

2012 Southeastern Fishes Council State Reports

Alabama

The Geological Survey of Alabama (GSA) continued surveys for the Trispot Darter (*Etheostoma trisella*) in the Little Canoe Creek system (Big Canoe Creek-Coosa River) and located additional breeding sites for this species and conservation actions with local landowners are planned for some of these breeding sites. Trispot Darters were also found in two small, direct tributaries to Big Canoe Creek and again in the Ballplay Creek system during 2012. Additional sampling during 2012 in tributaries surrounding Ballplay Creek failed to find Trispot Darters. A final report for this project will be prepared in 2012-13.

The GSA is continuing its work in cooperation with the USFWS, the Alabama Aquatic Biodiversity Center (AABC) of the Alabama Department of Conservation and Natural Resources (ADCNR), and the Alabama Clean Water Partnership (ACWP) to create new opportunities for imperiled aquatic species recovery and restoration through a concept called Strategic Habitat Units (SHU). Currently established SHUs encompass designated critical habitat for listed mussel species in the Mobile River basin which also encompasses some critical habitat for listed fish species as well. This initiative is facilitated through (1) geographic delineation of a SHU watershed or river segment, (2) development of integrated SHU-specific watershed information relative to aquatic habitat quality, biological condition, land-use assessment, and water-quality to determine likely threats to species, (3) using the threats determinations and watershed assessment data to identify stream reaches that need protection, management, or restoration, (4) implementation of an action plan to manage threats through a cooperative partnership of local landowners, organizations, and agencies including watershed partnerships, local and county governments, local businesses and farmers, state and federal agencies, and other interested parties, using a variety of conservation and habitat protection strategies, and (5) restoration and recovery of biodiversity working through the AABC. Three intensive fish blitz campaigns were conducted in 2012, Murder Creek in the Conecuh River system and Big Canoe Creek and Terrapin Creek in the Coosa River system. These watersheds have been designated as SHUs and will receive additional work in the coming years to restore and recover aquatic species.

The Alabama Cooperative IBI (Index of Biotic Integrity) project among GSA, ADCNR, and the Alabama Department of Environmental Management (ADEM) was completed in 2012 and calibrated to Alabama's unique physiography and biologically diverse fish assemblages. The purpose of this project is to create a statewide fish assemblage biological assessment tool for use in screening streams for use attainment, evaluating water quality more completely and effectively, assisting watershed conservation and species restoration/recovery activities, and providing a biological tool to assist in managing Alabama's water quantity resources in the future. A standardized fish community sampling protocol has been established, the state has been regionalized into five ichthyoregions, and IBI metrics and criteria have been preliminarily established for the five ichthyoregions. This project is continuing by developing a large river non-wadeable stream samplong protocol.

During the summers of 2009-2012 sampling for mussels in the Black Warrior River system yielded 28 species from 16 main channel and 119 tributary stations. The federally listed threatened *Potamilus inflatus*, Inflated Heelsplitter, a State of Alabama Conservation Priority 2 (P2) species in Alabama, was collected live at two main channel stations. Mussels were encountered more frequently and often in greater abundance in Coastal Plain tributaries downstream of Tuscaloosa. *Hamiota perovalis*, Orangenacre Mucket, a federally listed threatened, P2, species, was found live at two stations in Fivemile Creek in Hale County, and was the only federally listed species found in a tributary. Most tributary stations upstream of the Fall Line that were direct tributaries to the Black Warrior River yielded no evidence of mussels or only fresh or weathered dead shells of common species. A badly eroded valve of what may be *Pleurobema rubellum*, Warrior Pigtoe (= *P. furvum*, federally listed endangered, P1), was collected from Davis Creek. Some Locust Fork and Blackburn Fork stations yielded a few animals, and six species were collected live there. No listed species were found, but weathered dead valves of *Elliptio arctata*, a State of Alabama Conservation Priority 1 (P1) species, were found in Locust Fork. Mulberry Fork and its tributaries yielded no live animals or dead shells at any station. The Sipsey Fork, sampled mostly in or near Bankhead National Forest, still harbors what is likely the only intact fauna in the Mobile River Basin. All federally listed species documented from the watershed in the past two decades were collected, but in considerably lower

numbers and with less frequency than 20 years ago. Comparison of quantitative sampling by U.S. Forest Service personnel in 1993 and 2002-03 indicated that the fauna in streams in Bankhead NF had suffered from intense droughts, and results of our recent sampling indicate that, while every species has survived, populations are still suppressed.

The Wildlife and Freshwater Fisheries Division (WFFD) of the Alabama Department of Conservation and Natural Resources (ADCNR) hosted the Alabama Nongame Wildlife Conference in July 2012. Natural Resource professionals with expertise on nongame Fishes, Mollusks, and Crayfishes from all over the southeast participated in a 2 day meeting to develop current comprehensive lists of Alabama's fauna and to rank and discuss species in greatest need of conservation action. An updated version of Alabama Wildlife (2004) will be published in 2013. The WFFD continued cooperation with the Geologic Survey of Alabama (GSA) and USFWS to work in Strategic Habitat Units for imperiled aquatic species recovery and restoration, and participated in three fish bioblitz surveys in 2012. These surveys included Murder Creek of the Conecuh River system and Big Canoe Creek and Terrapin Creek in the Coosa River system. New records of Ironcolor Shiner, Bluenose Shiner, and Southern Logperch, all species of Conservation Concern in Alabama, were documented in Murder Creek and its tributaries. The Alabama Cooperative IBI (Index of Biotic Integrity) development project by GSA, ADCNR, and the Alabama Department of Environmental Management (ADEM) was completed on wadeable streams in 2012. This project is continuing by developing a large river non-wadeable stream sampling protocol. Large river IBI sampling has been completed in the Black Warrior and Lower Alabama River systems, and will continue in the Tennessee River system in 2013.

Working with Pat Rakes from Conservation Fisheries (CFI), the Fish Biodiversity Lab at Auburn University located populations of Boulder Darter and Spotfin Chub in Shoal Creek, Alabama, just down from the Tennessee state line. Presumably these fishes are the result of reintroduction efforts near Iron City, TN by CFI. Other species monitored by the Fish Biodiversity Lab in 2012 include Blotchside Logperch Elk river populations of Boulder Darter in Alabama and Blueface Darter. We are developing a monitoring program for Pygmy Sculpin that will be completed in 2013. We continue to work with the effects of elevated noise levels as stressors of stream fishes, and are looking at cortisol levels in *Cyprinella venusta* exposed to road

noise.

Mike Sandel, University of Alabama submitted a final report on the phylogeography of the mud sunfish was submitted to AWDF in February.

Mitochondrial DNA analysis identify unique haplotypes for three genes (ND1, COX1, and CYTB) for this population. Available data reject the hypothesis that this population is the result of translocation from the Atlantic Slope, but do not rule out the possibility that it was stocked from an unsampled Gulf Slope drainage. More samples are necessary to resolve this issue.

In October, the USFWS published a proposed rule that will protect the Spring Pygmy Sunfish under the Endangered Species Act.

optional info: The species will also receive a critical habitat designation. This encompasses all known extant populations and intervening stream channels, as well as the formerly occupied Pryor Spring system. The species is proposed as "threatened", but the final rule will be made after a final comment period. The designation of critical habitat will help protect the federally endangered Slender Campeloma, as well as the Tuscumbia Darter and Flame Chub, all cohabitants of the Spring Pygmy Sunfish. Mike is also developing a study to assess meristic and genetic variation in Mooneye (*Hiodon tergisus*).

Florida - Noel M. Burkhead, USGS, 7920 NW 71st Street, Gainesville, FL 32653

Research and Conservation Activities 2012

Doctoral student Towns Burgess and his advisor, Chuck Cichra, University of Florida Fisheries and Aquatic Sciences Program, School of Forest Resources and Conservation, have been conducting a long-term biological community monitoring in the Lower St. Johns River drainage since 2008, and have compiled one of the most comprehensive data sets on Florida's rivers. One of the tributaries studied, Rice Creek, receives paper mill effluent. The Florida Department of Environmental Protection requires monitoring of multiple community trophic levels to determine whether industrial usage in the St. Johns River causes adverse effects to biological communities. Their research results may be used as baseline data for future investigations. Towns may be contacted at otburge@ufl.edu.

Travis Tuten, Drew Dutterer, Kevin Johnson, and Eric Nagid of the Florida Fish and Wildlife Conservation Commission (FWCC, Gainesville Freshwater Fisheries Office), John

Knight, Matt Wegener, and Kate Harriger (Holt Freshwater Fisheries Office), and Chris Paxton, Katie Woodside, and Nicole Kierl (Panama City Fisheries Office), have been actively involved since 2006 in Florida's long-term monitoring program of its lakes and rivers. Sampling has focused on Orange, Lochloosa, and Newnans lakes, Rodman Reservoir, and Blackwater River, Chipola River, Escambia River, Holmes Creek, North Withlacoochee and Withlacoochee rivers, Ocklawaha River, and Yellow River. Part of the sampling efforts is focused on monitoring the ecological health of aquatic ecosystems and secondly on tracking the status and current distribution of state-listed fishes.

One of the state-listed species of interest is the southern-most population of the tessellated darter *Etheostoma olmstedi maculaticeps*; specific objectives are documenting the current distribution, abundance, habitat, and population genetics. Cooperators in this effort include Howard Jelks (U. S. Geological Survey), Jim Austin (University of Florida), and Mark Barrett (FWCC). The bluenose shiner *Pteronotropis welaka* surfaced again in the St. Johns River system in April and July after a 15-year hiatus since it was last captured in that system. *Pteronotropis welaka* was also collected in Holmes Creek and in the Dead Lakes. Population estimates and dietary studies are being conducted on the shoal bass *Micropterus cataractae* in the Chipola River system and interactions between *M. cataractae* and the largemouth bass *M. salmoides* are being examined within the Spring Creek to Johnny Boy Landing river reach. FWCC biologists have been developing imperiled species management plans for *P. welaka*, the blackmouth shiner *Notropis melanostomus*, the harlequin darter *Etheostoma histrio* and the exquisite crystal darter *Crystallaria asprella*. The draft management plans should be completed by December 2012 with presentations to the FWC Commissioners and public input sometime in 2013.

Notable collections of state-listed fishes from western Florida include *P. welaka*, three *C. asprella* from one location in the Escambia River—the second new record of the species in three years—as well as one saltmarsh topminnow *Fundulus jenkinsi* and six Florida chubs *Macrhybopsis* sp. cf. *aestivalis* from three locations on the Escambia and one in the Yellow River. Research is ongoing to determine habitat use, home range, and movement of alligator gar *Atractosteus spatula* in Florida using radio and ultrasonic transmitters. Other species-directed projects that were initiated include population size estimates of *E. histrio* from the Escambia River. Lastly, efforts continue to update the status and contemporary distribution of the enigmatic blackbanded

sunfish *Enneacanthus chaetodon*.

Pam Fuller and Amy Benson (USGS, Southeast Ecological Science Center, Gainesville), and their team, Matthew Neilson, Matthew Cannister, and Victor Engel, have been keeping the Nonindigenous Aquatic Species database current (<http://nas.er.usgs.gov/>). Recent activities includes publication of two papers on predictive modeling on invasive species' distributions (citations below); acceptance of a paper describing the NAS Alert System (email notification system for records of new introductions) in 'Fisheries'; authoring of the nonindigenous distribution section for the chapter on salmonids in the forthcoming book "Diversity of North American Freshwater Fishes: Natural History, Ecology, and Conservation Volume II"; creation of report for USFWS on nonindigenous species introductions and occurrence in USFWS Region 4 (southeast region, includes KY, TN, AR, LA, MS, AL, GA, NC, SC, FL, PR, and VI) since 2001; editing and enhancement of 168 species informational factsheets; addition of 3 new species and ~5400 new specimen records into the NAS specimen database, including 656 specimen records from Florida as well as many records based on specimens from the Florida Museum of Natural History and other museum collections. The program has also been tracking a relatively new marine invader, the Asian Tiger Shrimp, *Penaeus monodon*; however, due to funding cuts, NAS will no longer track aquatic plants or other marine invertebrates.

Poulos, H.M., B. Chernoff, P.L. Fuller, and D. Butman. 2012. Ensemble forecasting of potential habitat for three invasive fishes. *Aquatic Invasions* (2012) Volume 7 (1): 59–72. See http://www.aquaticinvasions.net/2012/AI_2012_1_Poulos_etal.pdf

Poulos, H.M., B. Chernoff, P.L. Fuller, and D. Butman. 2012. Mapping the potential distribution of the invasive red shiner, *Cyprinella lutrensis* (Teleostei: Cyprinidae) across waterways of the conterminous United States. *Aquatic Invasions* 7 (3): 377-385. See: <http://www.aquaticinvasions.net/2012/issue3.html>

Howard Jelks, (USGS, Gainesville), Frank Jordan (Loyola University, New Orleans), and Bill Tate (FWS, Panama City) continue research on the ecology and population structure of the Okaloosa darter *Etheostoma okaloosae* at Eglin Air Force Base. They have some remarkable longevity data based on continuous annual captures of darters marked by Dan Holt, a recent Auburn graduate. Okaloosa darter may be the longest-lived little fish in North America (until

somebody finds another old little fish). With a new major road crossing Okaloosa darter streams, there are opportunities for habitat restoration at several sites and population/habitat monitoring at the bridge locations and mitigation sites. Howard Jelks is busy as the chair of the American Fisheries Society Endangered Species Committee with active sub-committees on freshwater snails, mussels, and marine fishes.

Leo Nico (USGS, Gainesville) is involved in multiple studies of nonindigenous fishes within and outside of Florida. With Howard Jelks and Steve Walsh, and three outside colleagues, Leo as authored a recent publication reporting discovery of South American suckermouth armored catfishes in Florida's Santa Fe River drainage, Suwannee River basin. Leo continues researching Asian swamp eels and has several manuscripts in various stages of completion. One paper will focus on the parasites of Asian swamp eels, in collaboration with parasitologist Rebecca Cole (USGS National Wildlife Health Center, Madison, WI). Nico was minor author on a paper describing interactions between native eastern mosquitofish and non-native poeciliids.

Nico, L.G., P.L. Butt, G.R. Johnston, H.L. Jelks, M. Kail, and S.J. Walsh. 2012. Discovery of South American suckermouth armored catfishes (Loricariidae, *Pterygoplichthys* spp.) in the Santa Fe River drainage, Suwannee River basin, USA. *BioInvasions Records* (2012), prepublication copy available at:
http://www.reabic.net/journals/bir/2012/Accepted/BIR_2012_Nico_et_al_correctedproof.pdf

Thompson, K.A., J.E. Hill, & L.G. Nico. 2012. Eastern mosquitofish resists invasion by nonindigenous poeciliids through agonistic behaviors. *Biological Invasions* (2012) 14: 1515-1529.
<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/31704/ThompsonKevinFishesWildlifeEasternMosquitofishResists.pdf?sequence=1>

Pam Schofield (USGS, Gainesville) and Bill Loftus (USGS, retired volunteer) are continuing their mesocosm experiments at the USGS laboratory in Gainesville to determine the relative influence of a non-native cichlid predator (*Hemichromis letourneuxi*) on a simulated Everglades marsh community. While studies of this type do not allow for direct observations of behaviors, they provide valuable information on population-level effects of predators and generate

hypotheses regarding species relationships that can be more closely examined in subsequent studies. Their intention was to examine broad patterns of community dynamics change in the presence of non-native predators. Other ecological and physiological questions regarding interactions in nonindigenous fishes are addressed in the following papers:

Schofield, P.J., M. S. Peterson, M. R. Lowe, N. J. Brown-Peterson and W. T. Slack. 2011.

Survival, growth and reproduction of non-indigenous Nile tilapia, *Oreochromis niloticus* (Linnaeus 1758). I. Physiological capabilities in various temperatures and salinities. *Marine and Freshwater Research* 62: 439-449.

Lowe, M. R., W. Wu, M. S. Peterson, N. J. Brown-Peterson, W. T. Slack, and P. J. Schofield.

2012. Survival, growth and reproduction of non-native Nile tilapia II: Fundamental niche projections and invasion potential in the northern Gulf of Mexico. *PLoS ONE* 7(7): e41580. doi:10.1371/journal.pone.0041580 (available online).

Ken Sulak, Mike Randall, and the *Sturgeon Quest* team (USGS, Gainesville), are entering the 26th year of investigations on the Gulf sturgeon *Acipenser oxyrinchus desotoi* conducted by personnel from the Gainesville center (and laboratory in earlier incarnations). This duo and a host of volunteers have compiled an impressive body of work on abundance, population structure, dietary habits, seasonal movement patterns, habitat-use, spawning habitat, and spawning seasons of this ancient river beast. A brief summary of their sturgeon work is available at <http://fl.biology.usgs.gov/coastaleco/index.html>. Recent publication of interest:

Randall, M.T. and K.J. Sulak. 2012. Evidence of autumn spawning in Suwannee River Gulf sturgeon, *Acipenser oxyrinchus desotoi* (Vladykov, 1955). *Journal of Applied Ichthyology*, (1-7). [Journal Abstract]

Sulak, K.J., J. J. Berg, and M. Randall. 2012. Feeding habits of the Gulf Sturgeon, *Acipenser oxyrinchus desotoi*, in the Suwannee and Yellow rivers, Florida, as identified by multiple stable isotope analyses. *Environmental Biology Fishes* 95: 237-258.

Stephen Walsh, Howard Jelks, Nathan Johnson, and Zachary Martin (USGS, Gainesville), are working with Mary Freeman (USGS Patuxent Wildlife Research Center field station in Athens, Georgia), on a new U.S. Department of the Interior initiative entitled WaterSMART

(Sustain and Manage America's Resources for Tomorrow). The overarching purpose of WaterSMART is to develop data and tools needed by water resource managers to meet challenges imposed by aging infrastructure, population growth, groundwater depletion, impaired water quality, and water needs for humans, factoring in environmental uses and climate variability. The investigators are using the ELOHA (Ecological Limits of Hydrologic Alteration) approach to examining environmental flows and their effects on fish and mussel assemblages in headwater tributaries within the Apalachicola-Chattahoochee-Flint drainage. These hydrologic models will eventually be used in conjunction with the ecological models to relate population responses to stream flows, to apply models to forecast community changes under alternative management or climate scenarios, and ultimately, to develop flow-ecological response curves. Steve also coauthored papers recently with University of Florida colleagues on habitat use and movement patterns of fishes and age-0 assemblages in the Apalachicola River floodplain.

Burgess, O.T., W.E. Pine III, and S.J. Walsh. 2012. Importance of floodplain connectivity to fish populations in the Apalachicola River, Florida. *River Research and Applications* (2012), <http://onlinelibrary.wiley.com/doi/10.1002/rra.2567/pdf>

Walsh, S.J., E.N. Buttermore, O.T. Burgess, and W.E. Pine, III. 2009. Composition of Age-0 fish assemblages in the Apalachicola River, River Styx, and Battle Bend, Florida: U.S. Geological Survey Open-File Report 2009-1145, 28p. <http://pubs.usgs.gov/of/2009/1145/pdf/ofr2009-1145.pdf>

Noel Burkhead (USGS, Gainesville) has been investigating extinction patterns in North American freshwater fishes including modern to background extinction rates, biological attributes of extinct fishes, and a planned study comparing life history strategies in extinct fishes to a subset of 200 randomly selected North American fishes using the Fish Traits database. Noel was allowed to contribute to the forthcoming AFS conservation assessment of snails from Canada and the United States, so long as he did not behave like Art Bogan. The descriptions of new species related to the holiday darter *Etheostoma brevirostrum* should be completed at the end of this year or early 2013. The paper on fish extinction rates was published in September and a new USGS website on extinct fishes is at http://fl.biology.usgs.gov/extinct_fishes/index.html.

Burkhead, NM. 2012. Extinction rates of North American freshwater fishes, 1900 to 2010.

BioScience 62 (9): 798-808. Downloadable copy available at above website.

Georgia - Brett Albanese

Megan Hagler, Rachel Katz and Carrie Straight (UGA- Odum School) are investigating synergistic effects of streamflow and geomorphology on (respectively): algae, water quality and stream fishes in the upper Coosa system; stream fish survival and recruitment dynamics in the Flint and Oconee river systems; and spawning and migratory behavior of robust redhorse (*Moxostoma robustum*) in the Broad River system (GA). Christina Baker recently completed her thesis at UGA asking whether Conasauga River macroinvertebrates show species shifts in the river reaches where we're observing losses of fishes (the answer is yes, but fishes are easier and more fun to study). Freeman lab alumnus Greg Anderson (now at VPI) published papers on predictors of holiday darter (*Etheostoma brevirostrum*) occurrence in the upper Etowah River system, and on prioritizing culverts for removal to benefit imperiled stream fishes. Bud Freeman (GA Museum of Natural History) is working on systematics and taxonomy of the redeye bass species complex in the Chattahoochee, Altamaha and Savannah systems. Mary Freeman and USGS colleagues published on modeling effects of water diversions on stream fishes, and commenced field work in the Apalachicola-Chattahoochee-Flint system to track stream fish metapopulation dynamics.

Jennings Lab (GA Cooperative Fish and Wildlife Research Unit, UGA): Brittany Trushel is wrapping up a thesis in which she used local- and landscape-level characteristics to classify lakes in Georgia's Public Fishing Areas (PFAs). These lake classes were then used to model structural indices of selected sportfish from the PFAs. Generally, lake surface area, lake age, mean depth, and degree of urbanization affected sportfish metrics. Will Pruitt also is wrapping up a thesis in which he used occupancy modeling to estimate the habitat use and abundance of robust redhorse in the upper reaches of the Ocmulgee River. Generally, robust redhorse had ~50% probability of occupying shoal habitat if the shoals were present, but a much lower probability of occupying non-shoal habitat. Further, the study reach has a 9 river km reach with inaccessible shoals that has a high likelihood of having robust redhorse present. Patrick Ely is wrapping up a report that details attempts to use radio-tagged robust redhorse to document robust redhorse spawning locations in the Ogeechee River and to document habitat use during non-spawning periods. One confirmed spawning site was documented near the city of Louisville, GA. Generally, radio-tagged

robust redhorse frequented the areas between Millin and Louisville during the non-spawning period of the year.

Bringolf Lab (UGA): Peter Hazelton (PhD candidate) is in the final stages of his work with emerging contaminants and freshwater mussels. Andrea Fritts (PhD candidate) is wrapping up her work with mussel early life history and stress physiology, primarily with mussel assemblages in the Flint Basin. Whitney Jacobs (MS student) is examining the sources of estrogenic compounds in the Upper Conasauga Basin, and their effects on fishes. Kristen Kellock (PhD candidate) is finishing her work to better understand the distribution and causes of intersex in fishes.

Georgia DNR Region 3 Fisheries in cooperation with the FL FWCC, FWS, COE and TNC are in the fourth year of a five year proactive species conservation grant from NOAA being used to restore Alabama shad (*Alosa alabamae*) populations in the ACF. The primary management technique to expand shad populations is by providing fish passage at Jim Woodruff Lock and Dam on the Apalachicola River. Passing shad at this location provides several hundred miles of additional riverine habitat to both spawning adults and their offspring in the Flint and Chattahoochee Rivers. Yearly population estimates of spawning adults, though highly variable, indicate an increase in the number spawning fish and in particular more larger (older) individuals returning.

The Gary Grossman Lab is continuing long-term analyses of non-game fish and trout population data. Zach Anglin is completing a study of microhabitat use and movements in southern brook trout.

Georgia Power is working with Florida Fish and Wildlife Conservation Commission, Tennessee Wildlife Resources Agency, Texas Parks and Wildlife, the Oklahoma Cooperative Fish and Wildlife Research Unit, and the University of Florida on a special symposium on black bass conservation for the 2013 SDAFS meeting in Nashville. The symposium will highlight conservation needs of lesser studied black basses in their native ranges, and will help inform the NFWF Native Black Bass Initiative conservation strategy. GPC is also actively involved in shoal bass conservation in the Chattahoochee Basin and has recently partnered with Auburn University,

SARP, and GADNR on a collaborative research evaluation of shoal bass populations in the middle reaches of the Chattahoochee River between West Point Dam and WF George Dam. In addition, GPC continues to support and participate in robust redhorse conservation activities in the Ocmulgee and Oconee Rivers in collaboration with the USFWS, GADNR, and the USGS Coop Unit at UGA.

Gerry Dinkins has been conducting fish, mussel, and aquatic snail surveys in many drainages across Georgia, and doesn't have much to announce relative to fishes, but he has some news for those interested in, as Noel Burkhead says, the "dark side" (mollusks). Gerry and his crew found a robust and previously unknown population of the federally threatened Fine-lined pocketbook (*Hamiota altilis*) in a small stream in the upper Tallapoosa River drainage. Based on what is known about the species, this appears to be the most robust population not only in Georgia, but perhaps across its entire range. He was also able to confirm the species' persistence in several miles of the main channel Tallapoosa River.

Prior to any releases of the 700+ juvenile Conasauga logperch propagated last year to the Conasauga River, surveys were conducted to delineate and quantify habitat units and logperch numbers in order to guide a release plan. Floats (by canoe, kayak, and paddleboard!) and snorkel surveys of reaches from near the Jacks River downstream to Gregory's Mill in Georgia were conducted in April and May by TNACI and CFI. More than 50 *Percina jenkinsi* were found at more than a dozen new sites and many specimens were captured and fin-clipped for genetic analyses. Following surveys, propagated fish were tagged and 10-15 individuals released at each suitable habitat unit through the reaches below Minnewauga Creek down to the TN 74 Bridge as well as in the upper Conasauga River around the Watchable Wildlife site. Individuals from these upper releases were observed by snorkel groups all summer at the WW site.

The Nongame Conservation Section (GADNR) Team Aquatica (Brett Albanese, Jason Wisniewski—"Clambo", Deb Weiler, and interns) have continued high priority fish and mussel monitoring throughout Georgia. Brett has been focusing on fishes recently petitioned for federal listing, including the Coosawatee population of the Holiday darter (*Etheostoma brevirostrum*),

bluestripe shiner (*Cyprinella callitaenia*), and Altamaha Shiner (*Cyprinella callitaenia*). Surveys for the latter two species are in collaboration with Jim Williams. Former intern (Katie Owers) published a paper on the status of riparian zone habitats in the upper Toccoa River. We are also preparing a manuscript detailing the status and habitat use of the goldline darter in the upper Coosawattee River system. Jason discovered a large population of the Altamaha arc mussel (*Alasmidonta arcula*) in Lake Jackson, which greatly expands the known range of this state protected mussel species. Jason also documented American shad eggs inside the mantle cavities of live freshwater mussels and has submitted this exciting discovery for publication.

Chris Skelton (Georgia College and State University) has been working like a mad-man to finish his Crayfishes of Georgia website. Check it out: <http://www.gcsu.edu/crayfishes/> (or just google Crayfishes of Georgia). It includes keys, photos, species accounts, maps, and other useful information.

David Bechler and Josh Salter (graduate student) continued working on the Georgia DNR contract, "The Status of the Blackbanded Sunfish and Other Select Species in the State of Georgia". To date they have sampled over 50 sites (each 3-4 times!) and have documented 2 extant populations of *Enneacanthus chaetodon* in Georgia.

Louisiana

Marty O'Connell with the Nekton Research Laboratory (NRL) at the University of New Orleans (UNO) is happy to report no new occurrences of an invasive tilapia in the vicinity of Port Sulphur, Louisiana. Post-doc Tom Lorenz and NRL Research Director Chris Schieble have been conducting survey efforts for this non-native fish in both freshwater and estuarine habitats over the past year. The hope is that a combination of extensive rotenone treatments by the Louisiana Department of Wildlife and Fisheries, an unusually cold winter in 2010, and the introduction of native fish predators by researchers from Nicholls State University has led to the extermination of any remaining tilapia. Surveying will continue until August 2013. Dr. Lorenz is also conducting research on determining how another invasive fish, the Rio Grande cichlid (*Herichthys cyanoguttatus*), uses thermal refugia to survive cold winter periods.

Senior Biologist and Database Manager Meg Uzee O'Connell has collaborated with Dr. O'Connell on two submitted scientific manuscripts: one concerning the response of Lake

Pontchartrain fish assemblages to Hurricane Katrina and one summarizing a 2007-2008 survey for the blackmouth shiner (*Notropis melanostomus*) in Mississippi. In general, the composition of Lake Pontchartrain estuarine fish assemblages has remained stable since the storm, with some key species actually increasing. Concerns exist, however, about measured post-hurricane declines in Gulf menhaden (*Brevoortia patronus*), especially since numbers of this species had remained relatively stable in Lake Pontchartrain over the previous half-century. While the 2007-2008 survey for *N. melanostomus* led to the discovery of a new population of *N. melanostomus* in Luther Lake, there is concern about the overall decrease in *N. melanostomus* at historical localities since 1995. For example, recent clear-cutting activities adjacent to one historical site have threatened the largest and most consistent population of the species in Mississippi.

Shane Abeare (Ph.D. student) continues his work in the Bay of Ranobe, Madagascar, where he is applying satellite remote sensing in the study of coral reef fish spatial ecology. His study represents the first relatively large-scale, long-term study of coral reef fish spatiotemporal dynamics conducted in the waters of Madagascar. He hopes the results will prove to be an important resource for fisheries managers in the region. Patrick Smith (Ph.D. student) is continuing his study on habitat choice in native red drum (*Sciaenops ocellatus*) that have been restored to an urban fishery in New Orleans. Patrick's research also involves studying long-term changes in Bayou St. John fish assemblages. Will Stein (Ph.D. student) continues to study tarpon (*Megalops atlanticus*) habitat use in southeastern Louisiana. His work with local anglers and divers has yielded numerous previously unknown localities where all age classes of this species occur in Louisiana. Angela Williamson (M.Sc. student) continues to study the relationship between the Louisiana pearlshell mussel (*Margaritifera hembeli*) mussel and its possible fish host species. New graduate student Jonathan Davis (Ph.D. student) will be studying Lake Pontchartrain bull sharks (*Carcharhinus leucas*) in the hope of determining how this apex predator is using these estuarine habitats. Arnaud Kerisit (new M.Sc. student) is processing larval fish and invertebrate samples to determine if recent hurricane protection structures have changed the use of migratory passes by these species.

North Carolina - Bryn H. Tracy, NCDWQ

Carolina Redhorse

In Oct 2011, Bob Jenkins submitted to the US F&WS and colleagues a short, final report on the taxonomy and distribution of the undescribed Carolina Redhorse of the Cape Fear and Pee Dee River drainages. Bob is trying to finish certain other studies/manuscripts before returning to the Carolian Redhorse project to complete and publish it in full detail.

Bridle Shiner

Staff with the North Carolina Wildlife Resources Commission discovered a previously unknown population of Bridle Shiner, *Notropis bifrenatus*, in Deep Swamp Branch, Hertford County, of the Chowan River system in North Carolina. The discovery by Tyler Black and Michael Young in May 2012 was the first in the Chowan River system of Virginia and North Carolina since the late 1960s. Until this year, the Bridle Shiner was thought to be extirpated from the system. Wayne Starnes with the North Carolina State Museum of Natural Sciences is investigating the species current distribution in Virginia and had not found the species in the Virginia portion of the Chowan River system. Black and Young found the shiner while sampling for another rare species, the Chowanoke Crayfish, *Orconectes virginienis*. The historic range of the shiner spans from Lake Ontario in Canada to the Santee River in South Carolina. However, in North Carolina, the Bridle Shiner has been found only in the Neuse River system and not since 2001. In fact, the Bridle Shiner has declined throughout much of its historic range, with most states listing the species as vulnerable, imperiled, threatened or endangered. In North Carolina, it is listed as state endangered.

A slow-moving swimmer that needs the dense cover of aquatic vegetation to hide from predators and disperse its eggs, the Bridle Shiner is extremely sensitive to the loss of submerged aquatic vegetation that can occur with the use of herbicides and poor land use practices that result in excessive sedimentation and pollution. The introduction of exotic plants, such as *Hydrilla verticillata* and *Myriophyllum spicatum*, has hindered recovery of native vegetation that Bridle Shiners prefer. Staff plan to conduct a follow-up survey in the Deep Swamp Branch and surrounding water bodies to determine the extent of the population in North Carolina.

The Richland Creek Re-Introduction Project

The Richland Creek Re-Introduction Project in Haywood County is in its third year of operation. Since April 2010, more than 14,000 fish of nine species have been collected from nearby source populations and reintroduced at multiple sites across the City of Waynesville. The creek is on the state's impaired streams list due to historic and long-term poor water quality, hydrologic modifications, and habitat degradation. This innovative project (i.e., removing a stream from the §303 (d) list and restoring the biological integrity of the stream by re-introducing indigenous species, long absent from the watershed) is a cooperative effort among the the North Carolina Division of Water Quality, North Carolina Wildlife Resources Commission, Haywood Waterways Association, the University of Tennessee-Knoxville, and Evergreen Packaging. The project, patterned after the successful and on-going bi-state Pigeon River Re-introduction Project led by UT-Knoxville and NCWRC, has received print and electronic media coverage by the local newspaper. The low-cost project essentially involves the collection, transport and release of fish of several species upstream from Lake Junaluska twice a year for three years or until the species establish permanent, reproducing populations. Once the populations have become established, the Division of Water Quality will repeat its five-year cycle of monitoring. If the fish community rates at minimum Good-Fair, the rating which will trigger the removal of the stream from the §303 (d) list. Already, we have discovered that five species are reproducing and dispersing upstream and downstream on their own accord. As a whole, after three years, the team's consensus is that things are doing very well and we are very pleased with the volunteer efforts by everyone. The key to the project's success will be for the partners to keep preaching clean water and storm water runoff management so that water quality and biological integrity continue to improve throughout the Richland Creek watershed. Without human intervention re-introducing and re-locating critical species such as River Chub, Warpaint Shiner, Saffron Shiner, Mottled Sculpin, Rock Bass, Tuckasegee Darter, and Greenfin Darter, the stream could remain on the §303 (d) list despite continuing water quality improvements in the watershed.

Mississippi - Todd Slack and Jan Hoover

Susie Adams, Mel Warren and Wendell Haag from the U.S. Forest Service, Southern Research Station located in Oxford, report on some of their recent projects which include stream temperature relations to fish and crayfish communities in the Little Tallahatchie River basin, with a focus on the Yazoo darter (with Mel Warren); effects of logging and switchgrass interplanting in pine plantations on crayfish in intermittent streams (with Blake Davis, Weyerhaeuser); effects of small impoundments on downstream crayfish communities; effects of Deepwater Horizon oil spill on Alabama shad in the Pascagoula River (with Jake Schaefer, USM); and taxonomy of the *Orconectes* (crayfish) subgenus *Trisellezens* (with Chris A. Taylor and Guenter Schuster). Lastly, Susie adds that this year she will serve as president-elect of the International Association of Astacology. She encourages anyone with an interest in crayfishes to check out this society or contact her for more info.

Matt Roberts, Curator of Fishes at the Mississippi Museum of Natural Science, has spent the last two field seasons conducting an intensive survey for the piebald madtom, *Noturus gladiator*, in the Tuscumbia, Hatchie, Wolf, Coldwater and Big Black River systems. Although piebald madtoms were captured, they were encountered extremely infrequently and in very low numbers. Return visits to successful capture sites failed to yield new captures, suggesting site fidelity is low. For now, it appears the potential for field life history studies to yield robust information is low in the State of Mississippi.

With regards to the MMNS Ichthyology Collection, this is an exciting time. The collection is now settled in to its brand new collection range on the MMNS campus! Matt also welcomed Jessica Brown, Curatorial Assistant, who will join Jeremy Copley and Latoya Turner in keeping those specimens in tip-top shape!

Larry Pugh (Assistant Director--Fisheries Bureau, Mississippi Department of Wildlife, Fisheries and Parks) highlighted a number of research projects his agency is currently involved with. These include "Promoting Crappie Recruitment in Northwest Mississippi Reservoirs" in

collaboration with Steve Miranda (MSU) and Glenn Parsons (UM); “Walleye Movement in the Tombigbee River” investigated by Tyler Stubbs (MDWFP) and Ricky Campbell (USFWS); and “Lower Mississippi River Sturgeon Assessment Study” with Nathan Aycock and Jerry Brown organizing MDWFP’s efforts in this multi-agency collaborative project.

Mark Peterson, University of Southern Mississippi-Gulf Coast Research Laboratory, reports on some of his lab’s recent research activities. Their work with Gulf sturgeon continues on the Pascagoula River and on Ship Island in collaboration with Todd Slack and the US Army Engineer Research and Development Center (ERDC) team. In addition, the lab just added more Gulf sturgeon telemetry work in association with the Gulfport Harbor restoration project (Peterson and Slack) which has kept the USM-GCRL field crew, Jeanne-Marie Havrylkoff, Paul Grammer and Claire Matten, quite busy this fall netting for Gulf sturgeon. Paul Mickle (USM-GRCL post-doctorate), Jennifer Green and Mark continue their telemetry work on striped bass in Mississippi coastal rivers in addition to studying reef-associated diets and fish community structure of constructed nearshore reefs in the Mississippi Sound. Lastly, Mark comments that he is part of a collaborative group including Read Hendon (USM-GCRL), Marty O’Connell (UNO) and Sean Powers (DISL) which will examine long-term fisheries data sets in conjunction with current sampling to address concerns over potential impacts to fishes and decapod crustaceans in the three state area (LA, MS and AL) relative to the Deepwater Horizon incident.

Glenn Parsons, University of Mississippi, has a busy lab with a number of graduate students focusing on a diverse array of research topics. Glenn invites everyone to drop by his website (www.drparsons.wordpress.com) to get an update on their current happenings.

The ERDC Fish Ecology Team is working on several field and laboratory studies of imperiled and invasive fishes. Team members are beginning their eleventh consecutive year of sampling main channel Mississippi River fishes, including pallid sturgeon and Asian carp, but are increasing their efforts on describing communities in secondary channels. In addition, Jack Killgore is completing a synthesis of 20 years of data on fish communities in the streams of the Mississippi Delta and is collaborating with Mike Holliman in continuing laboratory studies of

susceptibility of Asian carp to electrical barriers. Phil Kirk oversees a multi-population assessment of age-and-growth in Asian carp using collections from the Lower Mississippi River main channel and backwater, the Bonnet Carré diversion, and Horn Lake. In a similar vein, Steven George and William Lancaster are collecting tissue samples for a multi-population assessment of genetic structure of Asian carp. Outside the Mississippi River system, the Team's Gulf sturgeon group, Todd Slack, Bradley Lewis, Alan Katzenmeyer and Steven George, continue to sample in both the Pearl and Pascagoula rivers for Gulf sturgeon as part of their collaborative efforts (Slack and Peterson) with Ship Island restoration efforts and the Gulfport Harbor expansion. Nicky Hahn continues her work with suckermouth catfishes (Loricariidae) by collecting demographic data on field-collected specimens and by continuing her mesocosm experiments to identify and quantify ecosystem impacts.

Paddlefish are another major topic of research at ERDC. Jan Hoover, in collaboration with Mississippi Department of Wildlife, Fisheries, and Parks, is coordinating studies of age-and-growth based on fish harvested commercially for caviar. He continues work on an interdisciplinary project to assess morphological and structural properties of paddlefish rostra and their possible application to defensive military technology. Jan, Alan Katzenmeyer, and Steven George also investigated a fish kill in the lower Pearl River in September that included more than 30 dead paddlefish. Jay Collins designed and supervised construction of a trailer-mounted 3000-liter swim tunnel which can be transported and used in other laboratories or in the field. The mobile swim tunnel was completed in October, and Jan, Jay, and Alan conducted a pilot study of paddlefish swimming performance in rectilinear, boundary layer, and turbulent flows. Newest Team member, Liz Rayfield, an engineering student at Mississippi State University, also conducted comparative swimming studies of fingerling and yearling paddlefish, using fish provided by Steve Kahrs, Osage Catfisheries (from Mississippi Basin broodstock) and by Ricky Campbell, Private John Allen National Fish Hatchery (from Tombigbee River broodstock). Nick Friedenber, using demographic data of Asian carp provided by student researcher Larry Southern, developed a bioenergetics model assessing impacts of Asian carp on paddlefish populations in the Lower Mississippi River.

Oklahoma

Bill Matthews, Edie Marsh-Matthews and student Nick Shepard have resampled fishes in the Tar Creek watershed and reference sites, Ottawa County, northeast Oklahoma, to follow up on a 5-year long study of fishes in this area, related to this being one of the largest EPA Superfund sites in the country. Bill had four years of sampling before a series of bio-treatment retention ponds were built by Dr. Robert Nairn (OU Engineering) to improve quality of heavy-metal laden waters that were flowing directly into a Tar Creek tributary. The retention ponds have now been operating successfully for two years, hence the follow up. They hope to continue to track recovery of fishes into the stream reaches most affected by the retention ponds treatment.

Shannon Brewer and collaborating researchers are studying habitat use and movement of fishes using shallow-water habitats in three scenic rivers in Oklahoma. Relations between habitat and flow will be assessed using a modified wetted-perimeter method and paired with habitat use, movement patterns, and survival of fishes. The goal of this study is to provide the State of Oklahoma with ecologically-relevant minimum flow recommendations. Currently, no instream-flow guidelines exist for the state.

Brewer and her associates also are studying changes in the native distribution of the Arkansas River shiner (*Notropis girardi*), a species once common throughout Oklahoma, southern Kansas, western Arkansas, northern Texas, and northwest New Mexico. The Arkansas River shiner represents a reproductive ecotype that is threatened by the effects of river fragmentation and changes to flow regimes in the Great Plains region. The researchers are combining presence data with information on geomorphology and hydrology to construct a time-series of the species' historic range and elucidate the causes of its decline at the landscape scale. The research also will assess the effects of environmental factors on early life stages of Arkansas River shiner and determine how habitat complexity influences the transport of the species' semi-buoyant eggs. The study will provide information needed for designing suitable management strategies for the

Arkansas River shiner and other similar Great Plains cyprinids.

Brewer also is evaluating existing ecohydrology models as potential management tools for interpreting the effects of climate change and land management on stream hydrology and associated fish assemblages.

South Carolina

The fish team at the University of South Carolina (Joe Quattro) have ongoing projects addressing (1) the degree of introgressive hybridization between nonnative and native species of black bass in the Savannah River drainage, (2) comparative historical phylogeography of minnows and black basses in the Savannah, Santee and French Broad rivers, (3) evolutionary history of broadtail madtoms (with Fritz Rohde), and (4) tongue-tied minnows (with Ken Oswald).

SCDNR's Diadromous Fishes Program (Bill Post) has ongoing research evaluating Atlantic and shortnose sturgeon, American shad, and American eel. These studies include a multi-state sturgeon grant to gain a better understanding of riverine and near coastal movements of shortnose and Atlantic sturgeon on a coast-wide basis. By monitoring movements, the results of this program should be able to identify potential spawning sites, over summer and over winter habitats, and should give better evidence of the extent of inter-basin transfer. Monitoring of recruitment of Atlantic and shortnose sturgeon within the Edisto River continues (since 1994). Critical habitat is being identified within in the Santee-Cooper Lakes by actively tagging Atlantic and shortnose sturgeon and monitoring their movement throughout the system. Additionally, an American shad stock enhancement program in the Edisto River, SC is beginning to evaluate contribution during return spawning migrations and SCDNR's adult and juvenile monitoring project collects fishery independent and fishery dependent data on the American shad and river herring populations in the Edisto, Santee, and Waccamaw Rivers. American eel research also continues with two additional ramps constructed at the Goose Creek Reservoir dam allowing passage evaluation on both adult and young-of-year individuals.

SC DNR's Freshwater Fish Section (Scott Lamprecht) has completed its 8th year of a robust redhorse restoration project in the Santee River system. The re-introduction goal of using a minimum of 100 parental crosses should be attained with one additional year of culture. Stocked individuals have been collected in mature condition and observed in spawning behavior below Wateree Dam during typical robust redhorse spawning season and temperature regime. Telemetry observations show a pattern of movement within the Wateree-Congaree-Santee River system that would suggest selection for cooler summer water temperatures produced by hypolimnetic water released by Lake Murray Dam. Multiple spawning season return trips to the fall-line shoals below Wateree Dam suggest favorable spawning habitat. However, upstream spawning season movement through the Columbia Dam Fishway suggests that the lower Broad River possesses suitable spawning habitat.

SCDNR's Estuarine Finfish Section (Tanya Darden) continues to contribute genetic aspects to DNR's American shad project in the Edisto River, robust redhorse restoration and striped bass research within the Santee Cooper system. Additionally, we are working on the development of an aging tool for shortnose and Atlantic sturgeon based on telomere length and are in our sixth year of an experimental population restoration study of striped bass within the Ashley River system.

Tennessee

The Service's Tennessee Field Office in Cookeville recently updated the 5-year Review for the federally listed snail darter, and it is currently under peer review. Also, the first draft (not a revision) bluemask darter 5-year review was completed by the Tennessee Field Office in 2010 and is currently under review by the Service's Region 4 Office. The final critical habitat rule has been published in the *Federal Register* for the federally endangered Cumberland darter, Chucky madtom, and laurel dace in Tennessee. The rule can be found at <http://www.regulations.gov> under the docket number: FWS-ES-R4-2011-0074 and becomes effective on November 15, 2012. The rule also includes critical habitat for the federally endangered rush darter in Alabama, and the yellowcheek darter in Arkansas.--Todd Shaw & Stephanie Chance, USFWS

The TWRA Region 4 streams crew is in its second year of working on the Cumberland arrow darter (*Etheostoma sagitta sagitta*) status project with the USFWS (Frankfort Field Office). The goal of the project is to determine persistence of arrow darter at approximately 40 sites in Campbell and Claiborne counties that were surveyed in 1994 and 2002. The information collected from these efforts is being used for the species assessment and candidate listing by the USFWS. As part of the status project we have been revisiting historic collection sites in the upper Cumberland portion of TN (Campbell, Claiborne, & Scott cos.). To date we have surveyed 29 locations where arrow darters were collected back in the 1990's. They are still present in 22 of the historic locations (about 76%), however in some places they seem to be gone completely. For example, in the upper Clear Fork of Claiborne Co., arrow darters were absent from all the previous known collection sites. We plan to complete the survey by the end of the year.

In June this year, we resurveyed Capuchin Creek in Campbell Co. near the state line and collected arrow darters there, along with about four *Etheostoma baileyi*, and two Cumberland darters (*E. susanae*). To my knowledge, this is the first collection of *E. susanae* from the Tenn. portion of Capuchin Creek since about 1987. They were estimated to be about 45-50 mm TL. That same day, we surveyed Jellico Creek in Scott Co. and collected two more Cumberland darters along with arrow darters and emerald darters. The Cumberland darters were probably about the same size as those from Capuchin. --Bart Carter & Rick Bivens, TWRA

The Tennessee Valley Authority (TVA) has been coordinating with various federal and state natural resource regulators to manage releases from Tims Ford Dam on the Elk River since 2007 in order to improve habitat conditions for the federally listed boulder darter (*Etheostoma wapiti*) and numerous federally listed mussels, as well as maintain an artificial trout fishery below the dam. Modifications to dam releases have included minimum flows, warming tailwater temperatures, and reducing peak flow events. In 2012, mussels were surveyed at six monitoring sites in an 85-mile reach of the Elk River in Tennessee and Alabama for the first time since 2008, shortly after flow modifications began.

Although few mussels are still found in the upper reach of the tailwater (upstream of Fayetteville, TN), TVA's warm-water fish community index showed notable improvements.

Mussels at all three downstream sites showed increases in density up to 2.5 times those estimated in 2008. Evidence of increased mussel reproduction at these sites was also apparent by the number of young individuals found. Perhaps the most significant evidence of mussel recovery was the collection of numerous juveniles of the federally endangered snuffbox (*Epioblasma triquetra*) and cracking pearlymussel (*Hemistena lata*) at two different sites. The cracking pearlymussel had not been detected in the Elk River for many decades until recent changes to Tims Ford Dam releases. Improvements in Elk River habitat have also encouraged the Tennessee Wildlife Resources Agency and Alabama Department of Conservation and Natural Resources to stock lab-cultured individuals of the extremely rare Alabama lampmussel (*Lampsilis virescens*) into the Elk River. -- *Chuck Howard, TVA*

TVA completed fish community sampling at 125 stream sites throughout the Tennessee River System during 2012. The most interesting find for the year was the collection of two snail darters (*Percina tanasi*) at river mile 12.1 of the Flint River in north Alabama. This represents the first record of snail darters from the Flint River and a western range extension.

Sampling in Estill Fork in north Alabama (tributary to the Paint Rock River) produced 17 palezone shiners (*Notropis albizonatus*), indicating continued stability for one of the two remaining populations of this federally endangered species. --*Charlie Saylor, TVA*

During autumn 2011, tissue was collected from all extant bluemask darter (*Etheostoma akatulo*) populations. Genetic analysis revealed the presence of three genetically distinct populations occurring in four tributaries to Great Falls Reservoir, an impoundment of the Caney Fork, a Cumberland River tributary. Of these, the Collins River was the most genetically diverse and had the highest effective population size. This work was conducted to inform future re-introduction efforts into the Calfkiller River which would potentially establish a fourth population of this narrowly distributed fish. This work was a collaborative effort between TVA and the U.S. Fish and Wildlife Service.

As with other aquatic faunal groups, the aquatic environments of Tennessee and Alabama contain more crayfish species than any other states. In this region, crayfish have not received as much attention as fish and mussels, thus large gaps exist in current understanding of taxonomy,

distributions, and conservation status of many species. New species are being described each year, indicating that much more work is needed to adequately understand species occurrences within this diverse region. Current efforts to document occurrences of native and non-native crayfish species within the Tennessee River system are ongoing. Over 1,000 lots of crayfish, collected during TVA survey efforts from the Tennessee River system, have been identified and are being cataloged into a museum collection currently curated by Jeff Simmons (TVA) in Chattanooga.

Pigeon River and Richland Creek Recovery Projects Update. 2012 fieldwork began with a warmer than usual spring. We started in NC with collections for the Richland Creek Re-introduction Project (RCRP) on April 3rd and 4th, conducted by NCDENR-DWQ, NCWRC, UT-Knoxville and, Blue Ridge Paper (Evergreen). Monitoring in 2012, prior to the collection effort, found 8 of the 9 reintroduced species. We continued collecting from Hominy and South Hominy Creek sites and added a new site on Jonathans Creek at the Creekwood RV Park. Species collected and reintroduced into Richland Creek above Lake Junaluska are as follows: Fantail darters (123), Tuckasegee darters (231), Greenfin darters (75), Warpaint shiners (127), Saffron shiners (42), Mirror shiners (54), River chubs (321), Mottled sculpins (356), Rock bass (1).

Collections for the Pigeon River Recovery Project (PRRP) took place April 10th and 11th and, were a combined effort of NCWRC, NCDENR-DWQ, UT-Knoxville, Haywood Community College, Progress Energy-Rick Smith, and UNCA- Dr. Mike Stuart, retired. We returned to the Swannanoa River site at Asheville to collect gilt and banded darters, bigeye and Tennessee shiners for PRRP; and fantail darters, river chubs and warpaint shiners for RCRP. Day 2, we collected on the French Broad near Hot Springs, getting low numbers of highland shiners, Tennessee shiners and bigeye chubs under less than ideal flow conditions. Spring Creek was exceptionally high and only 6 banded darters were captured. High flows continued in the French Broad watershed into May and early high air temperature in the 80's persisted so further attempts were suspended until fall. Species for PRRP were allocated as follows: Gilt darters (224) – released at Richland Creek, yellow VIE tag, 1st dorsal; Banded darters (42) - released at Richland Creek, yellow VIE tag, 1st dorsal; Highland shiners (118) – released at Crabtree Cr. Mouth; Tennessee shiners (389) –

released at Crabtree Cr. Mouth; Bigeye chub (55) – released at Crabtree Cr. Mouth. Species translocated for RCRP were as follows: Fantail darters (361), Warpaint shiners (45), River chubs (166).

In TN, we worked the French Broad River at Campbell Island again, thanks to TVA creating a window of minimal generation, on 4 June. Combined crews from TDEC, TVA, Ed Scott (TVA retired) and UT collected 113 mountain madtoms, 18 bluebreast darters and 602 common river snails. We also recorded 26 snail darter lengths for TVA. The mountain madtoms were released at a new site, PRM 12.6, Vinson Island at the I-40 interstate bridge. This site is upstream of the tomato fields. All darters and snails were released at PRM 13.7 (Cosby Cr. mouth). Additional stocking and monitoring has been conducted recently this fall in both TN and NC.

We (the UTK PR sampling team) have been taking part in ‘training exercises’ with NCDENR . We met with NCDENR folks (E. Fleek, S. Beaty, M. Shepherd) on June 11 at the South Toe River (NC) to ensure that our macro-invertebrate sampling protocols match with NC methods. Then on Wednesday (6/27), we will meet with Bryn Tracy’s group at Fines and Crabtree Creeks (NC) to observe and assist with their fish sampling protocol. This training was to fine tune our team for conducting the field work for our next project on the Pigeon River. In July, we began conducting a Balanced and Indigenous Aquatic Communities Study that will sample 23 sites on the main stem and major tributaries that will be completed in 2013.

The University of Tennessee has 5 students conducting research within the Pigeon River watershed this year. Three are graduate students: Phillip Harnage is looking at a comparison of macroinvertebrate sampling protocols; Justin Wolbert will be studying smallmouth bass populations in the Pigeon River; Dan Walker is working at rearing juvenile sturgeon to a releasable size (6-8”) and determining optimal diets. We have 2 undergraduates: Jared Chrisp, a junior in Wildlife and Fisheries Science, who received an internship for the summer and conducted surveys for crayfish in Pigeon River (TN) tributaries and, Zach Smitley, a senior at Lincoln Memorial University, received funding from the USDA to do research at UT conducting surveys for salamanders in Pigeon River (TN) tributaries. --Joyce Coombs, UTK

Conservation Fisheries, Inc. continues to propagate, stock, and monitor smoky and yellowfin

madtoms, Citico darters, and spotfin chubs in Tellico River, with reproduction and good numbers noted there for all four species again in 2012, including smoky madtom reproduction and recruitment at a new upstream site stocked for the first time in April (a 2 mile upstream range extension). Monitoring of Citico Creek detected no significant population changes of the darter and madtoms. A long term permanent monitoring protocol for the restored Citico darter, and smoky and yellowfin madtoms populations in Abrams Creek was initiated by Great Smoky Mountains National Park, developed and conducted with CFI during August and September. Yellowfin madtoms were detected in low numbers in all three zones of suitable habitat. Citico darters were present primarily in only the uppermost zone, while smoky madtoms were largely confined to only the two lower zones; however, numbers and densities of both species where present exceeded observations in Citico Creek! The numbers of smoky madtoms in both Abrams Creek and Tellico River are astounding--at least in localized areas, they now equal or exceed Citico Creek. It's an amazing "return from extinction" story.

Efforts to propagate and restore Emory River spotfin chubs and Elk River boulder darters to Shoal Creek continue. Reproduction and recruitment of both species was noted late last year above Iron City via snorkel surveys. Monitoring effort was limited in 2012, but was extended into Alabama this year via canoe float with Auburn University (Dr. Carol Johnson and students), where a lone boulder darter represented the first record in that stream in the state since the 1800s! Spotfin chubs were also detected at two sites, bringing the number of known AL Shoal Creek sites to three.

Prior to any releases of the 700+ juvenile Conasauga logperch propagated last year to the Conasauga River, surveys were conducted this year to delineate and quantify habitat units and logperch numbers in order to guide a release plan. Floats (by canoe, kayak, and paddleboard!) and snorkel surveys of reaches from near the Jacks River downstream to Gregory's Mill in Georgia were conducted in April and May by TNACI and CFI. (The uppermost reach is a special kind of hell to float during low water...) More than 50 *Percina jenkinsi* were found at more than a dozen new sites and many specimens were captured and fin-clipped for genetic analyses. (Plus two records--the first?--for *Percina lenticula* in Tennessee). Following surveys, propagated fish were tagged and 10-15 individuals released at each suitable habitat unit through the reaches below Minnewauga Creek down to the TN 74 Bridge as well as in the upper Conasauga River in

Alaculsy Valley and around the Watchable Wildlife site. Individuals from these upper releases were observed by snorkel groups all summer at the WW site as well as two logperch at the uppermost site in October. More than 100 propagated jenkinsi are still being held at TNACI and CFI awaiting disposition plans.

Late season efforts to collect slender chubs with a Missouri trawl in the lower Powell River and Clinch River at Sneedville in early October were unsuccessful, but did turn up numerous unexpected (in deep water) species, including lots of mimic shiners, channel darters (both rivers), and golden darters (Clinch). Much thanks to a large number of participants from MDCFD, TWRA, TVA, and USFWS, especially Bob Hrabik and Dave Ostendorf, for providing trawls and boats! Also, as a result, we now have an incredible new ally in the slender chub effort on the part of Louisiana's own Greg Faulkner at Innovative Net Solutions, who now views the difficulties of capturing *Erimystax* as a personal challenge!

Hatchery spawning and rearing included the following additional species/populations in 2012: greenside darter (to serve as imperiled mussel hosts), blackside dace, marbled darter, blotchside logperch, Barrens topminnow, wounded darter, ashy darter, Copper Creek and Powell River yellowfin madtoms, slackwater darters, spring pygmy sunfish, rush darter, Kentucky arrow darter, Cumberland darter, upper Allegheny R (PA) gilt darters, and diamond darters (though again none of the huge-gaped toothy larvae of the latter survived past yolk-sack absorption). Redline darters and sawfin shiners were produced--unfortunately, too late--to try to offer larval fish prey for the diamond darter larvae. Hopefully they will be ready in time next year...

CFI's website provides additional information, along with photos and video (www.conservationfisheries.org), PLUS there's lot's of stuff on the FaceBook page (<http://www.facebook.com/pages/Conservation-Fisheries/377299094501>). --Pat Rakes, CFI

The University of Tennessee Etnier Ichthyological Collection (UTEIC) is online! Access at: <http://tennfish.bio.utk.edu/>. And The Fishes of Tennessee, too: <http://www.newfoundpress.utk.edu/pubs/fishes/>

Virginia

Conservation Fisheries, Inc. has several projects in progress in VA funded by both Section 6 and SWG monies (many thanks to Mike Pinder!). These include propagation, stocking, and monitoring of Powell River and Copper Creek yellowfin madtoms in order to extend ranges upstream to historic distributions, collection of yellowfin madtom fin clips/tissue samples from all extant populations for genetic analyses to guide decision making for potential North Fork Holston River (NFHR) restoration of the species, NFHR habitat assays and surveys for yellowfin madtoms and spotfin chubs, and propagation of fish to serve as mussel hosts for imperiled mussel propagation efforts at the Aquatic Wildlife Conservation Center (AWCC) at Bullard Hatchery in Marion. The most notable field observations this year occurred last month in the upper Clinch River around Cleveland where the range of that yellowfin madtom population was extended to 38 river miles (Puckette Hole down to Burton's Ford), the ashy darter range was extended up to Cleveland (now 21 river miles), blotchside darters were found nearly everywhere, and channel and golden darters were observed well above Cleveland. Photos and video are posted at <http://www.facebook.com/pages/Conservation-Fisheries/377299094501>. –Pat Rakes, CFI

Corey Dunn is working on a master's thesis, under the supervision of Dr. Paul Angermeier, focused on the dynamics of the introduced variegate darter (*Etheostoma variatum*) and the New River drainage endemic candy (*E. osburni*) and Kanawha (*E. kanawhae*) darters. Most recently he completed sampling for a candy darter habitat suitability study relating instream habitat and stream temperature regimes to occupancy across the New River drainage, VA, WV. This study resulted in the discovery of a relatively major population at the southern edge of its purported distributional range. The newly discovered population is the most isolated from the variegate darter threat and brings the total number of known populations in Virginia to four. Corey will be synthesizing the results of multiple resource overlap and behavior studies in anticipation of the completion of his thesis in the spring of 2013.

Jamie Roberts of Virginia Tech recently completed his PhD on population genetics and ecology of Roanoke logperch, redline darters, and greenside darters, and has assumed a postdoctoral position there. Two of the projects he'll be working on are fishy in nature. One is a population viability analysis of Roanoke logperch using stochastic demographic/genetic simulation models. The other

is an investigation of the extant distribution of Roanoke bass in VA, and the extent of genetic introgression with non-native rock bass. The latter will be based on microsatellite markers, which he is developing for *Ambloplites*. He's also supervising undergrad research on the life-history of Appalachia darters in the New River.

Steve Powers at Roanoke College is currently working on life history projects for several species of fishes in Virginia in collaboration with RC students, as well as an examination of genetic differentiation within and among populations of *Percina aurolineata*, Goldline Darter, throughout its range.

Virginia Department of Game and Inland Fisheries (VDGIF) Aquatic Biologist Mike Pinder conducted several projects to further the conservation and recovery of Virginia's ichthyofauna during the 2012 field season.

Little River Sampling - VDGIF partnered with the Tennessee Valley Authority (TVA) to sample fish at nine main stem and three tributary sites on the Little River, a Clinch River tributary in Russell and Tazewell counties, VA. The purpose of the sampling was to assess river health using TVA's Index of Biotic Integrity methods. The survey yielded 39 of the 42 indigenous fish species known from the system. Notable absences were Blotchside Logperch (*Percina burtoni*), Sickle darter (*Percina williamsi*), and Sauger (*Sander canadensis*).

Hazel River Dam Study - VDGIF sampled fish at 20 sites in the Hazel and Thornton rivers, Rappahannock drainage, Culpeper Co., VA. The purpose of the sampling was to determine fish community structure prior to the removal of Monumental Mills dam on the Hazel River. The Thornton River joins the Hazel River approximately 0.5 miles downstream of the dam and was selected as an un-obstructed control. Preliminary results indicate 24 species in the Hazel River above the dam and 35 species each below the dam and in the Thornton River. The most notable find was stonerollers (*Campostoma sp.*), which were undocumented in the Rappahannock drainage. Several years after the dam is removed, staff will revisit these sites to determine fish community changes.

Roanoke Logperch Conservation Committee – VDGIF partnered with Virginia Tech to convene the first Roanoke Logperch (*Percina rex*) Conservation Committee, Blacksburg, VA. The Roanoke Logperch (*Percina rex*) is a federally endangered species that occurs in the Roanoke and Chowan river basins of Virginia and North Carolina. The purpose of the meeting was to update stakeholders on research and conservation efforts for the species and to prioritize future recovery needs. Attendees were from the Virginia Department of Game and Inland Fisheries, U.S. Fish and Wildlife Service (Regions IV and V), US Geological Survey, Virginia Tech, and the North Carolina Wildlife Resources Commission.

Blackbanded Sunfish Recovery Efforts - The Blackbanded Sunfish (*Enneacanthus chaetodon*) is a state-endangered species that occurs in the Blackwater and Nottoway drainages of Virginia. VDGIF surveyed six sites that once contained extant populations. The sunfish was found at only two sites, and at two others it appears to be absent or in numbers too low for conventional sampling techniques. Two additional sites that once held the species no longer contain the necessary habitat. Through efforts by VDGIF, the Virginia General Assembly has recently passed legislation that allows for an experimental/non-essential designation of habitat suitable for the reintroduction of listed species. VDGIF is currently developing on a conservation plan that will include captive propagation and reintroduction of the species into suitable sites within its range.

Additional contractual research being funded by VDGIF includes:

Comparison of habitat suitability among sites supporting strong, localized, and extirpated populations of Candy Darter (*Etheostoma osburni*). Contractors: Corey Dunn and Dr. Paul Angermeier, Virginia Tech.

Assessment of genetic diversity of Yellowfin Madtom (*Noturus flavipinnis*) population to determine their genetic distinctiveness for reintroduction efforts. Contractors: Drs. Greg Moyer, USFWS and Eric Hallerman, Virginia Tech.

Assessment of the distribution and degree of introgression of Roanoke Bass (*Ambloplites cavifrons*) populations in Virginia. Contractors: Drs. Jamie Roberts and Eric Hallerman, Virginia Tech.

Survey of Spotfin Chub (*Erimonax monachus*) in the North and Middle Fork Holston River, Virginia. Contractors: Pat Rakes and J.R. Shute, Conservation Fisheries, Inc.

Assessment of Ashy Darter (*Etheostoma cinereum*) presence and habitat suitability in the Powell River, Virginia. Contractors: Pat Rakes and J.R. Shute, Conservation Fisheries, Inc.

Phenology and habitat use of larval darters in the upper Roanoke basin. Contractors: Jane Argentina and Dr. Paul Angermeier, Virginia Tech.

Habitat use of Roanoke Logperch (*Percina rex*) in the upper Roanoke basin. Contractors: Jane Argentina and Dr. Paul Angermeier, Virginia Tech.

Yellowfin Madtom (*Noturus flavipinnis*) survey in the North Fork Holston River, Virginia. Contractor: Pat Rakes and J.R. Shute, Conservation Fisheries, Inc.

Augmentation and assessment of Yellowfin Madtom (*Noturus flavipinnis*) in Copper Creek. Contractors: Pat Rakes and J.R. Shute, Conservation Fisheries, Inc.

Status survey for Bridle Shiner (*Notropis bifrenatus*) in Virginia. Contractor: Dr. Wayne Starnes, North Carolina Museum of Natural Resources.

Life history and stream occupancy of Clinch Dace (*Chrosomus sp. cf. saylori*) in the upper Clinch River system, Virginia. Contractor: Shannon White and Dr. Don Orth, Virginia Tech.

Collection and tissue sampling of extant populations of Yellowfin Madtom (*Noturus flavipinnis*)

for assessment of genetic diversity to determine their genetic distinctiveness for reintroduction efforts. Contractors: Pat Rakes and J.R. Shute, Conservation Fisheries, Inc.

Missouri: Robert A. Hrabik

Neosho Madtom, Doug Novinger (Missouri Department of Conservation, MDC). We sampled sites on the Spring River during August 2011 and 2012 to monitor populations of the Neosho Madtom, *Noturus placidus*, and add to a time series of data started in 2010 to investigate trends in the species' distribution. Our approach involved evaluating dynamic occupancy models that estimated changes in probabilities of occupancy, colonization, extinction, and detection of Neosho Madtom inhabiting potentially suitable habitat found in the Spring River between CR 255 upstream and the Missouri State Line downstream. Neosho Madtoms were collected in 21 of 80 sites (26%) during 2012 compared to 25 sites (31%) during 2010 and 2011. Occupancy models provided evidence that the distribution of Neosho Madtom declined during 2010 to 2012 from an estimated 74% of sites occupied by the species during the initial survey to 53% during this most recent survey, though 95% confidence intervals on the parameter estimates overlapped. Increasing probabilities of local extinction not offset by colonization and decreasing probabilities of detection combined to shape the downward trend in occupancy. There was a strong longitudinal trend in the probability of occupancy, with downstream sites most likely to be inhabited though the upstream and downstream extents of the distribution were relatively unchanged. Detection probability was most-influenced by depth and substrate size, declining as each covariate increased. Despite the reduced distribution, the Neosho Madtom population appeared to be demographically diverse with a typical range of sizes represented including juveniles spawned during summer, 2012. Drought, particularly extreme during 2012, may have played a significant role in the apparent decline in distribution.

Niangua Darter, Doug Novinger (MDC). During June, 2012, we surveyed sites upstream and downstream of nine low water road crossings in the range of Niangua Darter, *Etheostoma nianguae*, replaced to improve fish and material passage. General patterns included declines in the post-replacement abundance of Niangua Darters downstream of four crossings but notable increases upstream of three crossings. The percentage of habitat patches occupied followed a similar trend with declines downstream of several crossings. The length of habitat not associated with deep pools increased following replacement of most crossings, particularly in sites upstream where pools that had been maintained by obstructed flows due to the old crossings were eliminated. Higher gradient of the channel following crossing replacement also may have been related to lower frequencies of highly embedded points upstream and downstream of most replaced crossings. Additionally, the number of darter species increased in most sites upstream of crossings, perhaps in response to the creation of non-pool habitat and reduction of fine sediments. Changes in the size distributions of rock particles measured during pebble counts were variable with some sites demonstrating increased roughness upstream following crossing replacement; however, consistent patterns were not apparent and suggested complex changes in streambed material are occurring in the reaches associated with each crossing. This may be a sign of instability as the stream channel adjusts to the new crossing and the driving influence of broad trends in environmental factors such as extreme floods (e.g., during 2008-2010) and drought (e.g., 2012).

Ozark Cavefish, Doug Novinger (MDC). Obligate subterranean aquatic organisms (stygobites) including threatened Ozark Cavefish, *Amblyopsis rosae*, potentially occupy shallow aquifers in the Tri-State Mining District (TSMD) that are impacted by mining activities. We performed

surveys for aquatic life and collected water and sediment samples in 67 sites in Jasper and Newton counties including 25 inside mined areas and 42 outside to describe relationships between mining related contamination (lead, zinc, cadmium) and stygobite distribution. Stygobites were observed in two sites (8%) inside mined areas and 24 sites (57%) outside. Ozark Cavefish were detected in 19% of sites with one site inside mined areas, 12 sites outside. Ordination of sites showed a clear grouping along gradients in metals and environmental variables inside vs. outside mined areas and according to the occurrence of stygobites. The pattern included positive associations between stygobites and both nitrate+nitrite and dissolved oxygen and negative associations with total Phosphorous (P), ammonia, and metals. Logistic regression indicated environmental variables (nitrate+nitrite and total P) were better predictors of stygobite range-wide distribution than mining-related variables (sulfate and lead). However, it was unlikely stygobites could persist in most sites inside mined areas even if environmental water quality was optimal as 64% of sites inside mined areas exceeded chronic effect thresholds for at least one mining-related contaminant compared to 19% outside. Our results showed that stygobites including Ozark Cavefish were unlikely to occur inside mining-impacted areas with high concentrations of metals and sulfate, low nutrients (nitrogen), and low dissolved oxygen the main sources of water quality impairment.

Longnose Darter, Dave Knuth (MDC). A single specimen of the very rare (for Missouri) Longnose Darter, *Percina nasuta*, was taken on 23 May 2012 from the St. Francis River in Madison County. The specimen was collected by electrofishing the edge of a cobble riffle that was heavily vegetated with water willow. Including this collection, 26 individuals have been captured at 11 sites in the St. Francis River since 1947. The collection was near to the most upstream documented occurrence. The specimen is currently being held in collections in the Southeast Missouri Regional office in Cape Girardeau. More surveys are being planned to document the range and distribution of this species in the St. Francis River.

Grotto Sculpin. This soon-to-be-described fish, known only from cave systems in Perry County (southeast Missouri) has been a candidate for federal endangered status since 2002. In 2004, the US Fish and Wildlife Service (Service) were sued by the Center for Biological Diversity to list the species as endangered. From that time to 2012, the Service did not pursue listing the species but instead attempted to move forward with conservation measures that could have stopped the need for federal listing. The failure to list the species brought a second lawsuit, this time by Wild Earth Guardians, earlier this year. The court has ordered the Service to make a decision to list or not within one year (ending on September 30, 2013). This prompted the Service to hold a public meeting on the potential listing in Perryville, the county seat of Perry County. This public meeting took place on October 30. One hundred twenty anxious landowners attended mostly worried that listing would affect how they use the land. Indeed, 89% of privately-owned Perry County land would be considered critical habitat for the Grotto Sculpin. This region is highly impacted by agriculture and the many sinkholes in the region are polluted through chemical contamination and outright trash that is tossed into the sinkholes to fill them up or hold water. As a result, this species has endured two significant fish kills since its discovery in 1991. Water quality and population monitoring shows somewhat of an increase in chemical pollutants and decrease in population size through time, but the results are cyclic. Population size has been estimated at 4,200.

New *Fishes of Missouri* book. Bob Hrabik (MDC) was selected to update and revise Bill Pflieger's *Fishes of Missouri* book. The first edition of the book was published in 1975; the second edition was published in 1997. For this 3rd edition, Hrabik will work with Pflieger, but Bill's role will be that of "technical advisor," while Hrabik will handle upgrades to the book format, illustrations, images, and scientific information. Hrabik will work directly with MDC's Outreach and Education Division to see the book through to publication, hopefully by late in 2015. Hrabik was lead author on the *Fishes of Nebraska*, which is *in press* by the University of Nebraska.