



## Poster Session Presentations by category and author

### FISHERIES

- 1) **STUDENT - PHYSIOLOGICAL BIOMARKERS IN RED SWAMP CRAYFISH *PROCAMBARUS CLARKII* DURING HYPOXIC STRESS.** Christopher P. Bonvillain, [cbonvi3@tigers.lsu.edu](mailto:cbonvi3@tigers.lsu.edu), D. Allen Rutherford, William E. Kelso, and Christopher C. Green, School of Renewable Natural Resources, Louisiana State University AgCenter, Baton Rouge, LA 70803.

Hypoxia (dissolved oxygen  $\leq 2\text{mg/L}$ ) in crayfish aquaculture ponds and natural systems can have sublethal, yet detrimental effects on crayfish populations. The purpose of our study is to determine physiological condition of red swamp crayfish *Procambarus clarkii* during hypoxic stress by quantifying physiological biomarkers. Adult red swamp crayfish hemolymph was collected by pericardial puncture from crayfish captured in naturally occurring hypoxic and normoxic waters and in three laboratory treatment groups; air, aerated water, and hypoxic water. Hemolymph samples were allowed to clot, broken up gently, and centrifuged to extract the serum. Serum lactate concentration was determined with a handheld lactate meter and spectrophotometrically to validate the lactate meter ( $R^2 = 0.9406$ ). Crayfish hemolymph lactate concentrations were significantly higher ( $P < 0.0001$ ) in laboratory stress crayfish from hypoxic water ( $=15.97\text{mmol/L}$ ) than from aerated water ( $=3.61\text{mmol/L}$ ) and air ( $=1.02\text{mmol/L}$ ). Additionally, crayfish captured in naturally occurring hypoxic waters also showed significantly higher ( $P < 0.0001$ ) hemolymph lactate concentrations than crayfish from normoxic sites. Crayfish hemolymph lactate concentration appears to be a good biomarker of hypoxic stress in red swamp crayfish and the use of a handheld lactate meter offers a simple and inexpensive method for determining crayfish stress level that can be used on site by commercial crayfish farmers or monitoring agencies.

- 2) **A NEW FRESHWATER NONGAME AQUACULTURE FACILITY IN NORTH CAROLINA,** Brena Jones, [brena.jones@ncwildlife.org](mailto:brena.jones@ncwildlife.org), NC Wildlife Resources Commission, 1142 I-85 Service Rd, Creedmoor, NC 27522, Steve Fraley, NC Wildlife Resources Commission, 50 Trillium Way, Clyde, NC 28722, Chris Eads, North Carolina State University College of Veterinary Medicine, 4700 Hillsborough St, Raleigh, NC 27606, Kyle Briggs, David Deaton, T.R. Russ, NC Wildlife Resources Commission, 645 Fish Hatchery Rd, Marion, NC 28752.

The North Carolina Wildlife Resources Commission (WRC) and North Carolina State University (NCSU) are working together to propagate native freshwater fish and mussel species in need of conservation throughout the state. Two WRC state hatchery facilities and a third at the NCSU College of Veterinary Medicine are currently supporting spawning, host fish infestation, and growout of a total of 13 species, including state and federally listed imperiled species such as the Carolina Heelsplitter (*Lasmigona decorata*) and the Tar River Spiny mussel (*Elliptio steinstansana*). Groundbreaking discoveries such as host species identification and successful propagation techniques for the latter two federally endangered species have been accomplished through this cooperative work. The new facility in Marion, NC is a 15 x 7.5 meter converted storage building with a flow-through system that pumps water from an onsite pond through multiple growout and holding tanks. Seven mussel species are held there presently, including juvenile Carolina Heelsplitters. Goals for animals produced from this increased culture capacity include endangered species recovery, toxicological studies, life history research, and river ecosystem restoration.

**3) A FRESHWATER MUSSEL (BIVALVIA: UNIONOIDA) PROPAGATION PROGRAM FOR RESTORING AQUATIC ECOSYSTEMS AND ENDANGERED SPECIES.** Catherine M. Gatenby, Ph. D., [Catherine.Gatenby@fws.gov](mailto:Catherine.Gatenby@fws.gov), Matthew Patterson, and Rachel Mair. White Sulphur Springs National Fish Hatchery, United States Fish and Wildlife Service (USFWS), 400 E. Main Street, White Sulphur Springs, WV 24986.

Freshwater mussel (Unionoida) populations are imperiled world-wide. In the United States, approximately 70% of native species are in serious decline because of chronic habitat degradation, toxic spills, and the invasion of the exotic zebra mussel. Approximately 23% of native freshwater mussels are federally endangered and another 7% are already extinct. Freshwater mussels are suspension-feeders equipped with very large gills; thus, they can filter 1000's of gallons per day, providing clean water and suitable habitat for other species. As they decline, however, the quality of that habitat declines. Regrettably, little is known how these population declines will impact existing water quality and riverine processes. Therefore, it is equally critical that we take action to conserve, restore and prevent further declines of this important fauna.

All 70 recovery plans for endangered mussel species in the United States call for propagation and reintroduction of populations to restore endangered species. These same recovery plans also call for restoration of critical habitat prior to reintroduction of target endangered species. A nation-wide conservation effort of the USFWS, therefore, includes the culture and propagation of mussels for restoration of endangered species, augmentation of populations to prevent the listing of species, and restoration of mussel bed habitat for the ecosystem services they provide as critical habitat to federally endangered species AND as habitat for fish. The goals of these conservation efforts are to protect and restore freshwater mussels, to protect and restore water quality, and enhance overall aquatic ecosystem health. Additionally, propagation technology is viewed as a mitigation tool for mussels killed by toxic spills or for mitigating the loss of a resource due to in-stream activities such as road/bridge construction and channel maintenance for navigation.

Propagation of freshwater mussels as a tool for restoring endangered species began in the early 1990s. To date, over 30 species of freshwater mussels have been propagated in captivity, and dwindling populations have been augmented with cultured mussels. I will discuss what we know about freshwater mussel declines, what we can do to help them, and what we still need to know. I will provide an overview of propagation and relocation technology in the United States to restore endangered species, restore habitat, and restore fishable rivers. I will discuss management challenges with respect to propagation and release/reintroduction of mussel species, and opportunities for restoration of riverine habitat.

**4) A SUITABLE DIET, FEED CONCENTRATION, AND CULTURE SYSTEM FOR REARING ENDANGERED JUVENILE NORTHERN RIFFLESHELL, *EPIOBLASMA TORULOSA RANGIANA*.** R. A. Mair, [Rachel.Mair@fws.gov](mailto:Rachel.Mair@fws.gov), C. M. Gatenby, White Sulphur Springs National Fish Hatchery, 400 East Main St., WSS, WV 24986, and R. J. Neves, Department of Fisheries and Wildlife, Virginia Tech, Blacksburg, VA 24061.

Three 60 d. experiments were conducted to improve culture methods for endangered juvenile northern riffleshell, *Epioblasma t. rangiana* at White Sulphur Springs National Fish Hatchery (WSSNFH), WV. The first experiment evaluated the effect of food concentration on growth (shell length, SL) and survival of juvenile (<1 mo.) *E.t. rangiana*. Juveniles were fed a live algae diet at three concentration treatments: 30,000, 90,000, and 150,000 cells mL<sup>-1</sup>. Mean shell length and survival were significantly higher (p<0.005) for juveniles fed 30,000 cells mL<sup>-1</sup> than other treatments. The effect of three diet treatments on growth and survival of *E. t. rangiana* juveniles (<1 mo.) was evaluated as well. Diet treatments included WSSNFH live algae mix and two preserved commercial diets from Reed Mariculture; 'Shellfish diet', and 'Phytofeast'. Juveniles reared on the WSSNFH live algal diet had significantly greater growth (Mean SL= 3.1mm, p<0.0001) and survival (85%, p=0.009) than the other 2 diet treatments (2.6 mm, 2.4 mm

respectively, and 79%, 75% survival respectively). Growth and survival also were compared among larger juveniles (>5mm) reared in three different culture systems which included a newly designed upwelling culture system at WSSNFH. Growth ( $p<0.0001$ ) and survival ( $p<0.05$ ) were significantly higher in mussels reared in the WSSNFH upweller system (increase in mean SL = 1.9 mm, survival = 100%) than in other culture systems (1.3 mm, 1.0 mm, 91%, 90%). Following results from these tests, WSSNFH has had repeated success culturing E. t. rangiana. We believe other species of federally endangered mussels may be cultured successfully with these techniques.

**5) EFFECTS OF DC AND PDC DEPLETION SAMPLING ON INJURY, STRESS AND SURVIVAL OF APPALACHIAN STREAM FISHES**, Frank M. Panek, [spanek@usgs.gov](mailto:spanek@usgs.gov), and Christine L. Densmore, U.S. Geological Survey, National Fish Health Research Laboratory, 11649 Leetown Road, Kearneysville, West Virginia 25430.

Depletion electrofishing is a common management tool for obtaining quantitative data on trout populations in wadeable streams. Very few studies have examined the effects of electrofishing on native, non-game fishes and in particular, those non-target species that can be subjected to multiple electrical shocks routinely used in 3-pass depletion sampling programs for salmonids. Potential effects include cardiac or respiratory failure, spinal or other related internal injuries, stress and fatigue, behavioral change and mortality. In this study we evaluated DC and PDC electrofishing forms at multiple power settings (100V DC, 100V PDC 60Hz, and 200V PDC 30 Hz) on several species common to Appalachian streams including brook trout (Salvelinus fontinalis), rainbow trout (Oncorhynchus mykiss), Potomac sculpin (Cottus girardi), and green sunfish (Lepomis cyanellus). Fish were held in four rectangular fiberglass tanks (190 cm x 66 cm) equipped with electrodes, a gravel/cobble stream substrate and continuous water flow. Three tanks served as experimental chambers and the other as a control. An anode and cathode were placed at opposite ends of the tanks and connected to a Smith Root Type LR-24 Backpack Electrofisher. Voltage gradients were measured for each electrofishing field with a Fluke Model 199C oscilloscope and the average voltage gradient (mV/cm) was calculated. Fish were exposed to either one, two or three shocks spaced 1-hr apart. A minimum of ten (10) fish were examined for hemorrhagic trauma and for spinal deformities, compressions and fractures. Radiographs were made with a Tech America MT8020 for 180 seconds at 20kv. Overall stress was measured by monitoring whole blood glucose (mg/dL) and serum lactate ( $\mu\text{M}$ ) thirty minutes post-shock. Rainbow trout were used as a preliminary species in order to establish the ranges of effective electrofishing in our tanks. We found that hyperglycemia and hyperlactemia were observed to be dose-dependent with treatment and number of shocks among these species. Lactate was the more reliable predictor of physiological stress. Both glucose and lactate values showed positive correlations with hemorrhagic trauma scores. The effects of electrofishing treatments were most severe on rainbow trout at 100V PDC 60Hz and at 200V PDC 30 Hz with incidences of hemorrhagic trauma of 100% and spinal trauma of 80% under the 200V PDC treatment. In general, the non-salmonids experienced less trauma than the salmonids under similar treatments and in general, 30-day post treatment survival was >95% for all species regardless of the treatment. The only exception was for Potomac sculpin which demonstrated significant mortality (39%) after exposure to multiple shocks at 200V PDC 30 Hz. Reductions in condition factor (K) with increasing electrofishing power and frequency of shocks was evident in all species. Differences among electrofishing treatments and species are described and discussed relative to management applications.

- 6) **STUDENT - A MODEL FOR LARGEMOUTH BASS FISHERIES AT THE KISSIMMEE CHAIN OF LAKES, FLORIDA**, O'Rourke, P., M. Allen, University of Florida, Program in Fisheries and Aquatic Sciences, 7922 NW 71<sup>st</sup> St., Gainesville, FL, 32653, and T. Coughlin, Florida Fish and Wildlife Conservation Commission, 1601 Scottys Road, Kissimmee, FL, 34744.

Variation in habitat parameters such as aquatic plant coverage and water level influence largemouth bass Micropterus salmoides recruitment in lakes and reservoirs. Water levels have been stabilized at the Kissimmee Chain of Lakes (KCOL), Florida due to flood control, which has influenced aquatic plant density and areal coverage. Additionally, presence of the invasive submersed aquatic plant hydrilla Hydrilla verticillata influences largemouth bass recruitment. We examined historical electrofishing, angler catch, plant coverage, water stage and water quality data at Lakes Tohopekaliga and Kissimmee to explore these relationships at the KCOL. We developed a largemouth bass population model for the KCOL to test the effects of varying these habitat parameters on largemouth bass recruitment. We explored a range of management policies at the KCOL and evaluated their impacts on the largemouth bass population, angler effort, and economic impacts. Management of moderate levels of hydrilla in the system will improve largemouth bass recruitment, fishing effort, and the economic aspects of the fishery.

## **WILDLIFE**

- 7) **A CONSERVATION STRATEGY FOR RAFINESQUE'S BIG-EARED BATS AND SOUTHEASTERN MYOTIS**, Mylea L. Bayless, [mbayless@batcon.org](mailto:mbayless@batcon.org), Bat Conservation International, P.O. Box 162603, Austin, TX 78716, Mary Kay Clark, Southeastern Bat Diversity Network, 1612 Bayleaf Trail, Raleigh, NC 27614.

Bat Conservation International and the Southeastern Bat Diversity Network have developed conservation and management guidelines for two species of southern bats, Rafinesque's big-eared bats and Southeastern myotis. Although they lack federal designation, both species are listed range-wide across the southern states as species of concern, threatened, or endangered by many state and federal agencies. Primary threats to sustainable populations for these species include loss of roosts and habitat conversion. Biologists and landowners (state, federal, and private) have frequently expressed a desire for consolidated recommendations for these species. A team of experts representing federal and state agencies, academic institutions, industry, and conservation groups collaborated to develop the document which includes: 1) updated distribution maps for both species, 2) a summary of existing knowledge, 3) recommendations for future research, 4) priorities for habitat conservation, and 5) guidelines for land managers. This presentation will summarize key components of the strategy.

- 8) **WHITE-NOSE SYNDROME: SOUTHERN STATES SHOULD BE PREPARED**, Mylea L. Bayless, [mbayless@batcon.org](mailto:mbayless@batcon.org), Bat Conservation International, P.O. Box 162603, Austin, TX 78716, Southeastern Bat Diversity Network – WNS Committee, c/o SBDN Treasurer Timothy Carter Department of Biology, Ball State University, Muncie, IN 47306-0440.

White-Nose Syndrome (WNS) is an emerging disease that has killed an estimated 1 million bats. Originally detected in caves in central New York, in 3 years the disease has spread southward into Virginia and has the potential to significantly affect southeastern bat populations, including the largest hibernating colonies of the federally endangered Indiana (Myotis sodalis) and gray bats (Myotis grisescens). Given documented mortality rates approaching 100% in many hibernation roosts (caves and mines) and suspected long-term negative impacts to survival and reproduction of surviving bats, it is

imperative the southeastern and mid-Atlantic states take pro-active measures. The Southeastern Bat Diversity Network (SBDN) is comprised of researchers, bat biologists, land managers and others interested in the conservation of bats that occur in the southeastern United States to facilitate communication within the region, identify priorities and needs specific to the southeastern US and develop and implement programs that address regional bat conservation needs. In states currently beyond the WNS affected area, SBDN recommends taking an active and coordinated role in the following efforts: 1) Stay current on all advisories, protocols and opportunities to contribute. The U.S. Fish & Wildlife WNS webpage ([www.fws.gov/northeast/white\\_nose.html](http://www.fws.gov/northeast/white_nose.html)) should be consulted regularly for up-to-date official protocols, 2) Participate in coordinated survey efforts through incorporation of WNS data collection requests and protocols into on-going field work. Important examples include: collecting wing-damage index data from all captured bats, establishing acoustic transect protocols, and long-term maternity colony monitoring at selected sites and 3) contribute your current bat handling and survey data to the SBDN/NEBWG bat database to allow regional assessment of parameters relevant to spread of WNS. The amount of mortality and the rapid spread associated with WNS necessitates immediate regional cooperation throughout the eastern United States.

- 9) **STUDENT - GENETIC ANALYSIS OF POPULATION DYNAMICS OF THE SOUTHEASTERN COYOTE (CANIS LATRANS)**, Dalinda L. Dennis, [dld0002@auburn.edu](mailto:dld0002@auburn.edu), James B. Armstrong, Auburn University, School of Forestry and Wildlife Sciences, 3301 Forestry & Wildlife Sciences Building, Auburn University, AL 36849, Antoinette J. Piaggio, USDA APHIS Wildlife Services, National Wildlife Research Center, 4101 LaPorte Avenue, Fort Collins, CO 80521, Wendy M. Arjo, AGEISS Inc., 12414 Nacogdoches Suite 200, San Antonio, TX 78217 and Kenny V. Brock, Auburn University, College of Veterinary Medicine, 264 Greene Hall, Auburn University, AL 36849.

Coyotes (*Canis latrans*) have been extremely successful in dispersing and expanding their range that now includes all fifty states of the United States in addition to Canada and parts of Central America. The southeastern United States is hypothesized as the last area of colonization for this species. Origins of coyotes in Alabama are being investigated using a phylogenetic approach integrated in our genetic analysis. Coyotes have generally been considered a pest species due to their adaptive ability, high reproductivity, and impact as a top predator on commercial agricultural business. Population dynamics of coyotes is still poorly understood, yet such knowledge will be beneficial to management practices of these individuals. The goal of this study was to determine population structure in Alabama by using microsatellite DNA markers. Bayesian clustering analysis was used to incorporate spatial data with the genotypes to identify potential populations. In addition we examined patterns of gene flow across an urban to rural gradient. ArcGIS was employed to define urban and rural populations within a sixty-mile radius of the Auburn/Opelika Metropolitan Area. High genetic diversity was detected across the sampled individuals within Alabama. In addition, some genetic differentiation was measured between urban and rural populations. Tracing patterns of gene flow within and among groups of coyotes in proximity to municipal localities is extremely applicable in urban coyote management. Information gained about population structure among coyotes in east-central Alabama could be informative about populations across the southeastern region. It is our expectation that such biological data will be consolidated with the vast knowledge of the ecology of the southeastern coyote gathered to date to inform and aid management plans and decisions across the region.

**10) STUDENT - TOP CONTRIBUTORS TO UNDERSTORY PLANT BIOMASS IN INTENSIVELY MANAGED PINE OF EAST-CENTRAL MISSISSIPPI**, Raymond B. Iglay, [ri14@msstate.edu](mailto:ri14@msstate.edu) Department of Wildlife and Fisheries, Mississippi State University, Mississippi State, MS 39762, D. A. Miller, Southern Timberlands Research and Development, Weyerhaeuser NR Company, P.O. Box 2288, Columbus, MS 39704, B. D. Leopold, and L. W. Burger, Dept. of Wildlife & Fisheries, Mississippi State University.

Fire and selective herbicides with imazapyr may enhance wildlife habitat in mid-rotation, intensively managed pine (*Pinus* spp.) by removing hardwood competition and releasing shade-intolerant plants. However, well-established plant species, uncontrolled by fire and imazapyr (e.g., *Rubus* spp.), may dominate and thereby limit plant species diversity. Therefore, we examined plant biomass in stands managed via prescribed burning and imazapyr on Weyerhaeuser NR Company land in east-central Mississippi during 1999-2009 to determine top contributors to understory biomass. We used a randomized complete block design of 6 blocks (pine stands) with treatments (burn, herbicide, burn+herbicide, control) assigned randomly to each of 4, 10 ha experimental units per block. We applied Arsenal ® (imazapyr) September 1999 by skidders and conducted prescribed burns during winter 2000, 2003, 2006 using drip torches. We clipped all plants < 1.3 cm diameter within 20, 1 m<sup>2</sup> hoops arranged diagonally across each experimental unit July 1999-2008 (10 hoops/unit 1999-2000), placed in paper bags, dried at 80°C until constant weight, and weighed them. We designated top contributors as plant species located before the horizontal asymptote on a graph of cumulative weight by species rank with the greatest biomass contributor ranked first and the asymptote representing minimal weight contribution. We used a repeated measures mixed models analysis of variance to test for differences among treatments within years, interaction terms, and differences within treatments if we detected a significant interaction for mean biomass of each top contributor. Ninety-two top contributors of 393 collected species comprised 95% of total plant biomass. Of these, 6 species (*Rubus argutus*, *Lonicera japonica*, *Chasmanthium laxiform*, *Toxidodendron radicans*, *Vitis rotundifolia*, *Rubus furvulus*) comprising 50% may have outcompeted other species restricting plant diversity and treatment impact on understory plant release. Managers should consider selecting treatments to effectively reduce highly competitive plant species present pre-treatment to enhance plant species diversity.

**11) MANAGING COASTAL WETLANDS TO MINIMIZE THE EFFECTS OF LATERAL EROSION AND GLOBAL SEA-LEVEL RISE**, Andy Nyman, Ph.D., <mailto:jnyman@agcenter.lsu.edu>, School of Renewable Natural Resources, Louisiana State University Agricultural Center, Baton Rouge, LA 70803.

Coastal wetlands throughout the southeastern U.S. are actively managed with prescribed fire and water control structures to enhance habitat quality for resident and migratory wildlife. Lateral erosion causes open water to replace emergent vegetation in many coastal marshes and thereby destroys wildlife habitat. Lateral erosion depends on the difference between the live rooting depth of emergent vegetation and the depth of the adjacent pond. Lateral erosion can be slowed and reversed by drawdowns, which oxidize soil and promote deeper penetration by plant roots. Sea-level rise will drown emergent vegetation and create new shallow open water areas if coastal wetlands vertically accrete too slowly. Inadequate vertical accretion already has contributed greatly to the loss of wildlife habitat in coastal Louisiana where subsidence can exceed 1 cm yr<sup>-1</sup>. Previously, it was widely assumed that all coastal marshes depended upon mineral sediments to vertically accrete but recent research shows that many marshes, from tidal fresh to saline, depend upon organic matter produced by emergent vegetation to vertically accrete. In such marshes, significant elevation can be lost if drawdowns are too long or frequent. Fire probably does not affect organic accretion, which apparently depends on root accumulation whereas fire removes aboveground biomass but effects remain undocumented. Global sea-level rise also causes saltwater to intrude into tidal, non-saline marshes. Some tidal non-saline marshes respond by converting to saline

marshes but others respond by converting to shallow open water. The reason(s) for such differences remain unknown. Determining how to prevent lateral erosion, enhance vertical accretion, and to protect tidal, non-saline wetlands from saltwater intrusion is crucial to determining strategies to protect, restore, and enhance habitat for wildlife and fisheries in coastal wetlands.

**12) STUDENT - TRENDS IN WHITE-TAILED DEER (ODOCOILEUS VIRGINIANUS) HUNTING EFFORT AND HARVEST BY MISSISSIPPI RESIDENT HUNTERS (1980 – 2008)**, Vanessa C. Oquendo, [vco8@msstate.edu](mailto:vco8@msstate.edu), Kevin M. Hunt, Steve Demarais, Mississippi State University, Department of Wildlife and Fisheries, Human Dimensions and Conservation Law Enforcement Laboratory, Mississippi State, MS 39762-9690.

Self-administered mail questionnaires have been used in Mississippi since 1980 to document resident hunting effort and harvest of game animals. These surveys provide information to biologists and researchers to determine trends in 1) proportion of licensed hunters seeking each game species, 2) number of hunters, 3) total person-days spent afield, 4) average person-days spent afield, 5) total harvest, 6) average seasonal harvest per hunter, 7) average daily harvest per hunter, and 8) percent successful hunters for 13 different game species and feral hog. This poster presentation focuses on hunter effort and harvest estimates for white-tailed deer (Odocoileus virginianus) which is the most hunted and economically important species in Mississippi. The proportion of licensed resident hunters who hunted for deer between 1980 and 2008 was variable and ranged from 0.673 to 0.886, peaking during the 1989 hunting season. Similarly, the number of hunters was variable and ranged from 118,897 to 200,067, peaking during the 1987 season. But, the number of hunters has generally declined since peaking in 1987. Total person-days hunting was variable and ranged from 2,390,619 to 3,603,325, peaking during the 1987 season. Average seasonal person-days deer hunting ranged from 14 to 24 days and has shown a general increase over the reporting period. Total resident harvest for white-tailed deer was variable and ranged from 196,375 to 335,599, peaking during the 1995 season. The average seasonal harvest of deer has ranged from 1.2 to 2.21 deer per hunter over the reporting period, peaking in 2002. Average seasonal harvest has been above 1.5 deer per hunter since the 1990 season. Average daily kill has remained relatively consistent throughout the reporting period ranging from 0.071 and 0.097, peaking during the 1995-97 seasons. The percent of successful deer hunters has ranged from a low of 49.4% to a high of 79.2%, and has shown a general increase over the reporting period. In summary, fewer hunters are spending more seasonal days hunting and have become more successful at harvesting deer. Nevertheless, the total harvest of deer in Mississippi has steadily decreased since the mid-1990s because of the reduction in total number of deer hunters. These trends provide important information to wildlife agencies to manage and sustain wildlife populations and their habitats, and they provide measures of relative importance to species like white-tailed deer for assessing and prioritizing wildlife management decisions.

**13) STUDENT - THE APPLICATION OF HUNTER OBSERVATIONS AND BROOD SURVEY ESTIMATES TO DETERMINE GOBBLING ACTIVITY OF THE WILD TURKEY THROUGHOUT MISSISSIPPI**, Matthew D. Palumbo, [mpalumbo@cfr.msstate.edu](mailto:mpalumbo@cfr.msstate.edu), Francisco J. Vilella, USGS Cooperative Research Unit, Mississippi State University, Bronson Strickland, Guiming Wang, Department of Wildlife and Fisheries, Mississippi State University, and Dave Godwin, Mississippi Department of Wildlife, Fisheries, and Parks, Mississippi State University .

The Mississippi Department of Wildlife Fisheries and Parks (MDWFP) relies on data from turkey hunter observations and brood surveys from across the state to effectively manage wild turkey (Meleagris gallopavo) populations. Our objective was to use this data to determine if gobbling intensity and frequency were related to nest success and jake recruitment throughout the state. The MDWFP has

divided the state into five turkey management regions based on physiographic characteristics and optimization of logistical resources. We used hunter observations to calculate the mean number of jakes seen per hour of hunting from 1995-2008 for each management region and statewide. We assumed that this sighting rate would index recruitment from the year one age class to the year two age class, when gobblers are typically the most vocal. We used the brood survey data to index nest success by calculating the total poults per total hens observed for each region and statewide from 1995-2008. Previous research in Mississippi indicated a high correlation between nest success of radio-collared hens two years prior to the number of gobblers heard. Therefore, we regressed the mean number of calls and gobblers heard per hour of hunting to the number of poults per hen two years prior and the mean number of jakes seen per hour of hunting the previous year at regional and statewide scales. Our regional regression models explained from 4 to 48% of the variation in mean number of gobblers heard, and from 6 to 32% of the variation in the mean number of calls heard. Our statewide models only explained 9 and 6% of the variation in mean number of gobblers heard, and mean number of calls heard, respectively. This analysis assessed the potential for determining gobbling activity from data sources the MDWFP currently collects. However, the large amount of variation observed warrants caution as to the current application of managers forecasting gobbling activity. Further investigation into the potential sources of the observed variation (i.e. observer, habitat, hunter effort, brood survey effort, weather conditions) may begin to better partition differences so that more accurate relationships can be determined.

**14) STUDENT - AMPHIBIAN AND BIRD ASSEMBLAGES AT HARDWOOD BOTTOMLAND RESTORATION SITES IN WESTERN TENNESSEE**, Elizabeth A. Summers, [esummer@utk.edu](mailto:esummer@utk.edu), Matthew J. Gray, University of Tennessee, Department of Forestry, Wildlife and Fisheries, 274 Ellington Plant Sciences Building, Knoxville, TN 37996.

The majority of hardwood bottomland restorations in the United States have been under the NRCS Wetlands Reserve Program (WRP). A primary goal of WRP is to restore wetland habitat for wildlife. To evaluate the efficacy of WRP for providing wildlife habitat, we measured avian and amphibian communities at 17 restoration and 4 bottomland reference sites in western Tennessee from March – August 2008. Surveys were conducted during three biologically relevant seasonal periods. Our results indicate that relative abundance of different amphibian and bird families varied among restoration ages. Relative abundance of Bufonidae (toads) and Ranidae (true frogs) was related to site age and size. Of the 23 commonly encountered bird families, relative abundance for 10 families was related to restoration age and abundance of 11 families was related to site size during at least one seasonal period. Amphibian species diversity and richness were similar among restoration ages, but bird species diversity and richness were positively related to restoration age. Our results indicate that differences exist in amphibian and avian communities between restoration and reference sites, and for some species, site size appears to be important. Thus, changes in amphibian and avian composition may be a useful metric to monitor ecological restoration in hardwood bottomlands. Future efforts include developing predictive models that will be used by NRCS biologists to monitor ecological restoration at hardwood bottomland sites.

**15) STUDENT - USING COST-SHARE DOLLARS TO ENCOURAGE WETLAND HABITAT MANAGEMENT, WATERFOWL HARVEST SUCCESS, AND WILDLIFE ENTERPRISE DEVELOPMENT IN THE DELTA OF MISSISSIPPI.** Terry Adam Tullos, [adamt@ext.msstate.edu](mailto:adamt@ext.msstate.edu), Walter Daryl Jones, Bruce David Leopold, Mississippi State University, Department of Wildlife and Fisheries, Mississippi State, MS 39762-9690.

Moist-soil management activities vary greatly throughout the Mississippi Alluvial Flood Plain on public and private lands. Understanding the differences in management strategies among landowners and public managers is challenging. Financial limitations, lack of knowledge, and proper timing of applications all present challenges to implementation of moist-soil management practices. As an outreach education tool for public and private land managers, we established a demonstration site in Tallahatchie County Mississippi to illustrate the impacts of active and passive moist-soil management regimes. We conducted manipulations on this demonstration farm for 3 years ( i.e., 2005-2007 ) and used mechanical treatments, water level management, and agricultural plantings within moist soil impoundments to demonstrate an array of habitat management techniques. To illustrate the use of these techniques we provided cost share funding to the cooperating landowner each year of our three year study period. These funds were disbursed at increasing levels each year corresponding to planned incremental changes in habitat prescriptions, US\$30.35, \$78.91, and \$151.76 per hectare respectively. The use of cost sharing habitat practices has been used to stimulate management activities within many government programs. We found that using cost share money to stimulate waterfowl management activities on private lands, and on wetland reserve program lands, contributed to an increase in private land interest in moist-soil management and promoted additional spending by cooperating landowners in subsequent years of \$7.77 per hectare. During the three year project period we also collected on-site waterfowl harvest data to evaluate attractiveness incurred during the enhancement phases of the project. Although many factors affect general overwintering populations and harvest effectiveness of hunters, we saw a general increase in total harvest as levels of management activity increased, 3.3 birds/man/day, 5.3 birds/man/day, and 5.0 birds/man/day. These harvest levels correspond to the increase in management activity on-site across the project period. Annually we conducted a one day waterfowl management field-day at the end of each project enhancement phase. This was done to assist landowners and farmers in managing over-wintering habitats and foraging areas on their lands for migrating waterfowl. Of those attending the workshops ( e.g. N=74 ) the vast majority of attendees, 87%, reported that they plan to modify their current land-use practices to incorporate waterfowl management and wildlife conservation on their agricultural properties. Additionally, workshop participants reported that they expect to earn an additional \$50,000 in individual family farm income by engaging in fee-access recreation involving waterfowl hunting. Across all workshops, attendees ranked these management sessions 3.8 out of a possible 4. However, only 16% of the landowners not currently leasing their land expect to implement a waterfowl lease based on these values.