



U.S. Fish and Wildlife Service

2013 Raleigh Field Office Accomplishment Report



Serving Central and Eastern North Carolina

A message from the field

The U.S. Fish and Wildlife Service (Service) is the principle federal agency protecting and sustaining our Nation's fish and wildlife resources. It is a big responsibility that we clearly cannot accomplish by ourselves or all at once. So, we rely heavily on our many partners in conservation and we focus our efforts on those actions and issues that are deemed to be the highest priority. In central and eastern North Carolina, the Raleigh Ecological Services Field Office (RFO) uses a 5-year Strategic Plan and Annual Work Plan to guide our conservation work. The following report summarizes our accomplishments for federal Fiscal Year 2013 (October 2012 through September 2013) and identifies some of the work that will be part of the Annual Work Plan for FY – 2014.

In 2013 the Service faced greater than normal challenges related to budget and staffing constraints, and the RFO was no exception. Despite this, we were able to achieve many significant conservation milestones. While the full body of work of the RFO is discussed in greater detail in the body of this report the following actions are among the most noteworthy and are organized in terms of the five goals of our Field Office Strategic Plan.

Goal 1. Conserving Federally Listed and at-risk species (*rare species that are not yet federally listed as endangered or threatened*);

- We worked with the NC Wildlife Resources Commission (WRC), North Carolina State University (NCSU) and other partners to successfully grow the magnificent ramshorn snail in captivity. This snail may be extinct in the wild and successful captive propagation is a vital first step to its survival and restoration.
- We worked with the town of Troy, American Rivers, the Piedmont Conservation Council and other partners to remove Lassiter Mill Dam on the Uwharrie River and Smitherman's dam on the Little River. These projects restored and im-

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St. Francis Satyr butterfly by Melissa McGaw © N.C. Wildlife Resources Commission, Hoke County, May 2010



A message from the field (Cont.)

proved 347 miles of fish habitat for the benefit of many at-risk aquatic species including Carolina redhorse and Atlantic pigtoe.

- We worked with WRC to successfully complete the first phase of a population augmentation for the endangered Cape Fear shiner in the portion of the Rocky River from which the species was first described. This involved moving about 200 adult shiners from the lower Rocky River and Deep River to the upper Rocky River above a hydroelectric dam that currently fragments the species' habitat.
- We evaluated plans by the city of Creedmoor for a new wastewater treatment facility that was proposed to discharge to a reach of the Tar River inhabited by the endangered dwarf wedge-mussel. This project posed a significant threat to one of the few remaining populations of this species in the State (as well as many other at-risk species). Our open and thorough communication of mussel status, pollutant sensitivity, and information needs helped decision makers as they weighed costs and benefits of alternatives. The City pursued alternative solutions that do not include new discharges to the Tar River.

Goal 2. Conserving migratory birds

- We worked with an array of partners and private landowners to restore 909 acres of longleaf pine habitat for the benefit of the endangered red-cockaded woodpecker (RCW) and other priority migratory birds such as Bachman's sparrow, brown-headed nuthatch, and pine warbler.

Goal 3. Conserving migratory fish

- We worked with the National Oceanic and Atmospheric Administration (NOAA) and many other partners to develop the Cape Fear River Action Plan for Migratory Fish ([link](#)).
- We celebrated with the U.S. Army Corps of Engineers (USACE) and many other partners upon the completion of the rock arch weir fish passage structure on Cape Fear River Lock and Dam #1. This structure improved access to over 100 miles of spawning habitat for striped bass,

American shad and the endangered Atlantic and shortnose sturgeon.

- We continue to work with WRC, NMFS, and Dominion Power to restore diadromous species (fish that migrate between fresh and salt waters) on the Roanoke River. Over 800,000 American eels passed over Roanoke Rapids dam in 2013 and the numbers of American shad on the spawning grounds continue to increase.

Goal 4. Supporting the National Wildlife Refuge System

- We worked with the staff at Pocosin Lakes NWR and restored 830 acres of peatland wetlands using funds we provided last year.
- We worked with the U.S. Geological Survey and others to strategically assess water quality issues affecting Lake Mattamuskeet NWR. The information developed through this effort will be vitally important to make science-driven decisions to manage the lake. Water quality monitoring stations operated continuously during 2013. Information is available to us all at <http://1.usa.gov/1e4tn7B>

Our impact beyond North Carolina

In addition to our work in central and eastern North Carolina, we also contributed to important conservation efforts across the Nation, including:

- Staff continued to lead efforts to assess natural resource damages associated with the 2010 Deepwater Horizon oil spill.
- Our staff worked for years with many partners to better understand the effects of various common pollutants on freshwater mollusks. That work paid dividends this year when the Environmental Protection Agency published new national recommended ambient water quality criteria for ammonia in freshwater. The adoption of these criteria by the states should improve conditions for freshwater mollusks and other aquatic life.

Accomplishments In Detail

The Service is evaluating whether to place more species under Federal protection as a result of national, multi-district litigation and a mega-petition brought by conservation groups. In 2011, the Southeast Region of the Service began a comprehensive and systematic review of more than 400 at-risk species that may need protection under the Endangered Species Act (ESA). In eastern North Carolina, we are working with public and private partners to implement conservation measures for as many at-risk species over the next few years, hopefully precluding the need to list them under the ESA. We are conducting careful prioritization of species with the State and species experts.

River restoration at the landscape scale

Using funds and technical assistance available through the Partners for Fish and Wildlife Program, RFO staff coordinated the removal of the Lassiter Mill dam on the Uwharrie River in 2013 and the removal of Smitherman's dam on Little River in Montgomery County, NC in 2014. Dams fragment river habitat and prevent species movement. These projects reconnected over 348 miles of river habitat for at-risk species including rare freshwater mussels and fish such as the Atlantic pigtoe and Carolina redhorse. Prior to demolition, RFO biologists participated in field surveys that confirmed the presence of endemic mussels and fish above these dams. We facilitated removal permitting and planning through sediment evaluations. In addition to several divisions within the Service (Ecological Services, Fisheries, and Refuges), many partners made these projects feasible: American Rivers, Piedmont Conservation Council, NOAA, private landowners and the Town of Troy. Other research partners are the WRC, North Carolina Natural Heritage Program, Duke Energy-Progress, Appalachian State University, Duke University, University of Virginia, and a host of volunteers. View video here. See pictures here.

Conserving At-Risk Species



Robust Redhorse (2010)
by *accousticgirl* via Flickr

Magnificent ramshorn snail

The magnificent ramshorn (*Planorbella magnifica*) is an aquatic snail that is only known to occur in the very southeastern corner of North Carolina. This candidate species may now be extinct in the wild, and may only exist in captivity. We are working with state and local partners to refine captive propagation techniques and identify locations that can support reintroduction of the species. We presented information about the species to the Cape Fear Arch Conservation Collaborative. We are working to identify willing landowners interested in entering into a potential Candidate Conservation Agreement with Assurances at promising reintroduction sites. Other partners are assessing the potential of several locations in Brunswick County. Many locations with historic or suitable habitat are under consideration.

The Robust Redhorse prelisting recovery

The robust redhorse (*Moxostoma robustum*), was believed to be extinct for 122 years. A remnant population was rediscovered in Georgia in August 1991, and a second remnant population discovered in the Pee Dee River (SC and NC) in 1991. The Service joined forces with others to learn about the species and began to recover the robust redhorse before it was protected by the ESA. The RFO cooperates in the study Assessing Water Quality Stressors and Food Web Contaminant Dynamics. The project will entail field sampling of habitat and food web components, use field bioassays with captively-propagated robust redhorse, include laboratory analyses of contaminants on aquatic habitat and food web components, examine fish condition, and develop population and food web models to describe and project effects of habitat and water quality modifications.

Venus Fly Trap

North Carolina designated the Venus flytrap (*Dinaea muscipula*) as the official state carnivorous plant in 2005. This plant is cultivated throughout the world, but it is native to North and South Carolina. In 2014 we will explore the condi-

tions of local populations.

Candidate species review in 2014

We will represent the SE Region in the American Eel (*Anguilla rostrata*) Status Review Core Team, for 2014 and 2015 that is lead by the NE Region.

Conserving Endangered Species

Achieving recovery benchmarks for the Cape Fear Shiner:

The Cape Fear shiner (*Notropis mekistocholas*) is a freshwater fish endemic to the central part of North Carolina. This species occurs in the upper Cape Fear River Basin as one population comprised of three recovery units: Haw River, Deep/Rocky Rivers, and the Upper Cape Fear River. The species was listed as endangered and critical habitat was designated in 1987. Dams are fragmenting the shiner's habitat and keep populations in different reaches of the river from interacting which increases the likelihood that isolated populations will die out. In 2013, we coordinated population augmentation for the Cape Fear shiner on the Rocky River in conjunction with the WRC. In the spring and fall of 2013, WRC and Service staff moved nearly 200 adult fish from the lower Rocky River and Deep River to the upper Rocky River above a hydropower dam. Biologists recaptured Cape Fear shiners, indicating preliminary success. More fish will be translocated in 2014.

We also participated in developing a dam removal mitigation bank (Hoosier/Woody Dam) on the Rocky River, which has potential to connect reaches of Cape Fear shiner habitat, and put into preservation riparian land along the banks of the Rocky River. The dam removal, if it proceeds, is expected to also benefit multiple federal at-risk species such as the Atlantic pigtoe, brook floater, and the drag-onfly Septima's clubtail.



Cape Fear Shiner

Five-Year Review for the Cape Fear shiner completed in 2013.

The Service reviews the status of each federally listed species every five years. These five-year reviews update available information regarding the status of the species and evaluate whether a species should be delisted, reclassified from endangered to threaten or vice versa, or if the species' classification should not change. The final document is pending publication and will be available here.

In 2014, our staff will continue to participate in a leadership role engaging stakeholders in issues of interest to the Chatham Conservation Partnership that may affect natural resources including the Cape Fear shiner.

Atlantic sturgeon stock assessment

We will also be participating in and contributing data for the Atlantic sturgeon stock assessment, which is being conducted by the ASMFC's Atlantic Sturgeon Technical Committee, and Stock Assessment Subcommittee during 2014 and 2015. This is a joint responsibility of Regions 4 and 5, working in partnership with NMFS and all the east coast states, Potomac River Fisheries Commission, and District of Columbia.

Preventing extinction of the Tar River spiny mussel

We are developing a plan with NCWRC and NC State University (NCSU) to increase wild populations of the Tar River spiny mussel (*Elliptio steinstansana*) by releasing adults from the stock at the Conservation Aquaculture Center in Marion, NC. View video here: <http://www.youtube.com/watch?v=TsLSkicgU8>

The Service is interested in identifying potential locations to protect extant populations, prioritize restoration areas, and identify sites for augmentation/reintroduction of the captive reared mussels. Currently, the U.S. Geological Survey (USGS) Cooperative Fish and Wildlife Research Unit at NCSU is developing a model to predict the probability of suitable habitat for the Tar River spiny mussel from available GIS data and the successful occupancy from field measurements. Once the model is completed experts will be elicited to validate the model.

Increasing our knowledge of the species' reproduction will be key to maximize captive propagation efficiency. Mussels typically need to "infect" a host fish to complete the reproductive process. NCSU is looking into the possibility of juvenile Tar River spiny mussels completing their cycle without the use of a fish host. More experiments will be performed in 2013-2014 to answer additional questions. To learn more view a video here.

Preventing statewide extirpation of the dwarf wedgemussel

We completed the planning and modeling exercises related to the dwarf wedgemussel (*Alasmidonta heterodon*), and began to work with partners on implementing identified priority conservation actions. A Strategic Habitat Conservation Structured Decision Making effort began in the fall of 2011 and finished in February 2013. Overall, the process helped identify the most promising strategies for recovery of dwarf wedgemussel while

accounting for costs and uncertainty.

We worked with the U.S. Department of Agriculture and others to evaluate plans by the city of Creedmoor for a new wastewater treatment facility that was proposed to discharge on a reach of the Tar River inhabited by the endangered dwarf wedgemussel. This project posed a significant threat to one of the few remaining populations of this species (as well as many other at-risk species) in the State.

RFO staff participated in an informal consultation process for this project. We provided a critical analysis of the Environmental Assessment, Biological Assessment, and other environmental documents. We provided field survey assistance, participated in intra-agency review meetings, applicant/consultant meetings and conference calls, Board of Commissioner meetings, and drafted a response to a request for information from the Southern Environmental Law Center. Our review helped influence the decision by the City to pursue alternative solutions that do not include new discharges in the Tar River.

Mollusk conservation

Fourteen mollusk species, snails and mussels, receive federal protection in North Carolina and many others are at risk. The RFO engaged in many activities designed to further our understanding of the conservation needs of these species and to promote effective conservation actions.

The RFO is collaborating with U.S. Environmental Protection Agency and USGS on a modeling tool for predicting the sensitivity of mussels to various pollutants through interspecies correlation estimation models. These models estimate toxicity of a chemical to a species, genus, or family from the known toxicity of the chemical to a surrogate species. The products will be valuable for risk assessment, including those supporting endangered species consultations on mussels.



RFO assisted USGS and USEPA in selecting chemicals for mussel and snail toxicity testing. We provided data, databases, and advice in selecting chemicals to which mussels may be sensitive for toxicity tests to support water quality standards derivations (new standards) and consultations (data to reduce uncertainty in ESA consultations on existing standards). This year, the cooperative project generated new information on the sensitivity of mussels for the first 10 high priority chemicals.

We completed evaluation of the 1888 Clifton 2 mill dam at the request of Spartanburg County Parks and Charleston Ecological Services Field Office. A final report (Augsburger, T. and S. Ward. 2012. Tier 1 Evaluation of Pollutant Sources to the Impounded Reach of Clifton 2 Mill Dam, Pacolet River, Spartanburg County, South Carolina. U.S. Fish and Wildlife Service, Ecological Services, Raleigh, NC. 39 pp. + appendices) concludes that pollutant concentrations in sediment behind the dam are not at levels of concern. The report facilitates dam removal planning, and dam removal would benefit mussel recovery.

On August 22, 2013, the USEPA published new national recommended ambient water quality criteria for the protection of aquatic life from effects of ammonia in freshwater. Ammonia is a constituent of nitrogen pollution, and it is considered one of the most important pollutants in the aquatic environment because of its highly toxic nature and common occurrence in surface waters, entering the environment directly in municipal and industrial wastewater discharges and runoff. The final criterion incorporates new scientific data on the toxicity of ammonia including data on freshwater mussels. Mollusks are now recognized as the most sensitive taxa in the national datasets used to set water quality criteria. As such, the new criteria recommend lower ammonia concentrations in the nation's waters. Among the new data are six publications between 2007 and 2011 co-authored by USGS, Service, USEPA and university scientists, some of which were funded by the Services

Endangered Species and Environmental Quality programs (including Region 4). The new criteria will be the basis for many state water quality standards which influence pollutant discharge permit limits, water quality use support ratings, total maximum daily load allocations, and nonpoint source pollution reduction targets. Their adoption by states should improve conditions for freshwater mollusks and other aquatic life; that's important in our southeastern rivers and streams which include 269 species of mussels, 313 species of snails, and 20 species of clams. RFO staff supported criteria revision since 1999 including work this fiscal year. At request of USEPA, we coordinated review their draft "Technical Support Document for Conducting and Reviewing Freshwater Mussel Studies for the Development of Site-specific Water Quality Criteria for Ammonia" this summer.

At request of American Rivers and the Service Asheville Field Office, we evaluated the potential for sediment contamination within the impoundment created by Shuford Mill Dam on Henry Fork (Catawba River basin). A tier 1 review of existing information on pollutant sources, similar to an environmental audit, was conducted; a draft was shared with project partners, and the tier 1 report will be finalized once water levels allow the field reconnaissance to be completed.

Red-cockaded woodpecker conservation

The Service's Safe Harbor program provides a way to increase endangered species habitat while reducing private landowner concerns regarding the presence of endangered species on their property. The Nation's first safe harbor agreement was established in 1995 to further RCW conservation in the Sandhills region of North Carolina. To date, 125 safe harbor agreements have been entered into with landowners encompassing over 63,000 acres. This includes 6 new agreements this year, encompassing 847 acres.

In 2007, the WRC implemented a Statewide RCW Safe Harbor Agreement. This year the Service assisted the WRC in enrolling Orton Plantation in



the program, which improved conservation of approximately 8,400 acres of RCW habitat.

The remnant longleaf pine forest in the town of Boiling Spring Lakes remains a stronghold for the RCW. This has posed a challenge for accommodating development in this rapidly growing coastal community. The Service and our partners have been working on means to facilitate development while protecting the remaining longleaf habitat and the RCW that depend on it. This year RFO staff undertook a major data collection effort to update our understanding of the RCW population and the available habitat. This information will be important as we rejuvenate efforts to work with the city and other partners on longterm solutions in the coming year.

Waccamaw silverside conservation

In the fall of 2012, State biologists discovered that Hydrilla, an invasive water plant, was occupying about 10% of Lake Waccamaw. The plant can spread quickly and its presence in Lake Waccamaw potentially threatens the existence of the federally threatened Waccamaw Silverside and several other endemic animals and plants. The Service was part of a technical advisory team that rapidly studied the extent of the infestation and developed a plan to begin chemically treating the Hydrilla. Service staff provided technical assistance to the advisory team, reviewed the Environmental Assessment for the treatment process, collaborated on surveys for fish and mollusks, and helped develop two grant applications (for \$30K and \$60K). Treatment was conducted this past summer and appears to have been largely successful in controlling the infestation.

St. Francis Satyr butterfly

In 2013 we completed a Five Year Review for the St. Francis Satyr butterfly (*Neonympha mitchellii*) and revised a Programmatic Biological Opinion addressing effects of Research/Recovery Permits under Section 10(a)(1)(A) of the ESA to

survey and research the St Francis' Satyr butterfly.

Golden Sedge (Carex lutea)

Staff from the RFO and NC Botanical Garden developed a draft Recovery Plan for golden sedge (*Carex lutea*) that is expected to provide benefits to the Golden sedge, Cooley's meadowrue and other savanna species. The plan was available for public comment until August 19, 2013. Find the draft plan [here](#).

Cooley's Meadowrue research

We organized site visits to nearly all known Cooleys Meadowrue (*Thalictrum cooleyi*) sites with professors and a student from East Carolina University. The purpose of these site visits was to orient the graduate student to the locations and biology of the species to initiate a research project. Data collected on this trip will be used to update most of the species element occurrence records in the NC Natural Heritage Program database. The research will contribute to our knowledge of and recovery of Cooley's meadowrue.

Michaux's Sumac

We completed a Five Year Review for the shrub Michaux's Sumac (*Rhus michauxii*) and collaborated with Raleigh Parks and Recreation Department to monitor and control invasive species at the Barwell Road site in east Raleigh.

Red knot proposed for listing

In September 2013 the Service published a proposal to list the rufa sub-species of the red knot (*Calidris canutus rufa*) as threatened. This shorebird breeds in the Arctic and winters from North Carolina to the southern tip of South America. The comment period closed on November 30, 2013. The Service will open a second public comment period when we publish a proposed Critical Habitat designation and Draft Economic Analysis in 2014. The RFO will be involved in the review of all the comments and questions relative to North Carolina. A final determination is expected in late 2014.

Loggerhead Sea Turtle Critical Habitat proposed

On March 25, 2013, the Service published in the Federal Register a proposal to designate specific areas in the terrestrial environment as critical habitat for the Northwest Atlantic Ocean Distinct Population Segment (DPS) of the Loggerhead Sea Turtle (*Caretta caretta*) under the ESA. On July 18 the Service released the Economic Analysis associated with the proposal. RFO provided communications and logistics support to the Jacksonville Florida Field Office and the Listing Office of the Southeast Region. Hearings were held in Wilmington and Morehead City, North Carolina. See pictures and learn more here. A final determination is expected in 2014.



Transportation planning

WRC and the NC Department of Transportation (NCDOT) promoted in 2013 the Green Growth Toolbox, a stakeholder driven planning effort with inclusion of the building, environmental and agricultural communities and local governments. RFO participated in the Green Growth Toolbox-Train the Trainer Workshop. We seek to increase awareness for the Service role and responsibility within transportation planning and further assist local governments, MPOs, and RPOs to develop long-range transportation plans. So far, we have reviewed planning documents associated with the Greensboro Urban Area, Durham-Chapel Hill-Carrboro, and Rocky Mount MPOs. Working with local governments early in the planning process may assist them in avoiding or minimizing impacts to our trust resources.

In Tyrrell and Dare Counties NCDOT is planning the US 64 improvement project. This highway will be widened from two-lanes to four-lanes,

and the long bridge over the Alligator River will be replaced. RFO provided extensive input to the NCDOT in support of the USACE. The project falls within the endangered red-wolf recovery area, and the RFO is interested in maintaining red wolves ability to cross from one side to the other. The portion of the project in Dare County runs through the Alligator River NWR. In the Tyrrell County portion of the project, the project also affects Futch Game Lands (a NCWRC property) and the Palmetto Peartree Preserve (a conservation property owned by The Conservation Fund, which serves as a NCDOT red-cockaded woodpecker conservation bank). The Service encouraged NCDOT to conduct three major wildlife studies: two with Virginia Tech (red wolf study and black bear study) and one with Central Florida University (general wildlife/road interactions). These studies led to a complex system of wildlife underpasses and fencing being designed into the project to allow wildlife to move across the landscape. The Tyrrell County portion of the project will have adverse effects on RCW and we expect to conduct formal Section 7 consultation for red wolves and RCWs in the near future.

We continue to work with the NCDOT and others to evaluate the proposed Triangle Expressway Southeast Extension. RFO staff contributed to completing the structured decision making exercises to identify and evaluate creative options to address likely impacts to the endangered dwarf wedgemussel. We seek to minimize adverse effects to the dwarf wedgemussel and other trust species, compensating for those adverse effects that are inevitable, and contributing towards its recovery.

Intraservice Section 7 consultations

Service staff from Raleigh and Asheville Field Offices have reviewed proposed projects and consulted on NCWRC applications for several Federal Aid grant programs, including State Wildlife Grants, Section 6 Funds, Sportfish Restoration Funds, and Wildlife Management Funds.

Restoring the longleaf pine ecosystem

We worked with an array of partners and private landowners to restore 909 acres of longleaf pine habitat for the benefit of the endangered RCW and other priority migratory birds such as Bachman's sparrow, brown-headed nuthatch, and pine warbler.

In FY13 the Partners for Fish and Wildlife Program completed an \$80,000 agreement with the North Carolina Chapter of The Nature Conservancy to restore longleaf pine habitat on 1292 acres. The project called the Carolina Longleaf Task Force restored habitat on 15 privately owned sites in the Cape Fear Arch and Sandhills focus areas. The primary restoration tool was growing season prescribed fire, but other practices included winter burning, hardwood midstory control, native understory seed collection, and invasive loblolly removal. A similar agreement to continue the Carolina Longleaf Task Force for \$50,000 was signed this year and will restore an additional 375 acres in these two focus areas over the next 5 years. While some of the projects will benefit RCWs, all are expected to benefit brown-headed nuthatches and pine warblers, and many will benefit Bachman's sparrows.



Long leaf pine. Photo: Onslow Bight Conservation Forum via <http://ncobcf.org>

New planning tools for wind energy projects

The RFO worked with our Division of Migratory Birds and others to create a Tool for Land-Based Wind Energy Project Planning. In 2013, we finalized the Wildlife and Habitat Risk Map for Land-Based Wind energy Projects available at

www.fws.gov/raleigh. The map allows wind energy developers to target areas where there is less risk to wildlife from wind energy projects. Access to accurate, reliable and consistent information about wildlife will enable wind project developers to implement the voluntary Land-Based Wind Energy Guidelines issued by the Department of the Interior on March, 23, 2012.

We provided technical assistance to about 56 solar development projects and 1 wind energy project (Element Powers Carteret Wind Project). Our early and thorough response to requests will assist the renewable energy companies in avoiding and minimizing impacts to migratory birds and other fish and wildlife resources.

Conserving Migratory Birds



*Tundra Swans
by John Stanton, USFWS*



Red cockated woodpecker exiting tree cavity. Photo: Onslow Bight Conservation Forum via <http://ncobcf.org>

Cape Fear River restoration

With NOAA-Fisheries leadership we worked with partners to develop the Cape Fear River Action Plan for Migratory Fish. This plan identifies a suite of actions needed to restore and sustain stocks of striped bass, American shad, river herring, and sturgeon in the Cape Fear River system.

Lock and Dam #1 on the Cape Fear River was redesigned to help migrating fish like the federally listed shortnose sturgeon and Atlantic sturgeon and game fish like shad and striped bass gain improved access to about 32 miles of main stem spawning habitat. This kind of fish passage is an improvement over fish ladders and other engineered solutions because it looks (to a fish) like a natural shoal on the river. Along with our partners, we are looking forward to improving passage at Lock and Dam #2 in the future for an additional 69 miles of main stem spawning habitat.

During the shad and striped bass spawning season, the USACE continues to work closely with WRC and the RFO to optimize discharge from Jordan Lake into the Cape Fear.

Roanoke River and western Albemarle Sound

We continued to work on a natural resource damage assessment case to address injuries to recreational fishing resulting from a fish-consumption advisory in the lower Roanoke River and western Albemarle Sound. We are working with others on plans to enhance fisheries and recreational fishing.

We continue to work with USACE, Dominion Power, WRC, N.C. Division of Marine Fisheries, the National Marine Fisheries Services,

and the USGS to restore diadromous fish species of the Roanoke River. Over 800,000 American eel were passed over Roanoke Rapids dam this year. Numbers of American shad on the spawning grounds are increasing likely due to stocking and efforts to improve spawning flows. Additional acoustic tags have been implanted in the endangered American sturgeon in an effort to better understand their usage of the river.

Conserving Migratory Fish



Striped bass by Lake Mead Imagery, DOI via Flickr

Neuse River

On the Neuse River, we helped the US Army Corps of Engineers conduct permit review and issuance for the removal of Milburnie Dam. Hopefully removal of Milburnie Dam will occur in the fall of 2014.

During the shad and striped bass spawning season, the Corps continues to work closely with WRC and the RFO to optimize discharge from Falls Lake into the Neuse River.

Catching, tagging and tracking fish

The RFO participated in the annual Striped Bass (*Morone saxatilis*) Cooperative Winter Tagging Cruise (Cruise) off the coast of North Carolina and Virginia. Fish tagging programs are a vital tool for fisheries managers to assess fish populations. The ASMFC through its Interstate Tagging Committee promotes tagging and information sharing to support the better utilization of the fisheries, marine, shell and anadromous resources of the Atlantic seaboard. In 2013, RFO biologists also participated in the striped bass hook-and-line tagging, as did some additional colleagues from the Northeast and Southeast regions. Tagging Cruise partners are working together to secure funding to continue conducting the Cruise in 2014 and 2015. We are working with others on plans to enhance fisheries and recreational fishing.

We provided support to the Southeast Natural Resource Leaders Group (SENRLG) planning efforts for climate change adaptations in eastern North Carolina, called the Landscape Conservation and Restoration Pilot Project (LCRPP). This project is intended to: (1) develop a consistent approach to understanding the shared values of the natural resource agencies; (2) develop shared tools that can assist local communities in protecting important landscapes from climate change and other potential risks; and (3) establish a common framework of accountability that provides a foundation for leveraging resources more efficiently.

RFO provided background material and raised awareness of lawmakers, regulators and other stakeholders regarding proposed changes to solid waste management rules in North Carolina. We noted the history and technical basis for protective measures of existing rules, particularly related to sensitive areas buffers and environmental review requirements for new landfills and made information available via our website to highlight the importance of maintaining mechanisms to prevent or minimize potential impacts of landfills in environmentally-sensitive areas, including North Carolina's 11 National Wildlife Refuges.

We provided technical assistance to renewable energy development projects that may affect our National Wildlife Refuges; including two Federal Register Notices from BOEM concerning the leasing of wind energy blocks in the Atlantic Outer Continental Shelf, and coordinated timely comments to protect our trust resources of the coastal National Wildlife Refuges (Pea Island, Currituck).

Pocosin Lakes National Wildlife Refuge

RFO is promoting the science and ecological

benefits of carbon sequestration through restoration of historically ditched and drained peatlands. Peat deposits underlie much of eastern North Carolina's pocosins. Their thick peat soils are chemical sponges over geologic time, locking-up carbon in vegetation and the deepening soil layer. Restoration benefits wildlife, habitat and people.

We provided support to the eastern NC and south-

eastern VA refuge expansion/ climate change adaptation/ peatland restoration/ carbon sequestration initiative. We participated in briefings of the DOI Assistant Secretary, Director of FWS, Directors of FWS Southeast and Northeast Regions, and presented the project along with partners as part of the FWS Office of the Science Advisor (OSA) webinar series. We continued to foster a relationship with Climate Action Reserve (CAR), providing them with scientific information (recent FWS-sponsored post-fire assessments, primary literature, as well as our synthesis of that information) to assist in

developing CARs peatland carbon trading issue-paper. We also assisted The Nature Conservancy and TerraCarbon in a project to develop carbon-marketing profiles on eastern North Carolina refuge lands. At the request of the FWS OSA and Office of Management and Budget, we prepared budget estimates for high priority restoration projects.

The RFO continued its partnership with Pocosin Lakes NWR, Duke University Wetlands Center, and The Nature Conservancy North Carolina Chapter to investigate the water quality benefits of restoring previously altered peat-based wetlands. Significant milestones achieved in 2013 included field hydrologic manipulations and a microcosm experiment to simulate the effects of drought on carbon stocks in natural, drained, and restored

Assisting National Wildlife Refuges



At Alligator River National Wildlife Refuge, Refuge Supervisor Pete Jerome, Northeast Regional Director Wendi Weber, Project Leader Mike Bryant and Southeast Regional Director Cindy Dohner, USFWS

unsaturated peatlands. Significant findings to-date show that although a higher temperature and lower summer water level exist in eastern NC peatlands, soil respiration is much lower compared to boreal peatlands.

We reported 831.93 acres of peatland wetland restored on Pocosin Lakes NWR this year. This area is a functioning wetland with wetland plant community and wetland hydrology. It resulted from water control work funded by the RFO a couple of years ago.

Mattamuskeet National Wildlife Refuge

We worked with others to strategically assess water quality issues affecting Lake Mattamuskeet. RFO updated the issue paper (Science to Support Hydrology and Water Quality Management Decision-Making at Mattamuskeet NWR) characterizing the lake's data needs, participated in a winter 2013 water quality workshop, and wrote the proposal and secured the matching funds to get a second year of continuous lake water quality monitoring funded. We coordinated an effort to get expanded sampling of key limnological parameters performed on a routine basis. We coordinated a summer synoptic sampling event to expand spatial resolution of water quality monitoring. We pushed for expanded monitoring by coordinating development of three proposals, and we publicized the cooperative efforts by developing and sharing a fact sheet on the jointly-funded continuous monitoring stations.

Roanoke River National Wildlife Refuge

The RFO provided technical assistance to the Army Corps of Engineers Section 216 Study of the Roanoke River. This study is looking at potential changes to management of water releases from a flood control dam on the river in order to reduce the severe adverse impacts current releases are having on the lower Roanoke River floodplain and the extensive conservation lands that exist there (including Roanoke River NWR). Additional affected conservation owners include The Nature Conservancy and WRC.

The RFO continues to participate in post licensing studies and review teams for Dominion Power's Roanoke Rapids and Gaston hydroelectric dams. These efforts are working to reduce the adverse impacts their operations are having on the aquatic ecosystem of the Roanoke River.

2013 Publications

- RFO staff gave or helped prepare many presentations or other outreach materials, which provide education on fish and wildlife, foster partnerships for conservation, and demonstrate the quality of technical assistance provided by the Service:
- Newcomb D, Hargrove W, Forest Structure, Hoffman F, and Kumar J, Bird Nesting Habitat Derived from LiDAR data Presented by Doug Newcomb at the North Carolina GIS Conference Feb. 8, 2013, Raleigh, NC. Pdf version of the presentation online at the conference website: http://www.ncgisconference.com/2013/documents/pdfs/Newcomb_Fri_1030.pdf
- Ward S, Bryant M, and B Van Eerden. 2013. Peatland Conservation in the Albemarle Pamlico Region - Meeting the Challenge of a Changing Climate. Presented to FWS Office of Science Advisor Webinar, April 18.
- Kwak TJ, Cope WG, Newton TJ, Bales JD, Daraio JA, Drew CA, Pandolfo TJ, Archambault JM, Ganser AM, Heise RJ, Nichols RB, Augspurger T, Karns BN. 2013. Breaking traditional barriers to model climate change and land use impacts on freshwater mussels. National Climate Change and Wildlife Science and Management Webinar Series. March 26.
- Wang N, Ingersoll CG, Ivey CD, Hammer E, Bauer CR, Augspurger T, Raimondo S, Shephard B, Bartoszek J, Barnhart C, Eckert N. 2012. Acute sensitivity of freshwater mollusks to select chemicals with various toxic modes of action. Poster RP 200 presented at the 33rd Annual meeting of the Society of Environmental Toxicology and Chemistry, November 15, Long Beach, CA.
- Ingersoll C, Wang N, Besser J, Augspurger T, Barnhart, C. 2012. Laboratory methods for conducting water-only or sediment toxicity tests with early life stages of freshwater mussels. Presented at the USEPA, DOI, and Participating Parties UCR Meeting, November 7, Spokane WA.
- Wicker M, Ward S, Augspurger T. 2012. Carbon, nitrogen and mercury sequestration benefits of pocosin peat bog restoration: Turning an estuarine liability into an asset. STP#37, Presented at the 6th National Conference on Coastal and Estuarine Habitat Restoration, October 22, Tampa, FL.

Partnerships are at the core of all that we do. Many of the specific activities mentioned above occur only through partnerships. In FY 2013 we continued to participate, support and provide leadership to our established conservation partnerships by attending meetings, participating on work groups and subcommittees, and serving in leadership roles.

Cape Fear Arch Conservation Collaborative

The Cape Fear Arch encompasses one of the most biologically diverse areas along the Atlantic Coast. It includes the watersheds of the lower Cape Fear and the Waccamaw Rivers. Like so many areas along the coast, this area is under great development pressure, creating an ever increasing demand for supporting infrastructure, which eliminates habitat for important wildlife species. Several interested conservation partners began collaboration in 2006 with a mission to develop a community conservation vision that provides protection and stewardship of the important natural resources and raises conservation awareness. RFO staff actively support the mission and participate in meetings and conservation planning for the Cape Fear Arch.

As part of the Tronox Bankruptcy proceedings for the Kerr McGee Chemical Corporation Site in Navassa, NC, we worked with Department of the Interior Solicitor's Office, NOAA and the State of North Carolina to finalize the memorandum of understanding and trustee funding agreement to facilitate restoration planning. We met with lower Cape Fear River Basin stakeholders to solicit feedback on restoration projects which have been summarized in a draft Damage Assessment and Restoration Plan submitted for co-trustee review. A range of restoration options are being scoped that will offset marsh injury and benefit migra-

tory birds, anadromous fish, and other important resources. A final restoration plan and project implementation should commence in FY 2014.

Conservation Partnerships



*Flathead catfish *Pylodictis olivaris* are an introduced / invasive species in North Carolina that can consume considerable amounts of prey given their wide mouths and large body size.*

Researchers at NCSU are conducting a telemetry study to examine their movement / migrations in the Cape Fear River, including passage at a rock arch rapids at Lock and Dam #1. Photo courtesy of Joshua Raabe, May 14, 2013 via <http://www.flickr.com/photos/joshua-raabe/>

Climate Ready

RFO staff participated in the NC Interagency Leadership Teams (ILT) Climate Ready Workgroup (CRWG). The end product of the CRWG was a document titled *Climate Ready North Carolina: Building a Resilient Future*. The CRWG examined how multiple government agencies could consider potential climate- and weather-related impacts to their areas of responsibility, and developed a coordinated climate adaptation framework. The emphasis is on practical, economically-feasible options that can be undertaken by state agencies, working with willing partners at local, regional, and federal levels. These possible actions could be integrated into existing planning processes, priorities and standard operating procedures.

Supporting statewide GIS initiatives

We are contributing to increased and enhanced uses of geospatial data and geographic information systems (GIS) to visualize, analyze, interpret, and understand natural resources issues. We are a member organization of the North Carolina Geographic Coordinating Council, and the Technical Advisory Subcommittee (TAC) and serves as Vice Chair of the North Carolina Federal Interagency Committee. In 2013, we assisted the State of North Carolina in making conservation data sets generally available to all interested parties through the use of open data standards. Through involvement with the Ad-hoc Metadata subcommittee, we are helping improve the quality of metadata collected for all geospatial datasets cre-

ated in North Carolina by State and local partners, to possibly serve as a model nationwide.

Improving management of GIS resources within the Service

The RFO is fully engaged in the National Remote Sensing Working Group, the Web Mapping Working Group, and the Region 4 GIS Committee. In FY 13 we helped plan the R4 GIS training that is held annually at the Tennessee Technological University in Cookeville, TN, and we co-authored and presented an Introduction to LiDAR (a detection system that works on the principle of radar using laser light) for ArcGIS 10.1.

Chatham Conservation Partnership, Steering Committee

The mission of the Chatham Conservation Partnership is to provide a voice for Chatham County's natural resources and a vision for their protection. Of particular interest to the RFO in Chatham County is the endangered Cape Fear shiner. RFO staff contributed by continuing to serve on the steering committee, developing agendas and facilitating quarterly meetings to discuss topics of transportation planning, agriculture assessments/farmland planning, development of Chatham Park, and invasive species control.

NC Longleaf Coalition

The mission of the North Carolina Longleaf Coalition is to promote the maintenance and restoration of North Carolina's longleaf pine ecosystem, including its cultural and economic values, by forming a collaborative network of diverse stakeholders to provide strategic leadership across the historic range while also supporting local restoration activities. The NCLC meets at least 4 times per year and provides leadership to help implement the goals of the Americas Longleaf Restoration Initiative across the historic range of longleaf pine in North Carolina. RFO staff serves as chair for this partnership.

Working through the NC Longleaf Coalition to maintain and restore the longleaf ecosystem will

benefit many federal trust resources. Longleaf pine habitat across the Southeast contains as many as 300 different species of groundcover plants per acre, and approximately 60 percent of the amphibian and reptile species found in the Southeast. Additionally, this forested habitat is home to at least 122 endangered or threatened plant and animal species including the fox squirrel, northern bobwhite, and RCW. Of the original 11 million acres that once occurred in NC, only about 220,000 acres remain.

NC Prescribed Fire Council

Scientists have determined that the majority of North Carolina burned every 4-6 years with the most frequent fires of 1-3 years occurring in the Sandhills and southeastern part of the state. There are areas in the northeast and in the mountains that were burned every 7-12 years or greater than 12 years. While the frequencies are variable, the fact is that most of our states ecosystems evolved with fire and burned with some regularity until the mid-1900s. The application (and reintroduction) of fire on the landscape will enhance all of North Carolinas natural habitats for the benefit of the native species that depend upon those habitats. The North Carolina Prescribed Fire Council recently completed a 5-year strategic plan which includes the Councils vision for the next five years: protect the right to burn, encourage the safe use of prescribed fire, and promote the public's understanding of prescribed fire. RFO staff members serve on the Board and subcommittees of the Prescribed Fire Council. We are active in promoting the goals of the Council. This year staff participated in the development of a joint meeting of the NC Longleaf Coalition and the NC Prescribed Fire Council at which over 200 attendees gathered to explore topics centered on the theme, "Working Together for Longleaf and Prescribed Fire." *Photo by USFWS*



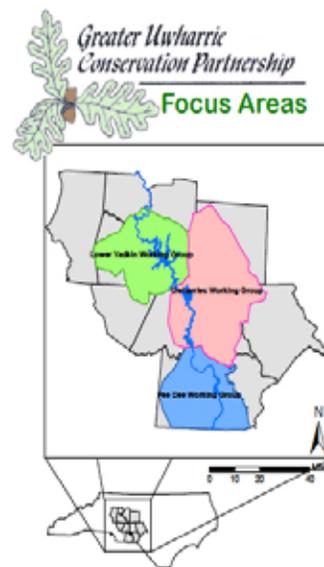
North Carolina Sandhills Conservation Partnership

In 2013, the North Carolina Sandhills Conservation Partnership was honored with the Gary Myers award for helping restore key populations of the RCW. The Americas Longleaf Restoration Initiative (ARLI) identifies the NC Sandhills region as one of 16 range-wide Significant Geographic Areas (SGA). The North Carolina Sandhills Conservation Partnership (NCSCP) has been in place since 2000 but is also now recognized as a local implementation team under the ARLI. Restoration and maintenance of habitat within the 16 SGAs will support a majority of needs in the longleaf pine ecosystem. The Nature Conservancy received a National Fish and Wildlife Foundation (NFWF) grant to create a task force to reintroduce growing-season fire in the North Carolina Sandhills. The \$350,000 grant provided resources for prescribed fire on 3,000 acres, establishing fire breaks, reducing 100 acres of mid-story hardwoods, removing off-site pine, eradicating invasive plants on 50 acres, establishing 100 acres of native groundcover, and planting of 200 acres of longleaf pine. The work completed under this grant in 2013 has already surpassed the goals. Thus far 5,014 acres were burned, 305 acres planted in longleaf, 239 acres of hardwood mid-story was treated and 54 invasive species infestations were treated.

In June of 2013, the NCSCP completed a Strategic Conservation Plan, a comprehensive guide for NCSCP to further its mission and improve conservation in the North Carolina Sandhills. RFO staff serves as the Partnership Chair, organizing meetings and overseeing the implementation of the conservation plan.

Greater Uwharrie Conservation Partnership

RFO staff continued to actively participate in the Greater Uwharrie Conservation Partnership which centers around the southern, central Piedmont of North Carolina that contains the Uwharrie, an ancient mountain range, a series of lakes along the Yadkin-Pee Dee watershed, nationally significant aquatic habitats, rare wetlands, Uwharrie National Forest, Pee Dee NWR, farmlands, and Piedmont prairie remnants. The mission of this partnership is “to work for the long-term conservation and enhancement of biological diversity and ecosystem sustainability throughout the Greater Uwharrie landscape compatible with the land use, conservation and management objectives of the participating organizations and agencies.”



Onslow Bight Conservation Forum

The Onslow Bight Conservation Forum has among its goals “to promote the conservation, restoration, health and sustainable use of the landscape and the native terrestrial and aquatic communities that depend, in whole or in part, on the lands and waters of the Onslow Bight area.” The Onslow Bight, bounded on the north by Cape Lookout and on the South by Cape Fear, contains a unique landform of saltwater marshes, riverine wetlands, pocosins, longleaf pine savannahs, and other coastal ecosystems. It also includes several large protected areas such as Camp Lejeune and Croatan National Forest. RFO staff has participated in the forum since it began and continues to serve on committees promoting conservation, particularly for longleaf pine and RCWs.

Outreach: In 2013 we participated in Hunter Safety Education Courses, Harnett County North Carolina Environmental Field Days, the Bluebird Nest Box Program in 8 NC schools and joined The Nature Conservancy's celebration of the RCW recovery in the Sandhills to commemorate the Endangered Species Act 40th Anniversary.

American Shad in the Classroom

RFO staff participated in this annual event to educate schoolteachers, and their students, about the life cycle of American shad. Staff participated in teacher education workshops and also participated in shad fry releases in the field during the spring spawning season. The project was developed and initiated by the RFO and subsequently transferred to the North Carolina State Museum of Natural Sciences for ongoing operation. Funding is provided by the Albemarle Pamlico National Estuary Partnership, with in-kind contributions by RFO and Edenton National Fish Hatchery, and the North Carolina WRC's Watha State Fish Hatchery.

Native Plants Outreach

The RFO managed a National Fish and Wildlife Foundation grant to help coastal towns and landowners eradicate the invasive plant species beach vitex. Over the past few years, this funding has provided for the chemical treatment of sites. We developed a reference sheet for landowners to continue with beach vitex treatment. We also worked

with partners to develop a brochure about Native Plants for Coastal North Carolina Landscapes and a Coastal Dunes sign. Both products were distributed to each coastal town involved in the grant. This invasive species eradication work will provide benefits to nesting sea turtles, shore birds and seabeach amaranth as well as other native beach and dune species.

Connecting People with Nature



Emmanuel Sosa, watching the wind twist and turn native sea oats at Jockey's Ridge State Park. Lilibeth Serrano, USFWS

Rocky River Science Festival

RFO staff participates in this twice-yearly event to teach high school students in Chatham County about the aquatic natural resources and significance of the rivers in streams in their own backyard. This event is a day-long immersion into the aquatic ecology of the Rocky River.

Social Media

In 2013 we established a new Facebook account, started to publish videos on YouTube and created a collection of photos in Flickr. RFO has consistently produced and provided an abundance of online resources and self-help tools. The expansion into social media is designed to increase the flow of information and engagement with potential partners, stakeholders and policy makers, and the public.



Our People

The RFO welcomed two new staff members this year. Lilibeth Serrano came on board to be our Public Affairs Specialist and thanks to her we are now officially part of the 21st century; so you can join us on Facebook ([link](#)) watch our videos on the Service Youtube Channel, and see photo albums about our work in North Carolina on Flickr ([link](#)).

Dr. R. Wilson Laney came over from the Service's Fisheries Program to join Ecological Services. Wilson will continue the important roles he has played over the years in representing the Service regarding fisheries issues in the South Atlantic region, including representation on the Science and Technical Advisory Committee and Policy Board for the Albemarle Pamlico National Estuary Part-

nership, and serving as the Regional designee on the South Atlantic Fishery Management Council, and Atlantic States Marine Fisheries Commission (ASMFC), and will also expand his work on hydro-power issues by serving as the Southeast Region FERC Coordinator. He serves as adjunct faculty at North Carolina State University, Department of Applied Ecology, and East Carolina University, Department of Biology, and is currently serving on five graduate committees (two PhD and three MS, at ECU).

