wilmington, Charleston, Savannah, and Jacksonville ports in terms of their history, geology, hydrography, and shipping movements
  American Association of Port Authorities 2005 Port Rankings (TEUs):
  Wilmington, NC 32nd

Charleston, SC 7th
Savannah, GA 9th
Jacksonville, FL 18th

- Comprehensive searches for molluskan, polychaete, and crustacean species in each port

  Hewitt, C.L. and R.B. Martin. 2001. Revised protocols for baseline port surveys for introduced marine species: survey design, sampling protocols and specimen handling. Centre for Research on Introduced Marine Pests. Technical Report No. 22. CSIRO Marine Research, Hobart. 46 pp.

  - August-September 2003
  - Sampling in three zones in each port
  - Sampled various habitats with diverse array of sampling techniques
  - 13 replicates/gear type/zone/port

- Provide baseline information on native biodiversity, and on the presence, distribution, relative abundance, and trophic status of identified nonindigenous species

  Molluscs: 36 species - 27 bivalve, 8 gastropod, 1 cephalopod, totaling 10,793 specimens

  Crustaceans: 122 species - 51 decapod, 30 amphipod, 18 isopod, 12 barnacle, 3 mysid, 3 tanaid, 2 stomatopod, 1 copepod, 1 mysidacean, and 1 ostracod species totaling 42,583 specimens

  Polychaetes: 63 species totaling 2,640 specimens

  221 species, 56,016 specimens: Georgia Museum of Natural History and SERTC in Charleston.

- Determine community structure, sediment size, and water quality at ports

  - Wilmington - lowest diversity & evenness
  - Diversity indices higher below ports
  - Cluster analysis - 2 groupings - marine and brackish water - with brackish sites further split into mesohaline & tidal fresh
  - Annual water temperatures in the ports range from 8 to 30˚C
  - Predominantly poorly sorted fine-medium sand substrates with low-intermediate organic matter
  - Varying distances port facilities are from open sea (5.5 to 26 miles) present a range in salinity regimes (0 ppt to 35.45 ppt)

Lessons Learned

- **Coordination & Permitting**: Marine Patrol, Coast Guard, port authorities, Department of Natural Resources, and Corps of Engineers. This was sometimes difficult, particularly out of state. Different states had different requirements. Security concerns. Convincing ports that project was beneficial was sometimes difficult. South Carolina required Coast Guard to be present for all sampling activities. Florida sampling permit had special conditions and required additional time to acquire.

  - Lots of communication necessary
  - Submit application for all permits at beginning of project
  - Get partners for each state being surveyed
  - Get port authorities on board

- Sampling Conditions:

  Weather: August and September hot, humid, thunderstorms - sampling difficult

  Tides: Very large tidal range - strong currents which may have contributed to lost fouling plates, and also made taking scraping samples difficult from a small boat. We were also dependent upon low tides during daylight hours to collect intertidal scraping and core samples.

  Sediment: Soft muds difficult to move in, made hand coring difficult

  - Collect scrapings at slack water
  - Do as much as possible in early morning
  - Schedule coring to begin while tide going out to allow time
  - Replace hand cores with grab sampler from boat

- Sampling Techniques:

  Trawling: Large quantities of bottom debris in port areas resulted in numerous net snags slowing down the sampling process and causing extensive net damage. Different regulations in Florida meant our nets there had to be pulled equipped with a Turtle Excluder Device which was not consistent with other locations. Trawling during the day will miss all those that bury up.

  Fouling Plates: Difficult to always find suitable site to hang plates. Lost several. No permission in Jacksonville and Charleston ports. Lost many of those we anchored and floated. Distance from sites prevented routine checking. Plates may have been lost due to currents, lines being cut by oyster shells, or may have been interfered with.

- Have many back up trawl nets
- Ask locals and use maps to ID heavy debris areas
- Deploy more plates than needed and use local partners to monitor
- Conduct one set of 13 trawls during day and another at night

Scrapings: Strong currents made it difficult to safely approach and remain at pilings by boat. Dense oyster growth on the pilings required the use of hammers as opposed to scrapers to collect the samples, often resulting in damaged specimens. It was also difficult to scrape a consistently sized area.

- Instead of scraping exact area fill a bucket to a set level
- If surface unavailable take oyster reef clumps from shore
- Sample at slack water
- Tie off or have few hold boat steady while others collect
- Have something obvious that identifies your boat as research
- Method does not sample subtidal fouling communities
- Floating dock would be ideal for subtidal communities

Sampling Adequacy

Our surveys only detected a fraction of the species we know are in the region from literature review. However, these are diverse systems and sample processing is labor and time intensive.

- Bump up number of replicate samples to 15 per zone per gear
- Ports with terminals spread out need more samples in this zone
- Place sufficient plates out to allow for significant losses
- Include shallow water seining and trawling
- Conduct seasonally
- Conduct annually
- Tie into other monitoring programs
- Redesign as rapid assessment type survey if have experts and resources available
- Need better taxonomic keys for region
- Need access to global list of experts for different phyla

We did not include several taxonomic groups that were collected, specifically fish, echinoderms, cnidarians, oligochaetes and other arthropod subphyla. Given the effort involved in collection it was wasteful that we did not have the resources to include them. These specimens were however retained and we are currently identifying them as part of another funded project. We are also targeting shallow water environments using seine nets and a small otter trawl.

- Preserve all specimens, may get opportunity to ID later
- Careful of metal debris, stingrays, alligators, catfish, etc.

- Have plenty of back up nets when tear on snags

Public awareness is critical. Use volunteers to monitor spread or watch for likely invaders. For more information: *http://www.shellfish.uga.edu/researchinvasiveport.htm*.

Members's Forum

Florida - D. Schmitz and S. Hardin reported that Florida held a Pet Amnesty Day on May 6, 2006. This was to give another option other than to turn pets loose into the wild. For this first event, they received very few animals. Plans are to follow up with a second event in March 2007. This event is tied into their outreach and education.

Schmitz also reported that Florida's strategic plan is being updated. Copies are being sent to Ron and Marilyn to look at next week.

Hardin added that they are also conducting a pilot program on risk assessment of triploid grass carp.

Alabama - Leslie Hartman reported that a commercial shrimper recently caught a non-native species of shrimp, *Penaeus monodon* or black tiger prawn, in Alabama's portion of Mississippi Sound. This shrimp is native to the West Pacific and if they become established here they could pose a threat to our native shrimp species. The species has distinct dark and white stripes along its back. Notices are being distributed to seafood shops instructing that if these shrimp are caught to please record the location, save the specimen and contact Leslie Hartman or Mark Van Hoose at the Alabama Marine Resources Division at (251) 861-2882. They are also instructed to ice the shrimp for future examination by biologists.

They have done research on the species and have not found any culturing in Mississippi or Louisiana. At this time they do not have any guaranteed source.

S. Rider added that the freshwater division is moving forward with their management plan. He has been told they will see a draft copy in the next two weeks. There are some things in the plan that his agency has already tried to adopt.

Mississippi - Dale Diaz outlined the following Mississippi activities:

- Grand Bay NERR holding workshops for city and county employees
- Work on state plan continues (90% complete)
- Seeking funding for a statewide coordinator (CIAP)
- MDMR hired 2 part-time employees to work on invasive species issues
- MDWF&P/USGS/USM working irradication and control of tilapia in south Mississippi
- Completed initial field work on MDMR/USGS giant salvinia project in the Pascagoula River

Status of Nile tilapia *(Oreochromis niloticus*) in Southern Mississippi

Pamela J. Schofield from the U.S. Geological Survey in Gainesville, Florida, gave a PowerPoint presentation on Nile tilapia. This work was funded by the U.S. Geological Survey.

- Nile tilapia, *Oreochromis niloticus* (sometimes *Tilapia nilotica*)
- Native range: widely distributed in tropical Africa, Middle East
- Used extensively in aquaculture world-wide
- Arizona: 1970s, no recent reports
- Pennsylvannia: Monongahela, 2006, collected
- Florida/Georgia: Apalachicola basin (Lake Seminole)
- Alabama: Tallapoosa drainage, 1986, collected
- Illinois: 1999, 2005 Chicago S & S Canal, locally established, power plant
- Puerto Rico: non-specific reports
- Mississippi: established in Pascagoula and Biloxi Bay

Species Update

Pam Fuller provided the June-October 2006 species update.

In the Southeast

- Spotted jellyfish (*Phyllorhiza punctata*)
  - Galveston Bay (June)
  - Lake Ponte Vedra St. Johns Co., Florida (July)
- Nile tilapia
  - Crane Creek in Melbourne, Florida (April)
- Tiger shrimp (*Penaeus monodon*)
  - Mississippi Sound (September)

In Other Areas (major jumps)

- Amur goby - new to US
  - Lower Columbia River

- Nile tilapia - new to Pennsylvania
  - Monongahela River near Pittsburg

- Chinese mitten crab - new to East Coast
  - Chesapeake Bay (2)

- Dungeness Crab - new to East Coast
  - Coastal Massachusetts

In Other Areas (minor)

- Pacu - all over (IN, MI, WI, MN, WY, UT, AZ)
- Ruffe - MI
- Silver Carp - Lower Kansas River, Kansas
- Atlantic salmon - Kenai Penninsula, AK
- Fathead minnow - Willamette River, OR

In Other Areas (expansions)

- Siberian prawn (*Exopalaemon modestus*)
  - Snake River, WA
- New Zealand mudsnail - MT, OR, MN
- Zebra mussel - OK, KS, MI, MO, IA
- Quagga mussel - Hudson River and Saratoga drainages, NY
- Nutria - WA

Public Comment

No public comments were received.

The meeting reconvened on Thursday, October 5, 2006.

Public Comment

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

AVM Updates - October 2006

Susan B. Wilde from the University of South Carolina provided a PowerPoint presentation on AVM updates.

Avian Vacuolar Myelinopathy: Model Estimating Potential Distribution
Susan B. Wilde, University of South Carolina/SCDNR and A. Townsend Peterson, University of Kansas

- Potentially toxic cyanobacterial colonies on hydrilla and other aquatic plants in AVM sites
- Aquatic plants and epiphytic algae are primary food source for coots
- Sick waterfowl are consumed by Bald Eagles

Supposed Structure of Transmission:
Cyanobacterium ➔ Hydrilla ➔ Coot ➔ Eagle
All connections are assumed to be obligate (i.e., all are necessary)

Two Simulations:

1. Cyanobacterium ➔ Hydrilla ➔ Coot ➔ Eagle
   Include cyanobacterium: Advantages include that the cyanobacterium may not have the same ecological potential as Hydrilla, more precise (conservative) estimate of distributional potential

2. Hydrilla ➔ Coot ➔ Eagle
   Exclude cyanobacterium: Advantages include that the cyanobacterium may not yet be at distributional equilibrium; as such, including information from its present distributional area may be overly conservative; more of a "worst case" estimate of potential distribution

Three invasive aquatic species dominate AVM reservoirs:

Hydrilla (*Hydrilla verticillata*)
Brazilian elodea (*Egeria densa*)
Eurasian watermilfoil (*Myriophyllum spicatum*)

Fall 2006-2007 Research
- More accurate AVM mortality assessment in waterfowl
- Refine cell line bioassay screening tool for toxic material

Rebecca S. Haynie, Tom Murphy, Charlotte Hope, Sarah Williams, Faith Wiley, Bill Bowerman, and Susan B. Wilde

South Carolina Department of Natural Resources
University of South Carolina
Clemson Institute of Environmental Toxicology

Where are they going? Atlantic fly-way midwinter coot numbers decreased from 869,124 in 1988 to 96,297 in 2004.

Is AVM contributing significantly to the apparent decline? Collections during winter months confirmed 50-95% of the coot populations residing in J. Strom Thurmond Reservoir show characteristic AVM lesions (*Southeastern Cooperative Wildlife Disease Study*).

Proposed Study Outline:

- J. Strom Thurmond Reservoir: Neck band 200 coots upon arrival in respective treatment, control areas

- Half of each group will be wing-clipped and have contrasting neck band color

- Throughout season:
  - Conduct carcasses recovery, analyze for AVM
  - Validate cyanobacterium is present on vegetation using genetic probe
  - Validate cyanobacterium is producing toxin with mallard feeding trial and cell line bioassay

Other questions to be answered:
What portion of symptomatic coots die during the season?
How does AVM effect future migration success?

Successful Extraction of the Toxin Responsible for Avian Vacuolar Myelinopathy (AVM)
Faith Wiley, Michael Twiner, Fran Van Dolah, Susan Wilde, William Bowerman, Tod Leighfield

Avian Bioassay
- Hydrilla collected weekly during trial; ½ frozen, ½ fresh (kept at room temp)
- 4 week trial (19 November - 17 December)
  - All birds sacrificed at end of 4 weeks
  - 2 birds developed signs of neurological impairment
- Experimental Groups (3 birds per group)

AVM(+)	AVM(-)
Hexane	Hexane
Acetone	Acetone
Methanol	Methanol

  - Extracts exchanged to non-toxic carriers

- Mallards dosed by oral gavage
  3x/week for 4 weeks

Avian Bioassay - Results

- No clinical signs of disease
- Regurgitation in methanol groups
- One bird in AVM methanol group broke wing on Day 14, euthanized
- Brain analysis results:
  AVM Hexane - no apparent lesions
  AVM Acetone - 1 with possible mild lesions, 2 no apparent lesions
  AVM Methanol - all 3 with definite, moderately severe lesions

  Control Hexane - no apparent lesions
  Control Acetone - no apparent lesions
  Control Methanol - no apparent lesions

Cell Bioassays

- Conduct cytotoxicity tests on established cell lines
- High-throughput 96-well format: Essential for testing of samples/fractions
- Mitochondrial dye (MTT) - colorimetric endpoint
- Total toxicity response

Cytotoxicity Results

- Methanol Fraction

Current Research

- Methanol Extract Fractionation
  - Avian Bioassay
  - Cell Bioassay
- Mammalian Susceptibility
  - Tested mice using same material from mallard assay
  - Suspect lesions, artifact?
  - Repeat experiment with new fixative

Administrative Issues

Lukens reported that the 2007 grant application has been submitted. He added that the Panel is supported by two grant programs. One area of focus for 2007 will be an early detection and rapid response activity which will include South Carolina.

Lukens also discussed several membership issues. The Corps of Engineers office where Al Confrensco is assigned is undergoing some reorganization. The Corps membership will be settled when this is completed. Tom Herrington from FDA has retired. Lukens contacted Tom's supervisor and asked if FDA had plans to replace him. At this time there are no plan for replacement so FDA's seat will remain unoccupied. Phil Bass, with Mississippi DEQ, has also retired. There has been no communication on whether DEQ will fill that seat. Lukens plans to follow up on that. Jim Kruse, a member at-large, has been unable to attend meetings due to scheduling issues. Lukens intends to pursue the issue of the at-large membership seat being unused.

Lukens indicated that he had received approval to order Panel t-shirts and hats to use as an outreach tool. He is currently trying to locate artwork for the t-shirt design. Don Schmitz volunteered to contact his graphics department and check on the possibility of designing the artwork for the shirts.

Member's Forum (Continued)

Georgia - T. Hendrickx reported that apple snails continue to be tracked in the state. They have an apple snail task force within the agency. Concerns are about the potential in Okefenoke Swamp. Swamp eels are another species of concern. They have wrapped up some initial research and are trying to come up with a plan to look at control and eradication. Due to budget cuts, on July 1 the aquatic plant control program was cut. Partial funding for the flathead catfish program was received.

Georgia is working on their plan and are exploring the Louisiana model. Hendrickx added that Marilyn has been instrumental in developing a white paper. Plan completion is a division goal for 2007.

South Carolina - S. de Kozlowski reported on South Carolina activities:

2006 Aquatic Plant Control Operations
- 25 water bodies treated
- 3,377 acres at cost of $589,135
  - Phragmites 1,945 ac, $352,058
  - Water hyacinth 305 ac, $27,214
  - Water lettuce 200 ac, $18,739
  - Hydrilla 105 ac, $27,815

New AIS Developments
- Monoecious hydrilla found in Lake Greenwood, Spartanburg Co. lakes, and in NC side of Lake Wylie in 2006
- Water lettuce overwintering in Charleston area
- *Salvinia molesta* limited to one site in Jasper Co.; may be eradicated
- Sterile grass carp continue to control hydrilla in Santee Cooper Lakes system for tenth year.

Aquatic Invasive Species Management Plan

- State AIS Task Force formed in July 2006
  - 34 members; represent 10 state agencies, 8 federal agencies, 4 private entities, 4 nonprofit
- One-year planning process; task force meets every other month
  - Met July 28 and September 29
  - Website established, meeting schedule, minutes, etc.
- Approved detailed plan outline last week
- Hope to complete problem review, species of concern, pathway discussion, and agency jurisdiction sections by November 30 meeting

Phragmites Control Management Strategy

- Initially focus control on public properties (DNR, FWS, COE)
- Refine survey techniques to measure problem and control (aerial, hyperspectral)
- Work with partners on public awareness and cost-share programs on private property
- Coordinate with all agencies and local entities to ensure success.

Texas - E. Chilton reported that Texas is working to finish their comprehensive management plan. November 30 will be the deadline for comments after it appears in the Texas Register. They are also trying to establish a Texas Invasive Species Task Force. They are experiencing some problems, so plans are to wait until after the election and then contact agencies wanting to be involved.

Chilton added that Texas continues to have Salvinia problems on the border with Louisiana. The Rio Grande is also having difficulties with watermilfoil, water hyacinth, and hydrilla.

HACCP and Brown Tree Snake Update

Bob Pitman reported that a new message system, the Aquatic Nuisance Species Hotline, is now available. This toll-free number (1-800-673-4313) is monitored 24 hours a day, seven days a week by live, professional staff who are trained to collect all pertinent information and immediately dispatch this information to federal and state invasive species biologists. The potential of this system allows for a proactive response in a manner of minutes when necessary and appropriate. Additionally, callers receive immediate feedback from a live representative, assuring them that information has been recorded and acknowledged.

He also reported that Scott Henke is still working on a web-based identification system for the brown tree snake. He is making a presentation at Southeastern to encourage incorporating the HACCP type concept to remove species that may hitchhike into their state.

Cooperative Phragmites Control Programming in the Winyah Bay Focus Area, South Carolina

Jack Whetstone from Clemson University Baruch Institute provided a PowerPoint Presentation.

Winyah Bay Focus Area
- Third largest east coast estuary
- 525,000 acres total
- 123,000 acres of forested wetlands
- 23,000 acres of tidal freshwater
- 50,000 acres of wetland impoundments
- 20,000 acres still impounded

Invasive Species Subcommittee
- Clemson University
- The Nature Conservancy
- South Carolina DNR
- Winyah Bay Task Force
- US Fish and Wildlife Service
- USC - NERR
- Natural Resource Conservation Service
- Historic Ricefields Association
- Ducks Unlimited

Why?
- Aquatic Invasives are a PROBLEM
- Prioritize Concerns
- Documentation of What Works
- Demonstrate to Landowners
- Cost-share Program for Private Landowners

Priorities
- Phragmites
- Water Hyacinth
- Alligatorweed
- Chinese Tallow
- Giant Reed
- Beach Vitex

Phragmites Control Demonstrations
- Mansfield and Rosemont Plantations
- Glyphosate and Imazapyr
- Aerial and Backpack

Phragmites Control Cooperators
- Mansfield and Rosemont Plantations
- Summit Helicopters Inc.
- The Nature Conservancy
- SC DNR
- BASF
- Clemson University

Cost-share Program - Phragmites
- Ranking - Acres, Additional Acres, Easement, Proximity to Protected Area
- SC DNR Application Recommendations
- Licensed Applicators with GPS Recording
- Imazapyr or Glyphosate
- $100 per acre - Imazapyr
- $40 per acre - Glyphosate
- $10,000 Max
- Follow-up Treatments
- Cost-share Payments after Application

Cost-share Technical Committee
- The Nature Conservancy
- SC DNR
- USDA - NRCS
- Ducks Unlimited
- Clemson University

Cost-share Funds
- $30K - National Fish and Wildlife Foundation
- $50K - SC DNR
- $30.5K - USDA NRCS WIP
- $10K - Historic Ricefields Association
- $10K - The Nature Conservancy
- $130.5K - Total

Project Obligations
- $97.9K Obligated
- 18 Tracts
- 988 Acres

Private Landowners 2005
- 834 Acres

Clearcast - Phragmites - Edges
- Phragmites on treed edges - Post Habitat
- 32 oz. Clearcast + .5% MSO in 15 Gallons
- 64 oz. Clearcast + .5% MSO in 15 Gallons
- 10 August 2006
- 11 DAT

Clearcast - Phragmites
- 64 oz. Clearcast + 1% MSO - 10 Gallons
- 22 June 2006
- Adjacent to Tree Canopy
- Summit Helicopter
- 44 DAT Rating
- Excellent Control
- Faster Efficacy than Habitat

Future Work
- Continue Phragmites Cost-share
- Annual Sampling - Phragmites
- Burn Plots - Fall &/or Summer

For More Information
- www.dnr.sc.gov/water/envaff/aquatic/phragmites.html
- www.dnr.sc.gov/water/envaff/aquatic/winyahphragmiteshare.html

Aquatic Nuisance Species Initiatives of the Lower Galveston Bay Watershed

Jim Lester provided a PowerPoint presentation for the Panel.

Galveston Bay
- Largest estuary in Texas
- Population of 4 million people
- 3 ports with 15,000 vessels per year
- 600 square miles of open water
- 1,500 miles of shoreline
- 6-8 feet average depth

Invasives and the Galveston Bay Plan
- Number 2 priority problem for Species Population Protection
  - Goal #1: Eradicate or reduce populations of invasives that threaten native species, habitats, and ecological relationships.
  - Goal #2: Prevent the introduction of additional exotic, invasive species.

Regional Network

- GBEP Invasive Species Working Group
  - Facilitates communication and coordination among stakeholders:
    - Federal and state agencies
    - Local government
    - Port authority
    - Universities
    - NGO's

Comparative Risk Assessment

- Prioritize funding
- Literature and database review
- 296 species - current or potential invaders
- 4 expert workshops to rank species
- 84 species ranked according to risk criteria
  - Likelihood of impact at ecosystem level
  - Severity of impact, loss of biodiversity
  - Location of invasive relative to region
  - Immediacy of invasion
  - Irreversibility of damage
  - Impacts to human uses

High Risk Aquatic Animal Species

Carcinus aestuarii	Mediterranean green crab
Carcinus maenas	European green crab
Channa argus	Northern snakehead
Ctenopharyngodon idella	Grass carp *
Dreissena polymorpha	Zebra mussel
Eriocheir sinensis	Chinese mitten crab
Limnoperna fortunei	Golden mussel
Monopterus albus	Asian swamp eel
Myocastor coypus	Nutria *
Oreochromis sp.	Hybrid tilapia *
Perna viridis	Asian green mussel
Phyllorhiza punctata	Australian spotted jellyfish **
Pomacea insularum	Apple snail ***
Zoobotryon verticillatum	Sauerkraut grass *

* Established population in Galveston Bay Estuary
** Species reported in Galveston Bay in 2006
*** Established population present; originally thought to be *P. canaliculatum*

High Risk Aquatic Plant Species

Eichhornia crassipes	Common water hyacinth *
Gymnodinium sp.	Exotic red tide **
Hydrilla verticillata	Hydrilla *
Ipomoea aquatica	Water spinach *
Lythrum salicaria	Purple loosestrife
Myriophyllum spicatum	Eurasian watermilfoil
Pistia stratiotes	Water lettuce *
Salvinia minima	Common Salvinia *
Salvinia molesta	Giant Salvinia *

* Established Population in Galveston Bay Estuary
** Reported in Texas

Research Activities
- Poorly understood, emerging species
  - Deep-rooted sedge
  - Applesnail
- Various Habitats
  - Bayous/riparian
  - Wetlands
  - Coastal prairie
- Introduction pathways (planned)
  - Analyze ballast discharge practices and locations
  - Risk assessment of vessel origins and trade routes
- Partners
  - Local universities
  - Federal and state agencies

Management: Eradication & Restoration
- Conservation lands and adjacent waters
  - Wetlands
  - Coastal prairie
  - Barrier island
- Target species
  - Giant Salvinia
  - Hydrilla
  - Water hyacinth
  - Chinese tallow
  - Brazilian pepper
- Partners
  - Local governments
  - Local Council of Government

  - State and federal agencies
  - Nonprofits and conservation organizations

Invasives Monitoring

- TPWD Houston Urban Bayous Study
  - Snow pleco, tilapia, grass carp, Rio Grande cichlid
  - 3 local bayous (Greens, Brays, Buffalo)
- TPWD Fisheries Independent Monitoring
  - Grass Carp
  - Sauerkraut grass
- Invaders of Texas: Citizen Scientist Invasive Species Monitoring Program
  - Phase 1 - Aquatic and terrestrial plants
    Phase 2 - Animals
  - Citizen volunteers: Master naturalists, Master Gardeners, nature centers
  - Online data entry and mapping application
  - www.texasinvasives.org

Education and Outreach

- TPWD and GBEP working with citizen groups and anglers to prevent additional introductions of aquatic plant species (hyacinth, hydrilla, salvinia)
- TPWD Dirty Dozen poster and brochure
  - Prohibited species in the seafood market
- The Quiet Invasion: A Guide to Invasive Plants in the Galveston Bay Area
  - 3000 copies printed; 2000 distributed
  - Interactive field guide www.galvbayinvasives.org
  - New guide planned to include animals

Conclusions

- Accomplishments
  - Multifaceted approach
  - Strong stakeholder coordination
  - Species prioritization
  - Control and restoration projects established
  - Public outreach and education started
- Challenges
  - Population and development increasing
  - Shipping traffic increasing
  - Regional land use planning lacking
- Additional needs
  - Additional monitoring - EDRR
  - Research emerging species - bay waters
  - Identify new ways to engage the public
  - $$

For More Information:

Houston Advanced Research Center

Jim Lester
Director, Environment Group
(281) 364-6041 jlester@harc.edu

Lisa Gonzalez
Research Scientist
(281) 364-6044 lgonzalez@harc.edu

TCEQ Galveston Bay Estuary Program

Jeff DallaRosa
Natural Resource Uses Coordinator
(281) 486-1242 jdallaro@tceq.state.tx.us

Hypoxia Tolerance of Native Sunfish (warmouth, dollar sunfish) and Non-native African Jewelfish in the Rocky Glades

Pamela J. Schofield from the U.S. Geological Survey presented a PowerPoint presentation. She indicated that this study was funded by the U.S. Geological Survey and the U.S. Fish and Wildlife Service.

- Solution holes experience periods of extreme temperatures, periodic low oxygen.
- Ability of fishes to survive dry season in solution holes allows them to repopulate marsh in wet season when water covers marsh.
- During wet season, fishes feed on marsh surface, reproduce and can expand ranges.
- Native fishes that inhabit marsh are tough.
- How do recent invaders compare with natives?
- Will they be able to colonize Rocky Glades?

Focus of this study: hypoxia tolerance

African jewelfish in South Florida
- Aggressive
  - Compete with natives for food
  - Prey on native fishes
- First documented in Miami canals in 1965
- Until mid-1970s, only found in canals near Miami
- First found in Everglades National Park in 2000
- Begun to expand through Everglades

Questions for this Study

- What is hypoxia tolerance of African jewelfish?
- How does it compare to native sunfishes?
- Is aggressive behavior attenuated by hypoxia?

Methods

- Progressively lowered hypoxia by bubbling N^2 gas into aquarium - each trial 4-6 hrs

  Two types of trials:
  - Single species (3 fish of same species per trial)
  - Mixed species (one of each species <3 total> per trial)

  Every 15-min, took the following data:
  - Number of fish performing ASR (10 x 10 sec each)
  - Gill ventilation rate (2 x per fish for 15 sec each)
  - Number of fish showing aggression (10 x 10 each)

Aquatic Surface Respiration - A Widespread Adaption to Hypoxia

- Not air breathing - in ASR, fish use uppermost layer of water that is high in oxygen
- By determining ASR threshold, gives information on relative ability to withstand hypoxia. ASR 10, 50, 90
- Comparison of gill ventilation rates gives information on how well fish can use ASR to extract oxygen from surface layer.

Aggression

- All three species known to be aggressive.
- When recording data, included biting, chasing, gill flaring, etc. For each data point (every 15-min), averaged number of times fish were aggressive over 10 10-sec intervals.
- Expect attenuation of aggression with decreased oxygen - trade off fighting for breathing.
- Comparison on single-species trials to mixed-species trials.

Conclusions

- African jewelfish is able to tolerate extreme low-oxygen conditions
  - ARS thresholds of jewelfish lower than native sunfishes
  - ARS thresholds of jewelfish, warmouth lower than swamp-adapted African cichlids

  - Gill ventilation rates of native sunfishes decrease at ASR onset, signaling efficient use of ASR
  - For jewelfish, no decrease in gill vent rate with onset of ASR, but does not use ASR until dissolved oxygen is very low (ASR_{90} = >0.2 mg/L)

- Jewelfish more aggressive than native sunfish
  - Warmouth also aggressive, more than dollar sunfish but less than African jewelfish

- Hypoxia not likely to limit spread of jewelfish through Everglades (low temp?)

Taxonomic Experts Database Update

Pam Fuller reported that the taxonomic experts database is in its final location and is ready to be populated. Fuller gave a demonstration of the database. Fuller indicated that a small working group should be appointed to populate that database. It was the consensus of the Panel to use the Research and Development Work Group to populate this database.

The Southeastern Regional Taxonomic Center (SERTC)

David Knott, Marine Resources Research Institute, SCDNR

Taxonomy is a branch of science that discovers and describes living things.

- There is a serious lack of trained taxonomists and also of data and knowledge about marine biodiversity, especially in the South Atlantic Bight region

- A decline in taxonomists threatens our ability to understand our marine biodiversity

The SERTC began operating in 2001 at the Marine Resources Research Institute, SCDNR, with funding administered by the National Marine Fisheries Service. The primary goal of the SERTC: *To serve as a focused regional taxonomic resource for individuals and institutions that are interested in the biodiversity of the marine and estuarine environments of the southeastern United States*.

The SERTC Invertebrate Database: Invertebrates of the Southeastern United States

The SERTC provides services as a taxonomic resource to students, educators, and scientists working on the marine and coastal invertebrates of the South Atlantic Bight (SAB) Region. A regionally focused and data based voucher collection of preserved animals is held at the center (including material preserved specifically for future molecular work), as well as a digital image library and an extensive invertebrate taxonomic literature collection relating to the SAB region. SERTC also provides the resources for the computerization of the fish collection catalog of the Grice Marine

Laboratory (College of Charleston). The SERTC Invertebrate Database aims to provide OBIS with much needed distributional information on the regional invertebrate fauna.

Website: www.dnr.state.scc.us/marine/sertc.

Directed Extinction of Exotic Fish Populations in the Wild Using a Fish Bearing Multiple Y Chromosomes

John Teem, Division of Aquaculture, Florida Department of Agriculture and Consumer Services

Approaches to the Eradication of Exotic Fish

Chemical	- Rotenone (nonspecific)
Biological	- Specific disease or parasites (unavailable)
	- Sterile males (specific, but requires overwhelming numbers of sterile males to compete with normal males)
	- Altered sex ratio (specific, requires that one sex is reduced to zero over time)

Coho Salmon Sex-reversed females (Fxy) in the Columbia River

- XY sex-determination
- Females with a Y chromosome produce more male progeny, some of which are Myy
- Myy males are viable and produce only male offspring
- If sufficient numbers of YY fish are added to a normal population, will normal females (Fxx) ultimately decline to zero?
- Hormone manipulation can be used to generate male fish with two Y chromosomes
- Hormone manipulation can also be used to generate female fish with two Y chromosomes (Fyy)
- Females with two Y chromosomes produce only male progeny, half of which are Myy
- Four different matings are possible, leading to increased male production

Conclusions

- For a target fish utilizing a simple XY sex-determination system, the addition of YY female sex-reversed fish (Fyy) to a normal population of exotic fish can cause extinction by reducing the numbers of normal females Fxx to zero over time.

- Fyy fish must be added in an amount that represents at least 1.07% of the total population, and the addition must be continuous over time.

- The shift in the sex ratio of the population requires many generations, thus extinction may require decades. However, the time required to attain extinction can be shortened by increasing the influx of Fyy fish (μ).

Education/Outreach Work Group - Chuck Jacoby

Jacoby updated the Panel on the development of the science fair guidelines and submission to INTEL. He also reported that he and Marilyn O'Leary had submitted a proposal to Sea Grant to research what kind of educational materials worked better than others. This will help to develop a priority setting process.

Pathways/Prevention Work Group - Pam Fuller

Fuller reviewed a presentation she gave last year on pathway analysis and how to rank pathways. She reported that ISAC has developed a pathways ranking tool. The work group held a meeting 2 weeks ago in Gainesville, Florida, and spent a lot of time reviewing the ISAC ranking tool. As a result of that they decided to part ways with ISAC and move on. The states decided the type of analysis started so far would work for them. When completed, this will be the first report of this type in the nation.

Research/Development Work Group - John Teem

GSARP Regional Priorities

- Long term studies on established nonnative species to understand their effects on other species (or lack of effects), with a particular focus on understanding why a species is invasive in one state and not in another.

- Increased systematic work on nonnative species that are difficult to identify, with particular emphasis on catfish and channeled apples snails.

- Multi-state approaches to address current species of concern including *Caulerpa*, hydrilla, Giant Salvinia, green mussels, channeled apples snails, Asian carp, Asian swamp eels, crayfish, and Nutria.

- Rapid assessments in both marine and fresh water systems, to provide a current snapshot of the ecosystem that can be used (1.) as a baseline for the detection of nonnative species, (2.) for monitoring the movement of species after a extreme meteorological events (such as hurricanes), and (3.) to assess the effect of land development on the spread of invasive species.

- Novel chemical, biological and mechanical control methods for the control of nonnative species.

It was the general consensus of the Panel to go forward and present this list of regional priorities to the National Task Force. John Teem will refine these in the next couple of weeks and get with Lukens for submission.

GSARP Regional Priorities by State

- State research needs could use additions and updates
- Still need input from Mississippi
- Will circulate the present list of state research priorities by email to get more input from the panel
- (please keep regional research priorities in mind when adding state research priorities)

Taxonomic Expert Database

- Have a partial list of taxonomic experts from FL, GA, SC
- Still need input from TX, LA, MS, AL
- Will circulate the present list of taxonomic experts by email to get more input from panel
- (present list is tier 1, need more input on tier 2)

Next Meeting - Time & Place

The Panel agreed that the next meeting should be held during the first weeks of April 2007 in Orange Beach, Alabama. Texas was selected as an alternative site.

Public Comment

No public comments were received.

There being no further business, the meeting adjourned at 4:25 pm.