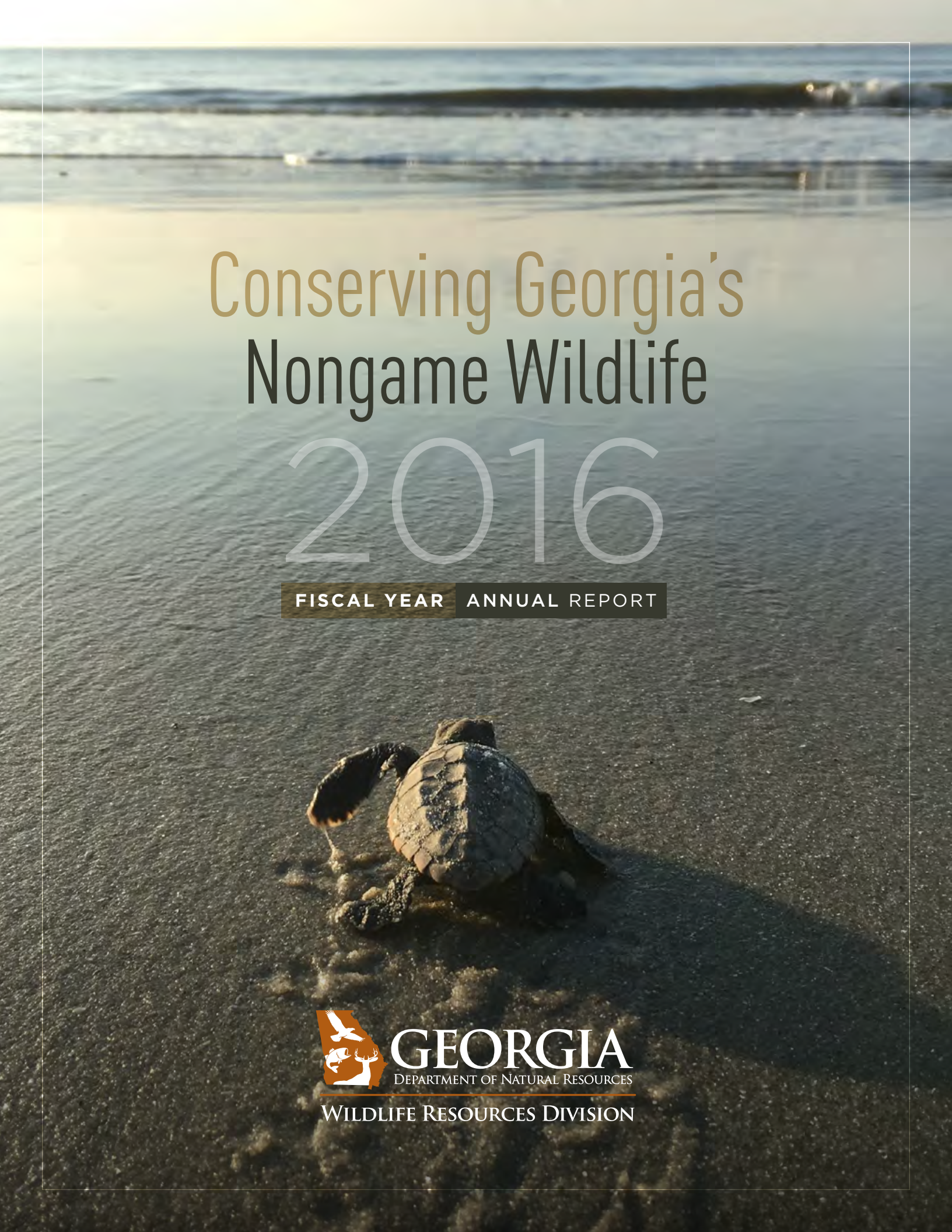

Conserving Georgia's Nongame Wildlife

2016

FISCAL YEAR **ANNUAL** REPORT

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
WILDLIFE RESOURCES DIVISION

Jon Ambrose *(Linda May/DNR)*

As part of Georgia DNR's Wildlife Resources Division, our mission at the Nongame Conservation Section is conserving the more than 95 percent of native species not fished for or hunted, plus rare plants and natural habitats.

In fiscal year 2016, we witnessed highs and lows related to that mission. Two examples:

Loggerhead sea turtles shattered the previous state record with more than 3,200 nests on Georgia beaches. That far surpassed a state recovery benchmark. The take-home: These federally listed turtles are recovering.

On the flip side, the disease that has killed millions of bats in North America isn't sparing Georgia. Our surveys of white-nose syndrome have documented 92 percent fewer bats in caves and mines we check each winter.

These examples illustrate one thing: Conserving wildlife is long-term work, full of highs and lows.

Yet most would agree that it's also vital work. And that it is our responsibility to pass on to future generations the incredible variety of wild creatures and wild places that enrich our lives now.

This annual report details our agency's efforts to research, restore and protect sea turtles, bats and the scores of other native animal and plant species considered a high priority for conservation in Georgia.

I hope you find this account informative, encouraging and, yes, challenging – a challenge to become involved in and support the conservation of Georgia's nongame wildlife.

Thank you,

Jon Ambrose
Chief, Nongame Conservation Section

Cover: Loggerhead hatchling *(Haley Watkins/Sea Island)*

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Waterbirds

Georgia's barrier island beaches, coastal salt marshes and freshwater wetlands support 86 species of seabirds, shorebirds and wading birds, collectively known as waterbirds. The Waterbird Conservation Initiative includes:

- Protecting important colonial waterbird nesting habitats.
- Conducting surveys to determine the status and habitat needs of resident, migratory and wintering waterbirds.
- Creating partnerships for long-term conservation of wetland-dependent bird species.

Conservation efforts include protecting and managing five sand islands for beach-nesting and migratory birds. While this is especially valuable for seabirds, resident and migratory shorebirds also benefit from protected critical nesting and resting areas free from disturbances. One of the areas, a dredge-spoil island near Brunswick, supports one of the largest colonies of nesting seabirds on the South Atlantic Coast.

One highlight in fiscal 2016 was the development of a Beach Stewards Program, a volunteer group committed to helping protect a least tern colony on St. Simons Island. The efforts of these volunteers helped more than 100 least tern pairs fledge many chicks at one of the state's most heavily visited beaches.

On other fronts, some small colonies of waterbirds suffered depredation and tidal flooding. However, a brown pelican colony on Satilla Marsh Island proved a success, with 522 nests, and the Brunswick dredge-spoil island had 3,149 royal terns. With assistance from the DNR's Coastal Resources Division, Nongame Conservation Section used a drone, or unmanned aerial vehicle, to photograph the royal tern colony for counts. This technology offers significant benefits over ground counts and helicopter surveys.

Nongame Conservation staff and partners also tracked seabird colonies on Ogeechee Bar, Pelican Spit, St. Simons' East Beach, Brunswick Dredge Island, Satilla Marsh Island and several rooftop colonies in the St. Marys area. Significant productivity was noted on Pelican Spit and Brunswick Dredge Island. These two sites are free from mammalian predators, a factor that often leads to high productivity.

In other fiscal 2016 updates, Nongame Conservation:

- Conducted American oystercatcher trapping projects. In the winter, 69 oystercatchers were caught, banded and released through the use of cannon nets. During the breeding season, another nine adults and 18 chicks were banded on nests (this time using a bow-net). American oystercatcher productivity was down from Georgia's record year in 2015, settling to about average production. In all, 120 pairs were documented and monitored on the state's coast.
- Partnered with the Smithsonian Conservation Biology Institute to trap and satellite-tag an Atlantic Coast long-billed curlew, a first for this population of curlews. Very few curlews winter on the Georgia coast. The project is exploring how this diminished sub-population relates to the majority of curlews that winter in coastal Texas and Mexico.
- Coordinated the fourth year of a major migratory shorebird survey based on a regional study by shorebird researchers with the Conserve Wildlife Foundation of New Jersey and the U.S. Geological Survey. Repeated surveys were conducted at 20 sites during fall 2015 and spring 2016. DNR and U.S. Fish and Wildlife Service staff, island managers and volunteers conducted the surveys, which are helping generate more

Adding temporary signs on Little Tybee to protect beach birds *(Rene Haidt)*

Long-billed curlew *(Smithsonian Migratory Bird Center)*

Birds

accurate population and trend data for a number of Arctic-nesting shorebirds.

- Supported, through a National Fish and Wildlife Foundation grant secured by staff, a graduate student experimenting with the use of predator exclosures on Wilson's plover nests on Little St. Simons Island. This project follows work that Nongame Conservation has supported involving this species at several sites. The grant also has allowed staff to partner with Virginia Tech to help analyze survey data of Georgia's migratory and wintering oystercatchers.
- Continued with partners a sharp-tailed sparrow banding project that is providing data on the winter distribution of two species – Nelson's and saltmarsh sparrows – and five subspecies of these little-known birds. If sea-level rise projections prove accurate, saltmarsh sparrows are considered at risk of extinction over the next 50 years.
- Continued taking part in a pilot project surveying nesting American oystercatchers. This work is helping lay the groundwork for a rangewide nesting oystercatcher survey in the near future. To date, all rangewide surveys of this species have been winter surveys, a season in which constricted ranges and communal roosting behavior make finding and counting birds easier. DNR and partners conducted 39 surveys at nine sites representing different habitat types and nesting densities.
- Led, with several coastal partners, the Georgia Shorebird Alliance. Involving state, federal and private groups, this organization is making significant progress in management, monitoring, research and education regarding shorebirds on the Georgia coast.

Red-cockaded Woodpeckers

The red-cockaded woodpecker is the only woodpecker in the U.S. that excavates cavities in living pines. The drastic loss of mature pine forests over the past 200 years has been the primary cause of this species' decline. Suitable habitat now occurs primarily on some military bases, national forests and other public lands, although red-cockaded woodpeckers still live on many private properties.

***Red-cockaded woodpecker** (Martjan Lammertink/USFS)*

In 1999, DNR developed the nation's first statewide red-cockaded woodpecker Habitat Conservation Plan to provide management options for private landowners. The plan includes options for mitigated incidental take and for Safe Harbor.

Safe Harbor focuses on landowners in southwest Georgia, where plantations managed for the northern bobwhite also support a significant population of red-cockaded woodpeckers. Safe Harbor involves a landowner's commitment to manage habitat beneficially for the site's "baseline" number of woodpecker families, or those on the site when the agreement is made. A family group refers to red-cockaded woodpeckers occupying a cluster of cavity trees. The group can vary from a single bird to a breeding pair plus one to three helpers – typically male offspring from previous years that help feed younger siblings. In exchange for maintaining this baseline number of family groups, the landowner's responsibility does not increase if the woodpecker population increases.

In Georgia, 176,593 acres are enrolled in Safe Harbor management agreements covering 105 baseline groups of red-cockaded woodpeckers and supporting 38 surplus groups, or additions to those woodpecker populations. Most of these properties are in the Red Hills region near Thomasville. The Red Hills region supports the largest population of red-cockaded woodpeckers on private lands. Since the inception of Safe Harbor in 2000, this population has stabilized at about 180 groups.

The Nongame Conservation Section worked with Safe Harbor participants and conservation partners in fiscal year 2016 to monitor nesting and population status, band woodpeckers and install artificial nest cavities. Staff also surveyed multiple Safe Harbor properties to locate new cavity trees and update property maps.

Staff continued to work with the Joseph W. Jones Ecological Research Center to restore the red-cockaded woodpecker population at Ichauway Plantation in Baker County. These 29,000 acres supported a single male in 1999. In part through the translocation of 71 young birds, Ichauway Plantation now has 32 family groups.

In 2008, DNR acquired 8,400 acres near Bainbridge to create Silver Lake Wildlife Management Area, the first state-owned property with red-cockaded woodpeckers. Silver Lake has extensive stands of mature longleaf pine habitat. In 2013, DNR entered into an agreement with the U.S. Army Corps of Engineers to manage the woodpeckers on corps land that DNR leases for Lake Seminole Wildlife Management Area. The property is adjacent to the Silver Lake population and features quality longleaf and wiregrass habitat, some of which red-cockaded woodpeckers already use as foraging habitat. In the near future, recruitment clusters will be installed in suitable places at Lake Seminole WMA to encourage the expansion of red-cockaded woodpeckers.

To supplement the population at Silver Lake, Nongame Conservation staff translocated six red-cockaded woodpeckers from Osceola National Forest in November 2015. The WMA's population continues to grow, with 31 family groups documented in spring 2016, five more groups than the year before. Nesting success remained strong, with 41 young fledged in 2016. Through more frequent controlled burning, installation of additional recruitment clusters and careful forest management, Silver Lake WMA eventually will sustain about 50 family groups.

At Moody Forest Wildlife Management Area in Appling County, Nongame Conservation staff monitored a red-cockaded woodpecker cluster and banded two nestlings. Habitat management, including timber thins and prescribed fire, is helping improve and create more woodpecker habitat. Staff will install additional woodpecker clusters at Moody Forest in the coming year.

Surveys and Habitat Restoration

Marshbirds

Secretive marshbird surveys in fiscal 2016 focused on **black rail**, **king rail** and **least bittern**, species that are difficult to survey due to their secretive nature and use of wetland habitats that are hard to access. Surveys in late March and April at Altamaha Wildlife Management Area near Darien detected sizable numbers of least bitterns and good numbers of king rails, as well as a few purple gallinules, another rare marshbird. However, no black rails were detected during these surveys. The black rail is an extremely secretive species that has declined precipitously over the last two decades.

Little is known about the population status of the **Florida sandhill crane**, a resident subspecies that occurs only in peninsular Florida and the Okefenokee National Wildlife Refuge in Georgia. Over the past five years, helicopter surveys have been conducted annually in the Okefenokee National Wildlife Refuge from March-April to count nesting pairs of Florida sandhill cranes. Starting in 2014, a standardized grid of transects has been flown to conduct the counts. Using this approach, statistically valid population estimates can be developed.

The one flight flown this year, in late April, proved highly successful, with 19 observations of active nests or adults with young. This is almost 50 percent more than the maximum number seen during any previous flight.

Grassland Birds

Surveys that were started six years ago for **Henslow's sparrow** continued in 2016. This species is a small songbird that nests in grasslands of the Midwest and Northeast and winters in grassy areas of pine flatwoods, pitcherplant bogs and powerline corridors in the Southeast's Coastal Plain. Henslow's sparrow numbers have declined precipitously over the last several decades due to habitat loss at breeding and wintering grounds.

This sparrow is a species of high conservation concern because of its small population size, greatly reduced habitats and other factors. Its secretive nature and small numbers make it difficult to survey and monitor. Little is known about its distribution and populations across most of its range, including in Georgia.

Standardized transects at Paulks Pasture WMA in Glynn County, Townsend Wildlife Management Area near Ludowici and Moody Forest Wildlife Management Area near Baxley were surveyed three times from January through March using the same techniques (flush netting) as the previous five years. Numbers captured rebounded from a low of only 33 birds in 2015 to a new record of 90 birds in fiscal year 2016. An average of 65 birds per year have been captured and banded since this effort began.

The significant rebound in the number captured this year compared to 2015 highlights the fact that there can be a great deal of inter-annual variation in populations of this species, as well as shifts in use of wintering sites. Two transects at Paulks Pasture that usually have the most Henslow's had very few birds in 2016, while a few other transects at the WMA had two to three times as many as in past years. Several birds banded in the previous two seasons were recaptured.

Surveys will continue at Paulks Pasture, Townsend and Moody Forest to track long-term population trends. Other sites with suitable habitat will be surveyed for new populations.

The nest box program for **southeastern American kestrel** continues with marginal success. Nest box use was up slightly in 2016 over 2015 and 2014. However, five clutches were lost to predation early in the season. About 40 unused boxes were removed or relocated. Nongame Conservation is working with a regional power distribution company to erect 30 boxes high on

DNR's Ashley Harrington removes a young kestrel for banding *(Josiah Lavender/DNR)*

the company's transmission line towers. The hope is these more elevated nesting sites will be less susceptible to predation.

On a positive note, staff recorded the first successful kestrel nest on the newly acquired Chattahoochee Fall Line Wildlife Management Area near Geneva, and in a site the agency's habitat models indicated was good nesting habitat. Nesting kestrels – the subspecies hasn't been determined – also have been documented near a native grass restoration site at Panola Mountain State Park near Stockbridge. Those birds were using restored grassland at the park.

Besides installing the additional boxes on power lines, upcoming work will include a rerun of nesting habitat models. The addition of three more years of survey data, including numerous new box placements suggested by the analysis, will help refine these models. Nongame Conservation also is cooperating with the Florida Fish and Wildlife Conservation Commission on a genetic analysis project to investigate the subspecies status of Georgia populations.

Native grass plantings were completed at Panola Mountain State Park. This 10-year effort restored more than 100 acres of Indian grass. While this aspect of the project is done, other work remains. For at least a few more years, exotic weeds will need to be controlled on the site as the grasses thicken and become more firmly established. Native forbs important for pollinators and other wildlife will be planted in the restored area, and rare species such as Michaux's sumac will be planted in these habitats. Canebrakes along the South River adjoining the native grass area are being restored by dozens of volunteers, and about 80 acres of adjoining forest is slated for restoration to a natural woodland.

Native grass restoration is being done at other sites as well. This includes planting about 40 additional acres on Joe Kurz Wildlife Management Area near Woodbury in coordination with a new dove field and other habitat work on adjoining land; about 30 acres on Chattahoochee Bend State Park near Newnan; about 120 additional acres on Sweetwater Creek State Park near Lithia Springs; and, about 70 acres on Flat Creek Public Fishing Area in Houston County, all in coordination with DNR Wildlife Resources Division's Fisheries and Game Management sections.

Mountain Birds

On Brawley Mountain in northeast Georgia's Fannin County, habitat restoration was completed for the only remaining population of **golden-winged warblers** in the state. Brawley Mountain was burned with the help of Nongame Conservation's west-central Georgia fire crew in spring 2016 to enhance the habitat further. (An adjoining unit was burned in spring 2015.) However, Georgia's golden-winged warbler population has faltered. Biologists detected a lone male in 2013, no birds in 2014, one male in 2015 and two males in 2016. Whether this population can recover is in doubt.

Georgia is not alone, however: Other states have lost populations of this species. The golden-winged warbler is in steep decline throughout almost all of its historic range. Despite the gloomy outlook, the Brawley Mountain project has yielded some promising results. The area has been restored to a montane oak woodland featuring especially high bird diversity, including many woodland and early successional bird species. The project site also has been invaluable as an outdoor classroom. Many field trips led by DNR and U.S. Forest Service staff have touted Brawley Mountain as a successful example of woodland restoration in the Southern Blue Ridge.

On a brighter note, for the second consecutive year a pair of **peregrine falcons** nested in a natural setting at Tallulah Gorge State Park. In 2015, the first time a wild peregrine nest had been documented in Georgia in 80 years, this pair produced two fledglings. In spring 2016, it appeared that at least one nestling, or eyas, hatched, but it was not clear if it fledged. The nest site selected by the parents could not be seen, and observations of the eyas were rare. The northeast Georgia park temporarily banned rock climbing in the area to protect the nest.

As for peregrine falcon activity in Atlanta, mating was observed at the usual location on the SunTrust Plaza Tower, but the birds abandoned the site before laying eggs. A falcon pair was seen frequenting a high-rise in the Buckhead area in April, but no nest was confirmed. In early summer two sightings of a juvenile falcon with an adult pair were reported; one was seen at SunTrust. It is unclear if these were two different juveniles or two sightings of the same bird.

Of particular note, a lone peregrine was seen at Sprewell Bluff Wildlife Management Area in May 2016, and two more were seen in the same area that September. Staff and birders will keep close watch on this site to see if perhaps a second "wild nest" might appear in coming years.

Wood Stork Nests

Wood storks were listed as endangered in 1984 following dramatic declines in breeding colonies

Young wood storks (DNR)

in southern Florida. Wood stork nests were first documented in Georgia in 1965. By the 1980s, the birds were nesting here in increasing numbers.

Georgia now supports more than 20 percent of the U.S. nesting population, which is about 9,500 breeding pairs. The recovery plan for the wood stork in Georgia includes monitoring reproductive success of nesting colonies and identifying potential threats.

The Nongame Conservation Section conducts aerial surveys each spring to find and monitor nesting colonies. Stork nesting effort – the number of pairs that attempt to reproduce – fluctuates annually. Calendar year 2014 was a record nesting season for wood storks in Georgia, with 2,932 nests in 22 colonies. Water levels were favorable for both nesting and foraging, and the colonies monitored for productivity had high nest success. A new small colony was also discovered in Brooks County.

In 2016, 2,310 stork nests were documented in 22 colonies across the Coastal Plain. While lower than the record counts in 2014, the 2016 totals fit within the trend of increasing nesting in Georgia. Productivity monitoring showed that almost all active colonies fledged young.

More than 75 percent of all wood stork rookeries in Georgia are on private land. Continuing the success of conservation efforts for this species depends on landowners' willingness to ensure the protection of viable freshwater-wetland nesting sites.

Swallow-tailed Kite Nests and Roosts

The swallow-tailed kite has suffered a significant range reduction since the 1880s when it bred in 21 states. These elegant raptors are now found in seven Southeastern states, where they nest in bottomland forests along some large rivers. Most nests in Georgia are on private land, particularly industrial timberlands.

The Nongame Conservation Section's kite project had two main focuses in 2016: encourage the public to report sightings by posting flyers at boat ramps on the periphery of the kites' known range, and revisit core nesting areas in the lower Coastal Plain. Staff also emphasized surveying areas that might be acquired or otherwise protected. Many of these were along the Satilla River.

Signs were posted upriver of known swallow-tailed kite habitat in six drainages. With newly confirmed nesting areas, the known breeding range was expanded 62 kilometers, or more than 38 miles, up the Ocmulgee River and another 32 kilometers, or nearly 20 miles, on the Savannah River. Thirty-four nests were found during surveys, and another five areas likely had nests based on kite behavior, though nests were not spotted. Kites used several sites that had been inactive for 10-13 years, indicating the importance of long-term protection of known nesting sites, even if kites are not nesting there in some years.

Overall, Nongame Conservation efforts include finding and monitoring nests, advising the public about reporting sightings, protecting nests from predators where possible, working with private landowners to ensure habitat viability, supporting habitat management on protected lands where kites nest and searching for previously radio-tagged kites.

Bald eagle *(Jerry Turner)*

An estimated 150-200 pairs of swallow-tailed kites nest in Georgia each year. Most nests are on the lower stretches of the Satilla and Altamaha rivers, but nests are also scattered throughout other south Georgia river drainages that feed into the Atlantic – such as the Savannah, Ogeechee and St. Marys – and almost all rivers that drain into the Gulf of Mexico, including the Suwannee, Alapaha, Aucilla, Flint, Little Ochlockonee and Withlacoochee. While densities are highest in the lower stretches of these rivers, kites nest well into the upper Coastal Plain on the Ocmulgee and Oconee rivers.

Kite numbers appear stable in Georgia, yet little recolonization of the species' historic range has been observed. About two-thirds of confirmed and probable kite breeding areas are on private land. The remaining third are on protected lands such as wildlife management areas, national wildlife refuges and military bases.

Bald Eagle Nests

Once fairly common in Georgia, the bald eagle declined in abundance during the mid-20th century and no longer was nesting in the state by the early 1970s. But bald eagle populations rebounded here and elsewhere, helped by a ban on the use of DDT in the U.S. in 1972, habitat improvements following enactment of the federal Clean Water and Clean Air acts, protection through the Endangered Species Act, increased public awareness, and the restoration of local populations through release programs.

Following federal de-listing in 2007, primary legal protection for eagles comes under the Bald and Golden Eagle Protection Act. Georgia's ongoing conservation efforts include monitoring all known eagle nests, working with landowners to protect nest sites from disturbance, public education programs about eagle conservation and ecology, and rehabilitation of injured eagles.

During the 2016 nesting season, the Nongame Conservation Section documented 201 occupied nesting territories. Of these, 149 were successful, fledging 240 eaglets. This marked the second straight year the number of occupied nesting territories in Georgia exceeded 200. There were 210 in 2015.

By comparison, there were 139 known nesting territories in Georgia in 2010, 55 in 2000, nine in 1990 and only one in 1980. Biologists continued to work with landowners to conserve nesting areas, including providing assistance with federal incidental take permits for development projects that might infringe on recommended buffer zones.

Nongame Conservation also continued working with partners at the University of Georgia's Warnell School of Forestry and Natural Resources, the Southeastern Cooperative Wildlife Disease Study, the Army Corps of Engineers, the U.S. Fish and Wildlife Service and the American Eagle Foundation to study avian vacuolar myelinopathy. Often referred to as AVM, this mysterious disease has caused significant mortality in American coots and bald eagles. The disease apparently is caused by an unidentified toxin produced by a cyanobacterium that grows on the surfaces of submerged plants, especially hydrilla, in some sites in middle Georgia and in a few other Southeastern states.

J. Strom Thurmond Reservoir, also called Clarks Hill Lake, on the Savannah River north of Augusta has been plagued with the disease since at least the late 1990s. The first AVM-killed eagle was found at this reservoir in 1998. There has been a dramatic decline in eagle nesting territories there, from a high of eight or nine in the 1990s to two or three in recent years. Fall surveys indicate that numerous wintering eagles arrive at Thurmond in October and November, probably drawn to the large numbers of coots attracted by the reservoir's extensive hydrilla beds. However, the number of eagles dwindles by January, with the only remaining eagles associated with a few foraging territories on the northern end of the lake, farther away from the hydrilla.

As of fiscal 2016, satellite telemetry devices have been placed on five eaglets from three nests on the northern part of Thurmond Reservoir. In fall 2015, one of the males was shot in Pennsylvania and the other shed its transmitter. The two males outfitted with transmitters in April 2016 migrated north in June. One of them flew to the Hudson Bay area; the other spent the summer in Pennsylvania and Ohio feeding along the Great Lakes and rivers. The three remaining birds in this study will be tracked through the coming fall to determine AVM impacts.

Golden Eagles

The Nongame Conservation Section is part of a regional project exploring migration routes and habitat use of golden eagles in the eastern U.S. Started in 2006 and first aimed at exploring threats wind turbine sites pose to golden eagles, the research by Appalachian Eagles has expanded from Pennsylvania and West Virginia to as far south as Alabama as scientists learned that the eagles don't always migrate to and from Canada along Appalachian Mountain ridges. Some fly through the Midwest, according to project leader Dr. Tricia Miller of West Virginia University.

To fill in details about the pathways and the population's distribution, scores of camera stations are used to document golden eagles, the continent's largest bird of prey. Researchers also track eagles fitted with transmitters that post almost real-time updates to cell towers.

A grant from The Environmental Resources Network (TERN), friends group of Nongame Conservation, was used to buy two transmitters. Both have been fitted on golden eagles trapped and released at Devil's Backbone Hunting Club, a project partner near Sprewell Bluff Wildlife Management Area in middle Georgia.

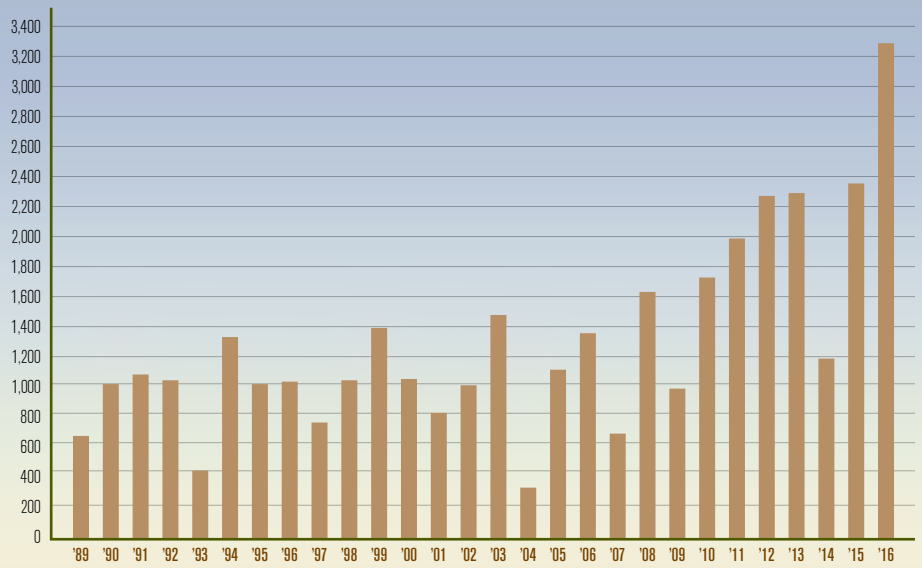
The first bird was trapped in February 2015, the second in February 2016. One has migrated to and from the Gulf of St. Lawrence area in Quebec, while the other has been tracked to the upper Midwest and Lake Superior.

Sea Turtles

Loggerhead sea turtles are found in Georgia's coastal waters year-round and nest on all barrier island beaches. In accordance with the National Oceanic and Atmospheric Administration/U.S. Fish and Wildlife Service recovery plan for this species, DNR management efforts focus on surveying and protecting loggerhead nests and managing nesting beach habitat. The Nongame Conservation Section coordinates the Georgia Sea Turtle Cooperative, a group of volunteers, researchers and government employees that conduct nest protection and management activities on Georgia beaches. In addition, Nongame Conservation is responsible for managing the nesting projects on the state-owned islands of Sapelo and Ossabaw, including hiring and supervising seasonal technicians.

Nest management strategies such as relocating nests, installing protective screens and removing predators help ensure high nesting success. Since comprehensive surveys began in 1989, loggerhead nesting has been highly variable, with an average of 1,300 nests per year. In 2016, more than 3,200 loggerhead nests were documented on Georgia beaches, a record high for the 28 years of surveys.

LOGGERHEAD NESTING IN GEORGIA Annual nest totals since comprehensive surveys began in 1989.



While long-term nesting data marked a significant decline in nesting from the mid-1960s through the early '90s, more recent data shows an increasing trend of approximately 3 percent per year. The federal recovery plan includes demographic criteria that must be met before loggerheads could be considered recovered in Georgia. In 2016, loggerheads reached an important milestone by surpassing Georgia's recovery goal of an increasing trend in nesting of 2 percent annually, equaling more than 2,800 nests. Although several other recovery criteria must be met before federal agencies will consider a change in status for loggerheads, reaching the nesting recovery goal is a key step in the process of population recovery. Other conservation activities conducted

Dawn nesting loggerhead (DNR)

Amphibians and Reptiles

DNR and National Park Service staff with sea turtle cooperator Carol Ruckdeschel on Cumberland (DNR)

by Nongame Conservation in fiscal year 2016 included reviewing development plans for offshore oil and gas development, conducting lighting surveys on developed nesting beaches, and monitoring the effects of harbor dredging projects on sea turtles.

To develop a comprehensive understanding of the number and relatedness of loggerheads nesting on Georgia beaches, DNR and the University of Georgia have developed a catalog of unique genetic profiles for Georgia's nesting female turtles. Drs. Joe Nairn and Brian Shamblin, working with DNR staff, have identified an average of 553 loggerhead females using the Georgia coast annually from 2008-2015, with a range of 347-733 turtles per year.

One of the significant findings of this study is that at least 80 mother/daughter pairs nest on Georgia's barrier beaches. Because it takes at least 30 years for a loggerhead to become sexually mature and begin nesting, the mothers are at least 60 years old, nesting alongside their 30-year-old daughters.

Sea Turtle Stranding Network and At-sea Recovery

The Nongame Conservation Section monitors sea turtle mortality through the Sea Turtle Stranding and Salvage Network. Systematic patrols of barrier island beaches provide information on the number and species of dead turtles that wash up on the Georgia coast. When possible, necropsies of stranded turtles are conducted to evaluate causes of mortality. Periodic aerial surveys are flown to determine distribution and abundance of marine turtles during migration. Sea turtle strandings are the primary index of threats to sea turtles in Georgia's coastal waters.

In fiscal 2016, 92 dead or injured turtles were documented, below the 27-year average of 191 strandings per year. Recent patterns in strandings strongly correlate with the shrimp trawling effort off Georgia's coast, suggesting that commercial fishing activity is a significant source of mortality for sea turtles.

Results from necropsy examinations indicate that boat collisions and commercial fishery mortality are significant sources of mortality. They accounted for, respectively, 19 and 30 percent of strandings in fiscal year 2016.

Bog Turtles

The federally threatened bog turtle, North America's smallest turtle species, inhabits Georgia mountain bogs generally found along slow-flowing spring creeks and seepages in low mountain valleys.

During the spring and summer of 2016, Nongame Conservation Section staff continued survey efforts, deploying 168 traps in eight sites – three with known bog turtle occurrences and five potentially suitable sites. The latter were identified through use of a species distribution model as well as an extensive review of aerial photography using Geographic Information Systems software. Over the last three years, more than 210 mountain wetland sites have been ground-truthed and evaluated in the field to identify sites targeted for surveys.

The 2016 survey effort totaled more than 8,500 trap days. While no new populations were found, 21 captures and releases of 16 different turtles were recorded at the three sites with known populations, including seven turtles that had not been caught before. Staff also documented recruitment and recent reproduction in a population discovered in 2014 with the capture of a 4-year-old juvenile bog turtle, suggesting long-term viability for this population.

DNR's Thomas Floyd checking bog turtle live-trap (Josiah Lavender/DNR)

Gopher Tortoises and Eastern Indigo Snakes

Both the gopher tortoise – Georgia's state reptile – and the eastern indigo snake, which is federally listed as threatened, are priority species in Georgia's State Wildlife Action Plan.

During fiscal 2016, the Nongame Conservation Section tortoise survey crew completed line-transect distance surveys on nine sites, sampling aimed at estimating tortoise density and abundance. Sites included Altama Plantation Wildlife Management Area in Glynn County, Flint River Wildlife Management Area in Dooly County, the Fort Perry Tract of Chattahoochee Fall Line Wildlife Management Area near Geneva, several Nature Conservancy properties near Fort Benning, private lands in Marion County, the newly acquired Altamaha "Connector" or BBT Tract in Altamaha Wildlife Management Area near Darien, industrial timberlands in Brantley and Camden counties, and a large private tract in Atkinson County. Highlights included a tortoise population topping 500 at Alapaha River Ranch, a new gopher frog site discovered at a Nature Conservancy tract and indigo snakes at both the Cox Tract at Altamaha WMA and the Atkinson County tract.

Nongame Conservation began doing line-transect distance sampling for gopher tortoises in 2007.

***DNR's Matthew Stoddard scoping gopher tortoise burrow** (DNR)*

***Head-started (lower) and hatching gopher tortoises released at Yuchi** (Dan Quinn/SREL)*

Surveys have been completed on 81 sites, public and private, statewide. Survey results are incorporated into conservation strategies aimed at precluding the need to federally list the tortoise under the Endangered Species Act.

At Yuchi Wildlife Management Area near Waynesboro, a site with extensive suitable habitat but a small, remnant population of gopher tortoises, Nongame Conservation has been augmenting the population with adult tortoises displaced by development and with juveniles hatched and head-started from eggs collected at stable populations. In fiscal 2016, 81 juvenile tortoises were released at Yuchi. Radio transmitters were attached to a subset of the group. University of Georgia researchers are tracking the free-ranging juveniles to evaluate growth, habitat use, home range and survivorship. Additional nests at stable sites were secured for egg collection and captive rearing of hatchlings for a spring 2017 release.

Since 2011, 273 gopher tortoises have been released at Yuchi to complement the natural population, previously estimated at 44 tortoises. These efforts will ensure the Yuchi population exceeds minimum standards developed by The Gopher Tortoise Council and the U.S. Fish and Wildlife Service that define a long-term viable population.

In another study funded and supported by Nongame Conservation, The Orianne Society, a nonprofit organization dedicated to conserving rare reptiles and amphibians, continued occupancy monitoring of imperiled eastern indigo snake habitat to determine population trends. In southern Georgia, indigos overwinter in xeric sandhill habitats, where they den in the burrows of gopher tortoises. The study is focused on the Altamaha River basin, considered a population stronghold for eastern indigos.

Orianne staff surveyed 12 sandhill sites on public and private lands, detecting indigos at 17 percent. The degree of detections in 2016 declined significantly from the previous four years where stability in the populations was observed. However, the sites sampled in 2016 had not been surveyed in previous years and likely are not comparable. In addition, Nongame Conservation microchipped five indigo snakes at the new Alapaha River Wildlife Management Area in Irwin County. This property and others in the Alapaha and Satilla River basins will be incorporated into future occupancy monitoring for indigos.

Gopher Frogs

State listed as rare, gopher frogs depend on intact sandhill habitats, where adults survive within the burrows of their namesake host, the gopher tortoise. However, these frogs also require nearby fishless wetlands where they breed and their tadpoles develop. Because of widespread upland and wetland habitat alteration throughout their range, gopher frogs are now limited to fewer than 10 sites in Georgia.

In 2007, the Nongame Conservation Section began a project that involved collecting gopher frog eggs from healthy populations, rearing them to late-stage tadpoles or post-metamorphic froglets and releasing them at an unoccupied but high-quality protected site at Williams Bluffs Preserve in Early County, which is within the species' historical range. The goal: Establish a self-sustaining breeding population of gopher frogs, a rangewide first for this imperiled amphibian.

Throughout the Fall Line sandhills region of the Southeast, biologists reported scant breeding by gopher frogs during the 2016 season. This observation also was the case in Georgia, where only a few egg masses were found at donor populations despite extensive searches. Portions from two egg masses were collected and raised, resulting in the release of 959 froglets at Williams Bluffs. Radio transmitters were attached to 15 of the metamorphs, and the froglets were followed for two weeks. One individual moved 752 meters, or nearly 2,500 feet, from the release wetland before settling down in a gopher tortoise burrow. Only one mortality of a tracked froglet was observed. While tracking, researchers encountered a frog from last year's release in a tortoise burrow. That frog had more than doubled in size.

Eastern Hellbenders

The state-protected eastern hellbender, North America's largest salamander, inhabits clear cold-water streams in the north Georgia mountains.

During summer 2016, Nongame Conservation Section staff surveyed for hellbenders in 23 stream stretches in 18 streams using conventional techniques – snorkeling and flipping rocks. Researchers caught and released 80 hellbenders, weighing, measuring, photographing and marking each with a Passive Integrated Transponder, or PIT, tag for future identification. More than 500 hellbenders have been captured since the 2011 start of a long-term monitoring effort in Georgia.

Eastern hellbender *(Thomas Floyd/DNR)*

As part of this project, 17 of the 24 stream stretches that were first surveyed in 2013 were re-surveyed as part of three-year cycle. This sampling schedule is building a long-term dataset, providing data for estimating hellbender numbers and allowing for periodic assessment of stream habitat conditions and hellbender population health. A healthy hellbender population is an indication of good water quality and a healthy environment. PIT tag scans showed that five hellbenders caught in fiscal 2016 also had been caught in 2013.

Genetic tissue samples were collected from 72 hellbenders for the Georgia Museum of Natural History genetic archive collection and for use in other genetics research. Tissue samples also will be examined for evidence of Chytrid fungus (Bd), salamander chytrid disease (Bsal) and Ranavirus. Results from the analysis are contributing to a rangewide assessment of the species' health. Abundance, size and mass data are used to determine the health of hellbender populations.

Ten artificial hellbender nest boxes were installed in a stretch of one Georgia stream as a pilot study for a larger effort that will be conducted with conservation partners in North Carolina and Tennessee over the next few years.

This project is part of conservation efforts implemented through Competitive State Wildlife Grant funds provided to five state wildlife agencies in 2016 for hellbender conservation and research. The nest boxes augment shelter and nesting habitat where hellbender populations persist but where these components of a natural streambed are limited due to habitat degradation. The boxes also allow for surveying and monitoring and serve as a technique to increase hellbender recruitment.

Alabama Map Turtles

The Alabama map turtle, found only in Mobile Bay drainages, is state listed in Georgia as rare and has been petitioned for federal listing as threatened. Because this species has been poorly studied in Georgia and in the Coosa River especially, the Nongame Conservation Section conducted a survey to determine the species' status in the Coosa to help inform the federal listing decision.

The Alabama map turtle was the third most abundantly observed turtle species during the survey, preceded only by the slider and river cooter. All size and age classes of Alabama map turtles were observed. The species' abundance and age distribution suggest a healthy, reproductive population in the Georgia portion of this river.

It is unlikely that federal listing of the Alabama map turtle is warranted based on the results of this study and a 2003 survey of inhabited Alabama streams.

North Atlantic Right Whales

The North Atlantic right whale is one of the most endangered marine mammals in the world. Commercial whaling in the late 1800s nearly drove the species to extinction. Since whaling was banned in 1935, the population's recovery has been slowed by mortality from ship collisions and entanglement in commercial fishing gear.

Each winter pregnant right whales and small numbers of nonbreeding whales migrate from waters off the northeastern U.S. and Canada to calving grounds along the coast of Georgia and northeastern Florida. As of 2012, the most recent year of data available, the population numbered at least 476 whales and was increasing at a rate of 2.8 percent a year. Despite an increasing trend, however, there are still fewer than 100 breeding females.

The DNR collaborates with National Oceanic Atmospheric and Administration Fisheries, the Florida Fish and Wildlife Conservation Commission, Sea to Shore Alliance and others to conserve North Atlantic right whales in the Southeastern U.S. Management actions focus on reducing human-related mortality, monitoring the whale population and protecting right whale habitat. From December through March, aerial surveys are flown along the Georgia and northeast Florida coast to document calf production, collect photo-identification data and warn ships about whale locations. At the same time, boat surveys are conducted to collect photo-identification data and genetics samples and to document injured and entangled right whales.

During the 2015-2016 calving season, survey teams documented 34 individual right whales, including 14 calves. Annual calf counts have averaged 14 calves per year over the past five years, compared to 23 calves per year during the previous 10-year period. It remains to be seen whether this dip in calving will negatively affect population growth trends. No entangled or dead right whales were documented during the 2015-2016 season.

In January 2016, the Nongame Conservation Section completed the second year of a four-year project to develop and deploy minimally invasive, implantable satellite tags on North Atlantic right whales. The work is being led by researchers at the Alaska SeaLife Center and University of Alaska Fairbanks, with help from DNR, Florida Fish and Wildlife, Sea to Shore Alliance and the NOAA Southeast Fisheries Science Center. Seven tags have been deployed. The longest deployment lasted 50 days and tracked one juvenile whale's migration more than 1,000 miles from Florida to Massachusetts.

Nongame Conservation also works to protect right whales and their habitat through involvement in the Right Whale Southeast Implementation Team, the Atlantic Large Whale Take Reduction Team and the North Atlantic Right Whale Consortium. The agency receives considerable support from DNR's Coastal Resources and Law Enforcement divisions in education and outreach, policy efforts, and enforcement of federal right whale protections. (Also see: Law Enforcement for Nongame.) Most funding for DNR right whale conservation efforts is provided through NOAA Fisheries grants. The Environmental Resources Network (TERN), the friends group of Nongame Conservation, is helping fund part of the satellite tagging project.

North Atlantic right whale and calf (Sea to Shore Alliance, NOAA permit 15488)

Mammals

Georgia Marine Mammal Stranding Network

The Georgia Marine Mammal Stranding Network was created in 1989 to coordinate marine mammal stranding response in the state. The Nongame Conservation Section coordinates the Georgia Marine Mammal Stranding Network with funding from NOAA Fisheries and help from other agencies and private organizations.

Network goals include investigating human impacts on marine mammals, monitoring population health, providing rapid and humane response to live stranded marine mammals, contributing to marine mammal research, and educating the public about marine mammal conservation.

From 2000 to 2015, the network documented an average of 33 stranded dolphins and whales a year. Bottlenose dolphins were the most commonly stranded species, making up 78 percent of strandings, followed by pygmy and dwarf sperm whales (13 percent combined). Other species that have stranded include Atlantic spotted dolphins, rough-toothed dolphins, Atlantic white-sided dolphins, Risso's dolphins, pygmy killer whales, false killer whales, short-finned pilot whales, humpback whales, North Atlantic right whales and beaked whales.

The network documented 40 strandings in calendar year 2015 – 34 bottlenose dolphins, two pygmy sperm whales, one short-finned pilot whale, one Atlantic spotted dolphin and one dolphin of undetermined species. Five human-related bottlenose dolphin strandings were documented: Two live dolphins were disentangled from commercial blue crab pots, two dolphin carcasses showed evidence of rope entanglements and one dolphin died apparently from a boat strike.

Florida Manatees

Endangered Florida manatees inhabit tidal rivers, estuaries and near-shore ocean waters throughout coastal Georgia during the warm months of the year. The Florida manatee population numbers at least 6,000, with approximately half of the population found along Florida's Gulf Coast and the remainder along the Atlantic Coast and the St. Johns River. Each spring and summer an unknown number migrate into Georgia, returning to Florida in fall as water temperatures cool.

***Tagged manatee TGA016 feeding with other manatees** (DNR, USFWS permit MA37808A-0)*

The Nongame Conservation Section cooperates with the U.S. Fish and Wildlife Service, the U.S. Navy and the Florida Fish and Wildlife Conservation Commission to conserve manatees in Georgia. Management focuses on reducing human-related mortality and protecting habitat. Recovery tasks include documenting causes of mortality and injury, rescuing injured and out-of-habitat manatees, monitoring distribution and habitat use, educating boaters about watercraft impacts, and reviewing permits and policies that may impact manatees and their habitat.

Sixty manatee mortalities were documented in Georgia waters from 2000 to 2014. Of those, 28 percent were due to watercraft collisions and 20 percent were from cold stress. Less common causes of mortality included drowning in shrimp nets, gunshot and entrapment. Five manatee carcasses were found in Georgia during calendar year 2015. Three died from cold stress. The cause of death for the other two could not be determined.

Nongame Conservation began a multiyear manatee satellite-tagging project in 2015 in cooperation with the Navy, Sea to Shore Alliance, Georgia Aquarium and others. The primary objective is studying fine-scale movement of manatees around Naval Submarine Base Kings Bay to assess watercraft collision risks. Other objectives include assessing migratory behavior and identifying travel corridors.

Five manatees were captured at Cumberland Island in June 2015 and fitted with high-accuracy, GPS-linked satellite transmitters. The manatees ranged as far as Sapelo Island to the north and Cape Canaveral, Florida, to the south. One manatee was still tagged as of Jan. 1, 2016. The other four manatees were tracked for an average of 88 days, with the days each was tracked varying from 57 to 132.

Another five manatees were caught, fitted with transmitters and released in May 2016.

Small Mammal Conservation

A grant for bat and small mammal conservation originally secured by the Nongame Conservation Section in 2012 continued to support work on these species in Georgia.

The DNR, the Georgia Department of Transportation and the University of Georgia started a cooperative project in fiscal year 2014 designed to learn more about the range of cave-dwelling bats in Georgia, with a focus on Indiana and northern long-eared bats. Since the Department of Transportation, or DOT, is required under the Endangered Species Act to ensure projects do not jeopardize the existence of bat species such as Indiana and northern long-eared bats, determining the accurate range and habitat specifics of myotis bats can assist DOT with project predictability, balancing federal funding by congressional district and possibly lowering project planning and construction costs.

In 2016, a UGA graduate student and technicians continued capturing and tracking the target species across the potential range as defined by the U.S. Fish and Wildlife Service. Simultaneously, Nongame Conservation biologists and DOT contractors completed project-based surveys in the same area. During the first two years of this

***Swabbing a bat for testing** (Katrina Morris/DNR)*

project, 14 northern long-eared bats were captured and tracked to roost trees in north Georgia. Results from plots around these roost trees and landscape-level analysis are expected to yield information about roost-site preferences that can better define potential habitat. If sufficient netting efforts and call analysis across an area do not yield targeted species, those areas might be removed from range maps the Fish and Wildlife Service maintains, reducing DOT's burden to do bat surveys for projects in those areas.

Nongame Conservation, the Fish and Wildlife Service and DOT staff also continued surveying for bats at bridges in fiscal 2016. Nongame Conservation refined a survey form and secured funding to develop a mobile version. The surveys of occupied bridges, continued through the winter, revealed a surprising number of bridges with bats year-round. DOT is working with DNR and the Fish and Wildlife Service to protect these populations during bridge maintenance, repairs and replacement projects.

Nongame Conservation biologists continued a project with UGA to inventory bats at several National Park Service sites in 2016. Biologists and technicians searched for roosts, set mist nets and conducted stationary Anabat surveys at Ocmulgee National Monument in Macon, Chattahoochee River National Recreation Area in metro Atlanta and Kennesaw Mountain National Battlefield near Kennesaw. The survey crews also established North American bat sampling grids at Ocmulgee National Monument in Macon and Cumberland Island National Seashore.

Nongame Conservation biologists remain active in the Georgia Bat Working Group and helped plan and hold the third annual Georgia Bat Blitz. For the event at Cloudland Canyon State Park near Trenton, teams spent three nights netting in and around the park, on the Chattahoochee National Forest and at Crockford-Pigeon Mountain Wildlife Management Area. More than 50 people attended the blitz. DNR staff led a public bat program at the park. Blitz participants caught more than 130 bats of seven species, providing key data in an area where few summer surveys had been done.

The statewide Anabat survey continued in 2016. The project used volunteers to drive more than 30 transects across the state, collecting bat calls. Most routes were completed once or twice. In 2016, Nongame Conservation also began taking part in the North American Bat Monitoring Project, which includes stationary and mobile acoustic sampling in pre-selected grid cells across the continent. Biologists in Georgia have selected sites and will add to them over the next several years.

Researchers used software and visual identification to analyze Anabat survey calls collected through 2013. Through such analysis, biologists are able to determine most bat species and numbers per route. The routes will be run over multiple years to build a long-term set of call data for determining bat population trends across the state. An interactive map of identified bat calls was completed for 2014 and 2015 and posted online.

A citizen-scientist program launched in 2014 to monitor summer bat maternity roosts in the state also was continued. This outreach encourages the public to count bats at bat houses, barns and other roosts twice each summer. The effort mirrors programs in Pennsylvania and Wisconsin and allows the public to help with long-term monitoring of wildlife populations.

A federal grant initiated in 2015 helped fund white-nose syndrome work in Georgia. As of winter 2016, Nongame Conservation had confirmed white-nose syndrome, or WNS, in 11 Georgia counties. Biologists also documented a 92 percent decline in populations at known hibernacula in north Georgia. In the Northeastern U.S., caves infected with white-nose syndrome have suffered mortality rates as high as 95-99 percent after a few years of infection. After several years of post-WNS surveys, it appears that sites in Georgia are following those trends.

According to Fish and Wildlife Service estimates, this devastating disease has killed more than 5.7 million bats and been documented in 29 states and five Canadian provinces as of the close of fiscal 2016. Nongame Conservation will continue to monitor sites in winter to document the disease's spread and related mortality. Biologists also are working with the public and the caving community to promote awareness of white-nose and support for bat conservation.

Biologists and seasonal staff began working on a spotted skunk camera-trapping project in fiscal 2016. University of Georgia and Clemson University staff met with DNR biologists to plan surveys in northeast Georgia. Skunks had been reported in that region and in nearby areas of South Carolina. Surveys revealed a number of new sites with skunk activity. This early work will help biologists determine where to focus efforts to learn more about this secretive and possibly rare high-priority species in Georgia.

Nongame Conservation staff also attended a Southeastern pocket gopher workshop at the Joseph W. Jones Ecological Research Center at Ichauway, in southwestern Georgia. The workshop, attended by researchers involved in a gopher project in Georgia, Florida and Alabama, focused on providing a forum to share information about trapping techniques and research plans. It also allowed students to connect with DNR staff and gather information about the species' status in the state. Nongame Conservation will continue to help provide technical assistance on the project, as well as field assistance when needed.

Freshwater Aquatic Species

Aquatic Conservation Initiative

Georgia is one of the richest states in aquatic biodiversity, ranking among the top five in the number of native species of mussels (127 species), fishes (265) and crayfishes (70). Unfortunately, Georgia also ranks among the top states in imperiled aquatic species. A recent assessment recognized 152 imperiled aquatic species in Georgia, more than half of which have a significant portion of their global range within the state's boundaries. Approximately 22 percent of Georgia's freshwater fishes, 28 percent of mollusks and 36 percent of crayfishes are ranked as imperiled or critically imperiled in the state. Yet even these numbers understate the problem because they don't include an additional 48 species, most of them mollusks, considered historic or extirpated from Georgia.

The Nongame Conservation Section launched the Aquatic Conservation Initiative in 1998 to determine the status of Georgia's aquatic fauna and develop conservation plans for declining species. This effort is aimed primarily at identifying important populations of rare aquatic species through surveys and research, incorporating species location and status information into the DNR database, and assisting with conservation planning for rare aquatic species.

Nongame Conservation conducts hundreds of surveys around the state each year, documenting or monitoring important populations of high-priority aquatic species. In fiscal 2016, survey and monitoring efforts focused on sicklefin redhorse, blackbanded sunfish and mussel communities in the lower Flint and Coosa river systems.

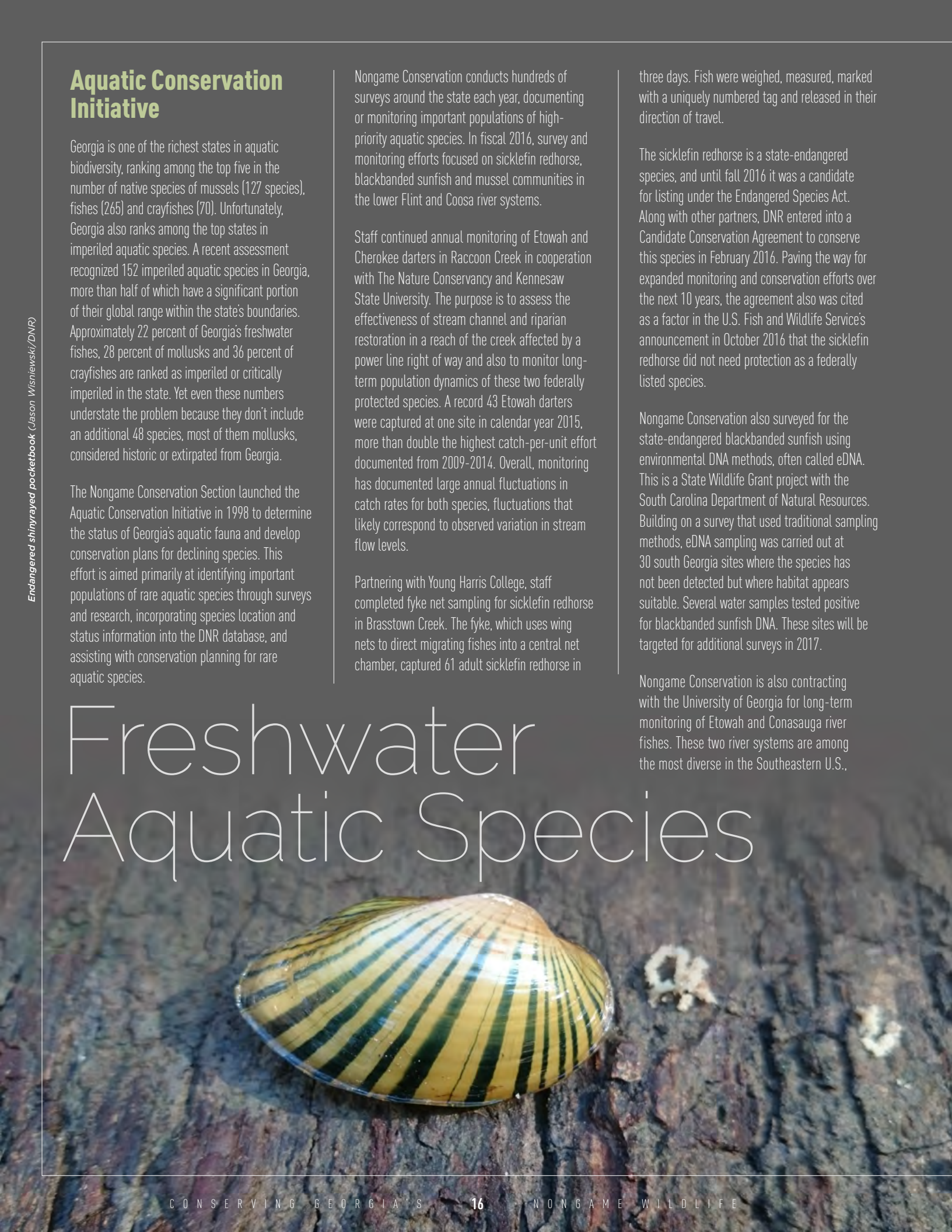
Staff continued annual monitoring of Etowah and Cherokee darters in Raccoon Creek in cooperation with The Nature Conservancy and Kennesaw State University. The purpose is to assess the effectiveness of stream channel and riparian restoration in a reach of the creek affected by a power line right of way and also to monitor long-term population dynamics of these two federally protected species. A record 43 Etowah darters were captured at one site in calendar year 2015, more than double the highest catch-per-unit effort documented from 2009-2014. Overall, monitoring has documented large annual fluctuations in catch rates for both species, fluctuations that likely correspond to observed variation in stream flow levels.

Partnering with Young Harris College, staff completed fyke net sampling for sicklefin redhorse in Brasstown Creek. The fyke, which uses wing nets to direct migrating fishes into a central net chamber, captured 61 adult sicklefin redhorse in three days. Fish were weighed, measured, marked with a uniquely numbered tag and released in their direction of travel.

The sicklefin redhorse is a state-endangered species, and until fall 2016 it was a candidate for listing under the Endangered Species Act. Along with other partners, DNR entered into a Candidate Conservation Agreement to conserve this species in February 2016. Paving the way for expanded monitoring and conservation efforts over the next 10 years, the agreement also was cited as a factor in the U.S. Fish and Wildlife Service's announcement in October 2016 that the sicklefin redhorse did not need protection as a federally listed species.

Nongame Conservation also surveyed for the state-endangered blackbanded sunfish using environmental DNA methods, often called eDNA. This is a State Wildlife Grant project with the South Carolina Department of Natural Resources. Building on a survey that used traditional sampling methods, eDNA sampling was carried out at 30 south Georgia sites where the species has not been detected but where habitat appears suitable. Several water samples tested positive for blackbanded sunfish DNA. These sites will be targeted for additional surveys in 2017.

Nongame Conservation is also contracting with the University of Georgia for long-term monitoring of Etowah and Conasauga river fishes. These two river systems are among the most diverse in the Southeastern U.S.,



***Endangered shinyrayed pocketbook** (Jason Wisniewski/DNR)*

***Sicklefin redhorse** (DNR)*

supporting important populations of rare fishes such as blue shiner, frecklebelly madtom, Etowah darter and Conasauga logperch. Monitoring has been ongoing since 1998. Information from these studies has been invaluable for conservation planning, species status assessments and documenting relationships between fish populations and environmental stressors. One objective is using eDNA technology to survey for the frecklebelly madtom in areas it has not been detected using traditional methods in more than a decade.

Mussel sampling continued in lower Flint River tributaries in fiscal 2016, marking the ninth year of monitoring these populations. Summer stream flows from 2013-2016 have provided the additional variability needed for assessing the impacts of low stream flows on freshwater mussel populations in these creeks.

Staff also initiated a comprehensive survey of the upper Coosa River basin in Georgia, something not done since 1999. The upper Coosa basin historically harbored more than 40 freshwater mussel species, including several protected under the Endangered Species Act. The goal of this project is to quantitatively assess the distribution of mussels in the basin. Sampling in 2015 focused on tributaries, but efforts in fiscal 2016 centered on main-stem rivers, such as the Conasauga and Etowah.

Sampling is expected to conclude by fall 2016, with distributional modeling following the sampling. Nongame Conservation staff presented research results at regional and national symposia and published study results in several peer-reviewed journals. Staff contributed, as well, to multistate and national efforts to assess the taxonomy, status and distribution of aquatic species in North America.

Data from survey and monitoring efforts, including data submitted through the agency's scientific collecting permit program, are entered into the NatureServe Biotics database. Partnerships also are maintained with the Georgia Museum of Natural History and the Stream Survey Team of DNR Wildlife Resources Division's Fisheries Section. These partnerships boost the amount of data available for environmental review and conservation planning. In 2016, staff used these data, along with data contributed from other Southeastern states, to develop rangewide conservation status assessment maps for imperiled minnows and suckers.

***Mountain madtom** (Brett Albanese/DNR)*

Robust Redhorse

The robust redhorse is a rare sucker with wild populations occurring in limited reaches of the Oconee and Savannah rivers in Georgia and the Pee Dee River in North and South Carolina. The fish is state listed as endangered in Georgia. Prior to its collection and identification in 1991 by DNR Wildlife Resources Division fisheries biologists, this species had not been observed in more than 100 years. A team of state, federal and industry biologists organized under the Robust Redhorse Conservation Committee has done intensive work since the early 1990s to recover the species in Georgia and the Carolinas.

A significant part of this effort has been capturing and spawning wild fish from the Oconee and Savannah rivers and producing young in hatcheries to restore stocks in rivers within the former range. In partnership with the U.S. Fish and Wildlife Service, Georgia Power and the University of Georgia, the Wildlife Resources Division helped develop a hatchery program in 1993. A Candidate Conservation Agreement with Assurances, the first of its kind for an aquatic species, was developed by DNR, the Fish and Wildlife Service and Georgia Power to help reintroduce robust redhorse into the Ocmulgee River in Georgia.

From 1993-2008, about 115,700 hatchery-reared robust redhorse were stocked in the Broad, Ocmulgee, Oconee and Ogeechee rivers in Georgia. Regionally, South Carolina stocked 71,934 fingerlings in the Broad and Wateree rivers before that state's hatchery program ended in 2013. North Carolina began a project to augment its Pee Dee River population in calendar year 2014.

Biologists documented growth and survival rates in all stocked rivers in Georgia and South Carolina. They also observed spawning behavior in fish stocked in the Broad, Ocmulgee and Ogeechee rivers. Researchers are trying to document survival of wild-spawned fish in stocked populations and their recruitment into juvenile and adult populations. Establishment of self-sustaining populations will represent a significant step toward recovery. Other recovery activities included evaluations of recruitment success and a major gravel augmentation project on the Oconee, as well as telemetry studies on the Ogeechee, Ocmulgee, Broad, Savannah and Pee Dee rivers and a population-dynamics study on the Ocmulgee.

Recent projects included the following:

An intensive electrofishing survey of the Oconee River from Sinclair Dam to Dublin – designed to assess the status of the Oconee population – was completed. Staff spent 65 hours electrofishing during April-May 2014, collecting two adult robust redhorse and spotting a third adult. As anticipated, this effort provided substantial evidence that the Oconee River population has experienced a major decline since the 1990s. Causes appear to be the long-term effects of a combination of reduced spawning habitat, unsuitable spawning and rearing flows, increased sedimentation, and the introduction of flathead catfish. A new fish community survey was proposed for this reach of the Oconee River in 2015, but low flows precluded sampling. The survey will be reattempted. The goal: Assess changes in the fish community since the early 1990s, when similar sampling was conducted. Because robust redhorse are so rare in this reach, changes in the abundance of other species groups (e.g., other sucker species) may help indicate why robust redhorse have declined.

Staff conducted electrofishing surveys of the Ogeechee River population as part of DNR's standardized sampling program. These surveys documented only three adult robust redhorse in 2014 and none in 2015. The only known spawning site on the Ogeechee was surveyed during 2015 and 2016, but high flows precluded visual observations during the spawning season. Robust redhorse have not been observed spawning in the Ogeechee since 2012, raising significant concerns about the long-term viability of this stocked population.

Remnant populations were searched for above Sinclair Dam (Little River and the Wallace Dam tailrace) and Wallace Dam (the Apalachee and Oconee rivers). A single adult robust redhorse was collected from the lower portion of Little River above Lake Sinclair in 2012, the product of an accidental escape of fingerlings from the Walton Hatchery in 1995. Potential spawning shoals were surveyed in Little River during 2013-2014, but no robust redhorse were observed. Additional surveys are needed in the Little and Apalachee rivers.

While adult robust redhorse are known to have survived and found spawning habitat in the Ocmulgee, Ogeechee and Broad rivers, additional monitoring is needed to ensure recruitment. In cooperation with partners, Nongame Conservation helped develop a visual monitoring protocol that estimates the number and size distribution of adult fish observed at spawning sites each year. If sufficient recruitment is occurring, the number of small fish and the total number of fish observed at spawning sites should remain stable or increase from year to year. This protocol was implemented on the Ocmulgee and Savannah rivers in 2015, documenting about 14 and 100 adult fish, respectively.

Unfortunately, a flood in winter 2015 deposited large amounts of sand over the Ocmulgee's only known spawning site. As a consequence, researchers were not able to document any spawning activity in the Ocmulgee during 2015. Fewer than 10 fish were documented at a Savannah River spawning site, but stream flow levels prevented staff from carrying out an adequate number of sampling events.

Juvenile robust redhorse have proved almost impossible to detect since the onset of sampling by the Robust Redhorse Conservation Committee and its partners. Three juvenile robust redhorse were documented in the lower Savannah River's intertidal zone from 2012-2014, more than 130 miles downstream from the nearest known spawning site. DNR's Stream Survey Team collected the first juvenile from the lower Ocmulgee near Hawkinsville in 2014, an occurrence consistent with long-distance dispersal from an upstream spawning site. While low detection of juveniles probably precludes their use for recruitment monitoring, these captures are helping researchers better understand the life history and habitat needs of robust redhorse.

Georgia and South and North Carolina were awarded a competitive State Wildlife Grant in 2016 for a three-year project to identify and implement the most critical management actions needed to insure survival of robust redhorse across the species range. Funds will be used to increase capacity for robust redhorse conservation within DNR and to support contracts for research and monitoring. Partners include Georgia Power, Georgia Southern University, the Georgia Cooperative Fish and Wildlife Research Unit at the University of Georgia and the Fish and Wildlife Service.

Large-flowered skullcap (Nate Thomas/DNR)

Plants and Natural Habitats

Sandhills Conservation

Two competitive State Wildlife Grants in Georgia and other states have benefited sandhill and upland longleaf pine habitats that support gopher tortoises. A third grant, awarded in calendar year 2015, continued that progress.

DNR received the first grant, for $1 million, in 2009 to work with Alabama, Florida and South Carolina on restoring high-priority sandhills. DNR and state wildlife agencies in Florida, Alabama, Mississippi and Louisiana were awarded a $981,000 State Wildlife Grant in 2011 for additional habitat restoration on the targeted habitats, referred to as phase two of the original project. In fall 2015, Georgia, Florida, Alabama, South Carolina, Mississippi and Louisiana began phase three, powered by a competitive $500,000 grant awarded earlier that year.

In phase one, completed at the end of fiscal 2013, all states exceeded their project goals and nearly tripled the original goal for overall acreage treated (95,000 acres treated vs. the 38,600 acres proposed). In phase two, completed in fiscal 2015, restoration goals were exceeded again, with 76,666 acres treated versus an original goal of 51,575. This work is expected to yield significant habitat benefits – largely through improvements in herbaceous understory coverage – for priority species throughout the sandhills, such as the gopher tortoise and northern bobwhite.

Goals for phase three, a two-year part of the project, include restoring or enhancing more than 33,000 acres of sandhill or upland longleaf habitat across the six states in the gopher tortoise's range.

Partner states are using standardized methods for long-term monitoring to gauge the success of habitat treatments. Changes in vegetation and breeding bird communities were picked as key indicators of progress toward restoration objectives. In general, progress toward habitat goals has been excellent across the states. In several cases, however, fire-return intervals of greater than three years have failed to control shrubby hardwood midstories to the extent desired. Some data analysis on the response of breeding-bird communities to restoration continues, with publication of results expected in fiscal 2017.

Rare Plant Surveys on Public and Private Lands

Surveys are conducted throughout Georgia to identify and inventory locations of rare plants and provide guidance on appropriate management activities. This work is done with consultants, private landowners, photographers and members of botanical organizations.

***Growing-season prescribed fire at Silver Lake WMA** (Joe Burnam/DNR)*

Also, the Nongame Conservation Section's participation in the Georgia Plant Conservation Alliance allows for the exchange of information on significant discoveries and other plant conservation activities.

During fiscal 2016, numerous rare plant discoveries were made on private and public lands. Here's an overview of significant finds and other important plant conservation activities, excluding those noted in the Coastal Habitat and Rare Plant section that follows.

Orchids are always high-priority plants, since most rare ones are in need of regular monitoring. Most of these conservation projects are coordinated with Atlanta Botanical Garden. Efforts to enhance and monitor monkeyface orchid, also called white fringeless orchid, continued during the most recent fiscal year. This showy orchid is found in peat bogs scattered across the Piedmont, including in the foothills along the Tallulah River in Rabun County. Atlanta Botanical Garden assisted in the restoration of three sites and, working with state parks staff, established a safeguarding site at Chattahoochee Bend State Park near Newnan. Work to manage and safeguard all remaining populations was started in fiscal 2015. In September 2015, the U.S. Fish and Wildlife Service proposed listing monkeyface orchid as threatened under the Endangered Species Act. (The plant was listed in October 2016.)

The Kentucky ladyslipper, found naturally in Laurens County and safeguarded on Beaverdam Wildlife Management Area near Dublin, remains a high-priority species. In 2016, an additional population was found during a project initiated to survey hardwood ravines in central Georgia near and below the Fall Line. Other rarities found during the fiscal year included yellow milkvine and relict trillium in the Oconee River watershed and Ocmulgee skullcap in the Flint River watershed.

Surveys continued for Georgia aster under provisions of a Candidate Conservation Agreement signed in 2014. At least 15 days' worth of surveys were conducted by Nongame Conservation staff working with consultants and volunteers, the Georgia Department of Transportation, the Fish and Wildlife Service, the U.S. Forest Service and the National Park Service. Significant new populations of Georgia aster were found in west-central Georgia and in Bartow County along power lines.

Coordination with partners and private landowners is critical for plant conservation. For example, in calendar 2015 a privately owned wetland with federally endangered Canby's dropwort was permanently protected by the National Resource Conservation Service's Wetland Reserve Program. In all, three Canby's dropwort sites have been protected using this program since 2010. As part

***DNR and Fish and Wildlife Service survey Georgia aster** (Mincy Moffett/DNR)*

of the U.S. Agricultural Department, the Natural Resources Conservation Service funds restoration activities at the sites. Nongame Conservation botanists coordinate the projects with landowners. Protection for Canby's dropwort also protects critically rare cypress-savanna isolated wetlands. Other advances for Canby's dropwort in fiscal 2016 included the re-discovery of a population not seen since 1994 and seed collection across the species' range in Georgia for germination research.

Coastal Plain pitcherplant bogs remain a special conservation concern. New populations of wiregrass dropseed, Tracy's dewthread, hooded pitcherplant and yellow flytrap were documented on a private tract in Brooks County. Well-managed pitcherplant bogs and nearby intact wiregrass uplands are especially rich in species of milkweed. In collaboration with the Georgia Plant Conservation Alliance, staff assisted collecting the seed of several milkweeds. Making propagated milkweeds available will promote the use of native plants for pollinator gardens and as host plants for numerous insects, including monarch butterflies.

Botanists in Georgia also continued to discover and describe plants new to science. A spurge named Euphorbia georgiana was recently described by Kansas State University researchers as a new Georgia endemic of granite outcrops. The plant is known from two collections made more than 20 years ago from sites near active quarries. Nongame Conservation will conduct field surveys of likely habitats in hopes of relocating and safeguarding live specimens. Also, staff contributed to research naming the Georgia dwarf trillium (Trillium georgianum) as new to science. This showy wildflower is known from one small watershed along a tributary to the Conasauga River in north Georgia.

Other botanical highlights in fiscal 2016 included the discovery of a large colony of bay star-vine, or climbing magnolia, on a county park in Gwinnett County; snowy orchid and wild Stokes aster on private bogs near Claxton; Vasey's trillium near the Fall Line in Crawford County; and new colonies of bottomland skullcap and purple milkweed in the Conasauga watershed in Murray County. The recent revision of Georgia's State Wildlife Action Plan noted 21 plants in most critical need of conservation action. Progress was made safeguarding many of these, including Carolina windflower found in the upland seepage-swamp margins of Monticello Glades, Georgia leadbush from streamside terraces along Sugar Creek in Telfair County, tawny cottongrass in a bog on Fall Line Sandhills Wildlife Management Area and cutleaf meadow-parsnip found in limestone glades near Chickamauga battlefield in Chickamauga and Chattanooga National Military Park near Fort Oglethorpe. These latter four Georgia rarities occur only in one or two sites and involve management on private and public lands.

Coastal Habitat and Rare Plant Conservation

The Nongame Conservation Section's focus on plant and habitat conservation and restoration along the Georgia coast ranged far and wide in fiscal 2016. Staff led coastal land protection efforts, including applying for acquisition grants through the North American Waterfowl Conservation Act and National Coastal Wetland Conservation Grant programs. These two U.S. Fish and Wildlife Service grant programs have been critical in conserving fish and wildlife habitats on Georgia's coast in recent years.

Spearheaded by Nongame Conservation work, in fiscal 2016 a Waterfowl Conservation Act grant for acquiring Sansavilla Wildlife Management Area phase 1 near Brunswick was awarded, as well as Coastal Wetland Conservation grants to help acquire Sansavilla phase 2, Musgrove Plantation phase 2 on St. Simons Island and the 792-acre Altamaha "Connector" or BBT Tract in the lower Altamaha River watershed. Each of the grants is worth $1 million and matched with funds from the state and other partners.

Staff also completed a map of longleaf pine restoration areas on Townsend Wildlife Management Area near Ludowici. Spatial pine harvest and planting data were used to map areas where offsite pine species such as invasive sand pine were harvested and longleaf planted in the last six years. These maps will be used for restoration and management planning at Townsend.

Nongame Conservation worked with Weyerhaeuser biologists and foresters to help protect rare forest communities on Weyerhaeuser properties as part of Weyerhaeuser's Sustainable Forestry Initiative certification. During fiscal 2016, the company was in the process of taking

Carolina bishopweed with fruit *(April Punsalan/USFWS)*

over former Plum Creek lands in a merger with the latter company. Nongame Conservation helped by familiarizing Weyerhaeuser staff with the rare habitats that occur on company lands in southeast Georgia.

A draft management plan was completed for Altama Plantation Wildlife Management Area, 4,123 acres in Glynn County that DNR acquired in fiscal 2016. The plan includes restoration and management strategies, as well as goals for improving habitat and conserving rare species. Altama has a significant number of gopher tortoises, and this keystone species is a major component of the plan.

Staff worked with Weyerhaeuser, Rayonier, the U.S. Fish and Wildlife Service, The Nature Conservancy and other partners to conserve federally endangered hairy rattleweed. This rare legume is found worldwide only in two counties in southeast Georgia. DNR held an annual meeting for hairy rattleweed conservation at the DNR Coastal Regional Headquarters in Brunswick and helped organize a field meeting with timber companies and the Fish and Wildlife Service. In fiscal 2017, staff will focus efforts on a rangewide survey and assessment of the species, along with landowner contacts and protection of populations.

Nongame Conservation staff rediscovered Georgia's only known population of Carolina bishopweed. The federally petitioned species, not seen in Georgia since 1966, was found in a tidal freshwater marsh near Savannah National Wildlife Refuge. Botanists are working with the Fish and Wildlife Service, the state Department of Transportation and the Georgia Plant Conservation Alliance to help conserve this species in Georgia.

Staff also conducted surveys for rare plant species in southeast Georgia. New populations of night-flowering wild petunia, snowy orchid and sandhills lily were documented. A population of Florida scrub sunrose, a plant with only one known population in Georgia, was safeguarded. Seeds were collected from the Florida scrub sunrose, also called frostweed, as well as other rare species, including hairy rattleweed, night-flowering wild petunia and Carolina bishopweed. Partner botanical gardens will try to grow these plants for restoration purposes.

Vegetation Monitoring

Because of its importance in conducting sound conservation and management, monitoring is essential to implementing Georgia's State Wildlife Action Plan. To meet plan goals, the Nongame Conservation Section has incorporated habitat and vegetation monitoring. Monitoring is key to tracking changes in wildlife habitat and measuring biological diversity and habitat suitability for rare wildlife species. Quantifying the changes resulting from the agency's rare-species and habitat-restoration efforts will help gauge the success or failure of conservation actions.

Nongame Conservation habitat monitoring in fiscal 2016 included a statewide fire monitoring program, sea-level rise monitoring in coastal marsh habitats and monitoring that emphasizes, in part, gopher tortoise habitat at the new Altama Plantation Wildlife Management Area near Brunswick.

The fire effects monitoring program addresses the need for a simple, broadly applied protocol. This program has been implemented at 25 state parks and wildlife management areas. Local staffers collect data and submit it online to a centralized repository of photos. Then the photos are organized into a chronological demonstration of fire effects for each site. The program not only helps track habitat changes, it engages staff in a collaborative effort focused on understanding prescribed fire at sites. The photos also can be used to inform the public about the importance of fire ecology.

Nongame Conservation continued a collaborative project with DNR Coastal Resources Division to monitor salt-marsh transects. Started in 2012, the project is designed to examine long-term change in Georgia salt-marsh communities and determine the effects of sea-level rise on coastal habitats. In 2016, staff monitored vegetation plots along transects at nine study sites. Transects start at an upland anchor point and continue into the salt marsh until reaching marsh dominated by Spartina alterniflora, or smooth cordgrass.

Staff also began a vegetation monitoring project in fire-maintained uplands at Altama Plantation. This project is aimed at determining the effects of different types of management on longleaf pine restoration sites at the WMA. Restoration will include conducting prescribed fire, thinning trees and planting longleaf pine. Monitoring will help determine if management is improving habitat for gopher tortoises and other priority species.

Mountain and Coastal Plain Bogs

Mountain bogs are one of the most critically endangered habitats of the Southern Appalachians. The bogs are typically small, from a half-acre to 5 acres, and usually associated with seeps, springs and small creeks. These early successional habitats support a variety of unique and imperiled flora and fauna, including the federally threatened bog turtle and swamp pink, possibly the state's rarest reptile and plant species, respectively. Other

Mountain bog work day *(Rebecca Byrd/DNR)*

rare and state-protected mountain bog plants include the montane purple pitcherplant (which is petitioned for federal listing), broadleaf white meadowsweet, Carolina bog laurel, Canada burnet, Cuthbert's turtlehead and marsh bellflower.

For 24 years, the Nongame Conservation Section has worked to restore mountain bogs independently and as a member of the Georgia Plant Conservation Alliance, or GPCA. In fiscal 2016, these efforts were best described as "more work by more people in more places." The GPCA had a record number of mountain bog workdays and record levels of participation – 20 workdays devoted to mountain bogs with more than 200 volunteers assisting. The GPCA also added a mountain bog, called Brasstown Seeps, to its list of sites in need of restoration and management, a list now up to 11 mountain bogs. Brasstown Seeps has a number of rare plant species, including Darlington's glade spurge, large-leaved grass-of-parnassus, Loesel's twayblade orchid and roundleaf sundews, plus the federally listed bog turtle.

During the past year, the state-rare broadleaf white meadowsweet was outplanted at two additional bogs. Marsh bellflower was outplanted at Hale Ridge Bog, the first time this has been done anywhere with the species. Chattahoochee Nature Center and Atlanta Botanical Garden are safeguarding both species ex-situ.

Purple mountain pitcherplant and swamp pink continue to recruit well at outplanting sites. Pitcherplant seedlings were observed at Cooper Creek Bog for the first time. Carolina bog laurel plants outplanted at Tom's Swamp finally have begun to bolt (growing quickly before stopping to flower and seed).

Nongame Conservation continued its participation in the Bog Learning Network. This association of state and federal agencies, nongovernmental organizations, academicians, private consultants, and land managers is advancing the stewardship and management of Southern Appalachian bogs by providing a forum for sharing information and resources. Nongame Conservation botanist Dr. Mincy Moffett and wildlife biologist Thomas Floyd serve on the network's steering committee. In the recent fiscal year, the Bog Learning Network began an Invasive Species Fun Field Day Series. In this work-and-learn series for professionals, volunteers and students involved in the network, participants learned about mountain bog botany, ecology and bog impacts from invasive plant species. The volunteers then provided several hours of labor in tough, mucky conditions. The series has been held at McClure's and Pineola bogs in North Carolina and Quarry Bog in Tennessee, and it is coming to Georgia in fiscal 2017.

Bog restoration is not limited to the mountains. Georgia's Coastal Plain herbaceous bogs are small but rare jewels, one of the highest-priority habitats for rare plant conservation. These bogs face threats such as hydrologic disturbance, fire suppression and land development. A number of species of southeastern Coastal Plain pitcherplant and orchid species are safeguarded by GPCA partners, with corresponding habitat restoration projects.

One of the GPCA's most successful Coastal Plain bog restoration projects is taking place near Claxton at a privately owned bog that contains five state protected plants. The Interagency Burn Team has been critical to these efforts, conducting a spectacular growing-season burn at the bog in April 2016. Growing-season fires strongly mimic the effects of natural fires, opening habitat for pitcherplants, native grasses and other wildflowers. The two landowners partnering in these efforts have been thrilled with the results. In addition, monitoring revealed greater than 50 percent survival of pitcherplants outplanted at the bog in calendar year 2015, which is excellent for new plants in untended natural habitats.

Habitat Improvement on State Lands and the Interagency Burn Team

A number of significant restoration projects begun in calendar year 2015 were completed in 2016. Many of these successes involved working with adjoining landowners to improve wildlife habitats on and around the DNR's WMAs.

In a project with the Natural Resources Conservation Service and DNR Private Lands Program biologists, 200 acres of offsite loblolly pine and a sand pine plantation were clear-cut on the Hughes Tract next to Fall Line Sandhills Wildlife Management Area near Butler. After the Nongame Conservation Section burned the site, the Natural Resources Conservation Service paid to plant the tract in longleaf pine, following Nongame Conservation site-prep recommendations to conserve groundcover plants. The additional habitat will prove critical to keeping viable populations of rare species on Fall Line Sandhills, a WMA almost surrounded by solar farms and sand mining.

Also in fiscal 2016, Nongame Conservation planted 50,000 longleaf pines on Camp Thunder, a 2,000-acre Boy Scouts of America property with significant old-growth longleaf. The site is near Sprewell Bluff Wildlife Management Area in Upson County. A National Fish and Wildlife Foundation grant funded the planting. About 500 acres of Camp Thunder and 450 acres of Pasley Shoals, another site near Sprewell Bluff with old-growth longleaf, were burned in 2016 – work that will benefit wildlife on adjoining WMAs.

Including the burns at Camp Thunder and Pasley Shoals, Nongame Conservation's west-central Georgia prescribed fire crew had its most productive year, burning 14,780 acres. Crew members worked two burns that brought fire for the first time in decades to old-growth longleaf, plus a large helicopter burn on Tallulah Gorge in north Georgia and a myriad of fires in the Fall Line sandhills region (more details on prescribed fire below). Among other jobs, the crew also completed work controlling Chinese privet on Sprewell Bluff, girdled encroaching hardwoods at Sprewell Bluff and Fall Line Sandhills WMAs, erected nest boxes for southeastern American kestrels, cleared a bog on Fall Line Sandhills and planted longleaf pine on multiple properties.

At Silver Lake Wildlife Management Area near Bainbridge, work was started with a forestry mulcher to eliminate the extensive hardwood mid-story in several young, planted longleaf stands and numerous old loading decks in mature longleaf pine stands. This work focused on stands that will connect and improve foraging habitat for endangered red-cockaded woodpeckers. About 40 acres mulched in 2015 were burned in spring 2016 as part of the ongoing project.

Nongame Conservation planted 21,000 native grass plugs at Chickasawhatchee Wildlife Management Area near Albany. These plugs, grown in a nursery, were a mixture of species

of native grasses, including little bluestem, wiregrass and common Indian grass. The plugs were placed in recently thinned loblolly pine stands as a seed source that will expand coverage following growing-season burns.

Prescribed fire is one of the most effective tools for conserving and restoring fire-adapted habitats and helping numerous species of conservation concern. While Nongame Conservation uses a variety of land-management techniques on state lands to improve rare species habitats – techniques such as removing invasive species, planting native species and thinning timber – prescribed fire is vital. It is a safe way to apply a natural process, ensure ecosystem health and reduce the risk of wildfire.

Including all DNR Wildlife Resources Division efforts, the acreage burned on DNR-managed lands has almost doubled in the last decade, from 31,897 acres in 2007 to 60,363 acres in 2016. By land type, most of the acres burned are on WMAs. But the growing trend in burning is the inclusion of property managed as natural areas and state parks.

During fiscal 2016, Nongame Conservation staff applied prescribed fire to almost 30,000 acres on state, federal and private lands. As a member of the Interagency Burn Team, the agency worked with the Georgia Forestry Commission, The Longleaf Alliance, The Nature Conservancy, Orianne Society, the U.S. Forest Service and the U.S. Fish and Wildlife Service. Nongame Conservation staff also teamed with other Wildlife Resources Division sections and DNR's State Parks and Historic Sites Division, as well as volunteers trained to federal fire standards.

Since 2009, seasonal fire crews have carried out the bulk of Nongame Conservation's burning. Always on call and working statewide, members have helped increase the acreage burned each year. A single seasonal fire crew burned 7,061 acres in 2009. In fiscal 2016, the agency's two crews combined burned 19,034 acres. For the third year, Nongame Conservation had two seasonal crews, one housed in southeastern Georgia and the other in west-central Georgia (as referenced previously in this section). Nongame Conservation also worked with the Game Management Section's first seasonal fire crew. Housed at Altama Plantation WMA near Brunswick, this coastal crew proved very productive and reintroduced fire to several high-priority conservation lands, including Altama and Sapelo Island.

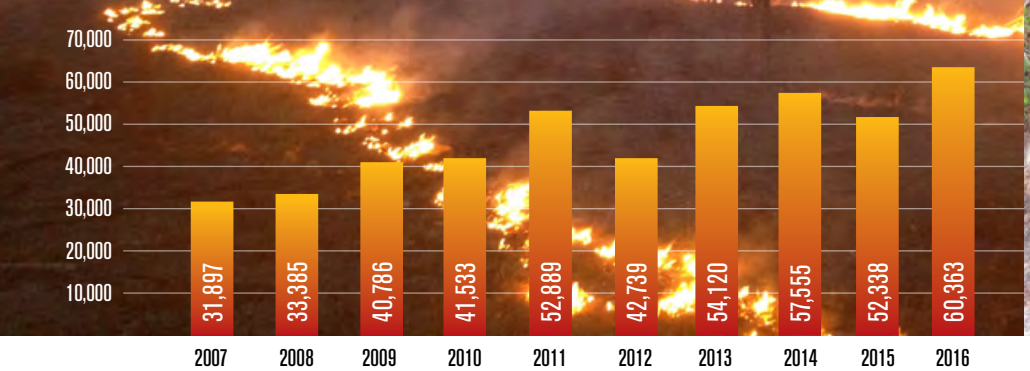
The Nongame Conservation crews work independently – the west-central crew, for example, focused on the Fall Line sandhills region and Pine Mountain – and cooperatively on complex fires. The southeast crew was funded by a National Fish and Wildlife Foundation grant focused on longleaf pine. This group also helped burn rare-species habitats on priority state parks across the Coastal Plain. When not burning, members worked on projects that included marking timber, post-burn monitoring and controlling invasive species.

Nongame Conservation is also heavily involved with State Parks' burn program. This past

DNR-MANAGED ACRES BURNED 2007 - 2016*

Acres treated with prescribed fire on DNR-managed lands has more than doubled in the last decade.

**By calendar year*



DNR's Shan Cammack with shed from eastern indigo snake (DNR)

***Chickasawhatchee WMA grassland restoration** (Phil Spivey/DNR)*

burn season, prescribed fire was conducted at 12 parks and totaled almost 2,000 acres. Staff took advantage of numerous educational opportunities to inform park visitors of the benefits of fire. Park camp hosts provided important support, bringing food and drinks to the fireline, encouraging the crews and patrolling units after the burn.

High-priority conservation sites treated with prescribed fire by Nongame Conservation included state-owned lands such as Altama Plantation, Chickasawhatchee, Doerun Pitcherplant Bog, Fall Line Sandhills, Joe Kurz, Mayhaw, Moody Forest, Ohoopee Dunes, Paulding Forest, Penholloway, Sansavilla, Silver Lake, Sprewell Bluff, Townsend and West Point wildlife management areas, as well as General Coffee, George L. Smith, Hard Labor Creek, Panola Mountain, Reed Bingham and Seminole state parks. Nongame Conservation also helped federal agencies with burns on the Chattahoochee and Oconee national forests and at Piedmont National Wildlife Refuge near Juliette.

A variety of fire-dependent habitats were targeted for restoration, such as aeolian dune sandhills with xeric longleaf pine/turkey oak, Coastal Plain pitcherplant bogs, striped newt pond habitats, Fall Line sandhills, longleaf pine flatwoods, longleaf pine/wiregrass woodlands, oak woodlands and native grasslands. Many high-priority species identified in Georgia's State Wildlife Action Plan benefited from these efforts.

Conservation successes tied to the prescribed fire program include the resurrection of a pitcherplant bog at Reed Bingham State Park near Adel, the return of Bachman's sparrows to Sprewell Bluff and Joe Kurz WMAs (after being gone for decades) and evidence of new red-cockaded woodpecker activity more than a mile and a half from the established population at Moody Forest Wildlife Management Area near Baxley.

Another example is the restoration of ephemeral wetlands and pine savannas at Mayhaw Wildlife Management Area in Miller County. In 2015, reticulated flatwoods salamanders were found at Mayhaw. In March 2016, Nongame Conservation, state Department of Transportation and U.S. Fish and Wildlife Service staff documented almost another 20 reticulated flatwoods larvae. This endangered species had not been recorded at Mayhaw in 12 years. Habitat degradation seemed to have extirpated the salamanders, including from the known breeding pond that produced them more than a decade ago.

Since 2004, however, restoration work has yielded some 500 acres of upland habitat and multiple ephemeral wetlands, including three ponds considered active breeding sites for flatwoods salamanders. While chemical and mechanical techniques have been used, the most critical tool was fire. Changing the timing of prescribed burns to the drier months of the year provided the greatest habitat enhancements. When completed, the Mayhaw restoration total will provide more than 1,000 acres of pine savanna habitat – providing a home to many species of concern, including reticulated flatwoods salamanders.

As sites move from restoration to the maintenance phase, Nongame Conservation has been able to conduct more growing-season burns. These ecological burns have a profound impact on species, restoring the natural balance in fire-adapted ecosystems by reducing hardwood competition and increasing native grasses and forbs. DNR increased its growing-season burns from 151 acres in calendar 2003 to an agency-record 6,501 acres in 2014. Thirty burns totaling nearly 4,400 acres were conducted in the 2016 growing season.

Georgia Plant Conservation Alliance

The Georgia Plant Conservation Alliance, or GPCA, is an innovative network of more than 40 public gardens, government agencies, academic institutions, utility companies and environmental organizations committed to preserving Georgia's endangered flora. Formed in 1995 with the Nongame Conservation Section as a charter member, the GPCA initiates and coordinates efforts to protect natural habitats and endangered species through biodiversity management, public education, and rare plant propagation and outplanting (i.e., safeguarding). Member organizations are engaged in recovery projects for 100 imperiled plant species. Of these, 99 are in safeguarding programs at botanical gardens, arboreta and seed banks, and 49 species have been reintroduced successfully into the wild. GPCA has 11 safeguarding partner institutions that hold and manage ex-situ collections for recovery and study.

GPCA contributions since the alliance's inception amounted to an estimated $1.7 million in direct and indirect support for plant conservation. More than $1.2 million was supplied by non-DNR members supporting high-priority species and habitats identified in Georgia's State Wildlife Action Plan. A significant portion of contributions came from GPCA's trained volunteers, who are called botanical guardians. More than 140 volunteers contributed more than 1,000 hours of conservation work during fiscal 2016.

Member institutions also contributed substantially to the revised State Wildlife Action Plan, especially the Plants Technical Team Report, which identifies high-priority plant species, habitats and conservation actions. Approved by the U.S. Fish and Wildlife Service in September 2016, the revised Wildlife Action Plan will be the guiding strategy for the GPCA for the next decade. All GPCA projects are designed to address high-priority species, habitats and conservation actions identified in the plan.

During 2016, the GPCA continued its mission of encouraging the start of other plant conservation alliances in the U.S. The focus this year: Tennessee and Kentucky. GPCA representatives travelled to both states for presentations and meetings. A plant conservation delegation from Tennessee was invited to Georgia, with the group attending a GPCA project planning meeting and touring partners' safeguarding facilities.

The importance and benefit of establishing GPCA-like organizations across the Southeast to meet the challenges of plant conservation was a focus of the Southeastern Partners in Plant Conservation Symposium, held in November 2016 at Atlanta Botanical Garden. The U.S. Fish and Wildlife Service, principal sponsor of the symposium, is trying to build capacity to address the listing, recovery and proactive conservation needs of a recently expanded list of petitioned and at-risk species.

In September 2016, the Association of Fish & Wildlife Agencies honored GPCA with a special recognition award at the association's annual meeting in Philadelphia. The award celebrated GPCA's "outstanding contributions" to the association and to advancing professional fish and wildlife management in North America.

DNR Commissioner Mark Williams was on hand for the presentation. "GPCA has proven incredibly effective in focusing and increasing efforts to conserve Georgia's rare plant species and their habitats," Williams said. "Not only is this work benefiting our state, other states are considering setting up alliances, meaning plant conservation in those states will reap from what the GPCA has sown in Georgia."

Dr. Wilf Nicholls, director of the State Botanical Garden of Georgia, noted that ensuring "our state is as rich and biodiverse as the one we inherited is a lofty goal." "But in a true spirit of openness and sharing," Nicholls said, "the GPCA has brought together dozens of institutions and agencies all working together toward well-defined conservation goals. It has proven to be a recipe for success for which we can all be proud."

The GPCA expanded its own ranks in 2016 as well, adding two members: Beech Hollow Farms in Oglethorpe County and East Georgia State College in Swainsboro.

The alliance's fall symposium in fiscal 2016 focused on milkweed conservation and production. The Georgia Milkweed Initiative, launched in 2013 under the broader Georgia Native Plant Initiative, was designed to get Georgia milkweeds (multiple ecotypes of the Asclepias species occurring in Georgia) into cultivation. A State Botanical Garden of Georgia project endorsed by the GPCA, this initiative was driven by national and local interest in monarch butterfly and bee conservation, renewed interest in native landscaping, and – later – by federal Farm Bill programs encouraging "pollinator strips." With new federal mandates for producing milkweeds came increasing pressure to collect native seed. The GPCA worked in 2016 to develop Georgia-specific guidelines for milkweed seed collection and outplantings for use in gardening, restoration and monarch conservation by agencies, museums, industry professionals and land managers.

A survey of member institutions first conducted in summer 2015 and updated in 2016 yielded impressive results regarding plant conservation and general conservation, education, outreach and promotional activities. As reported by the alliance's coordinating office, during 2011-2016 member institutions provided a minimum of 303 public and professional presentations; staffed or led 339 classes, programs and field trips; authored or were the subjects of 134 articles in popular literature and scientific journals;

GPCA award from AFWA celebrated with Gov. Deal

developed or made 107 contributions to social media websites and blogs; developed and designed 41 brochures, field guides and posters; and arranged or were the subjects of 44 radio, television and video interviews.

In winter 2016, the Association of Fish & Wildlife Agencies invited DNR and GPCA to present a webinar on "Plant Conservation and State Wildlife Action Plan Implementation." The presentation provided an opportunity to demonstrate the benefit of including plants in State Wildlife Action Plans, as well as providing a case study of GPCA's instrumental role in developing and implementing Georgia's Wildlife Action Plan. Another purpose of the webinar was to encourage other states to work toward including plants in the revision of their plans and to consider building their own plant conservation alliance.

The GPCA is also involved with plant conservation on a continental and global scale. Several member institutions are integral in the American Public Gardens Association, the Botanic Gardens Conservation International, Center for Plant Conservation and national Plant Conservation Alliance. In summer 2016, these organizations signed a memorandum for active collaboration and developed the 2016-2020 North American Botanic Garden Strategy for Plant Conservation. This document recognizes the increased capacity and commitment to plant conservation on the part of botanic gardens, and attempts to leverage those collective resources to halt plant extinction and the loss of wild habitats.

Ginseng Management

Export of American ginseng is regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora, an international agreement administered in this country by the U.S. Fish and Wildlife Service. The export of ginseng from Georgia is authorized by that agency in combination with the Georgia Ginseng Protection Act of 1979, a state law amended in 2013.

In order to have a legal ginseng trade in Georgia, the Fish and Wildlife Service requires Georgia to maintain a ginseng management program that ensures compliance with federal and state regulations. The objective is to prevent this perennial forest herb from becoming endangered because of trade. Demand for ginseng is high in natural medicinal markets and in Asian medicine.

***DNR's Greg Krakow managing Biotics database** (Linda May/DNR)*

The Nongame Conservation Section administers the Georgia Ginseng Management Program, which monitors harvest and sale of ginseng. Staff works with ginseng dealers, growers, the DNR Wildlife Resources Division's Game Management Section and DNR's Law Enforcement Division to make ginseng regulation a transparent and simple process.

In calendar 2015, the dealer-reported Georgia wild ginseng harvest was 345.7 pounds dry weight. This was higher than the 10-year average of 308.8 pounds. The reported harvest was 33 percent lower than last season's ginseng harvest in the state, a dry weight of 517.3 pounds. Over the Georgia Ginseng Program's 27 years, there has been an overall decline in harvest and trade.

In fiscal 2016, Nongame Conservation continued to field many questions about growing and selling live, cultivated ginseng. However, the number of registered dealers and growers declined in 2015 from 41 to 26.

Overall, the cultivated ginseng trade is not significant in Georgia, but cultivated ginseng is encouraged in the state as one strategy to relieve pressure on wild populations. Nongame Conservation worked with the Georgia Department of Agriculture to develop permits for a grower to sell cultivated, live bare root seedlings nationwide.

Most American ginseng harvested is exported to China, although local interest in Georgia ginseng for personal use has increased. Georgia is at the southern edge of the distribution of ginseng, and the trade is much smaller than in nearby states such as North Carolina and Kentucky. Ginseng exports in those states total millions of dollars a year.

Biotics Database

The Nongame Conservation Section manages the NatureServe Biotics database, the state's most comprehensive database of occurrences of rare species and natural communities. Data in Biotics are used for many purposes: environmental site reviews, conservation planning, scientific research, habitat restoration and management plan development.

The database contains more than 15,000 occurrence records for rare species in the state and provides web access to information on occurrences of special-concern species and significant natural communities. During fiscal year 2016, Nongame Conservation added 1,116 records and edited 2,003 existing ones. Significant efforts were made to update information on species proposed for listing under the Endangered Species Act. Many species are under review, and updating database records allows for a more accurate review of species.

Staff also responded to 510 formal requests for data, not counting in-house environmental reviews or data obtained by the public through the website. Lists of rare and protected plants, animals and natural communities are available at www.georgiawildlife.com/conservation/species-of-concern. Range maps are at www.georgiawildlife.com/about_rare_species_range_maps. Staff has developed a draft web portal for accessing Georgia rare-species information.

Private Lands

Private Land Activities

With more than 90 percent of Georgia lands in private ownership, conservation activities on private lands are crucial to wildlife and natural communities in the state. The Nongame Conservation Section worked with private landowners throughout Georgia on a variety of conservation activities in fiscal year 2016 (also see "Land Acquisition and Conservation Easements").

Staff answered landowners' questions and visited sites to give management advice. Nongame Conservation worked to make landowners aware of cost-share and grant opportunities and help them navigate procedures for using the programs. Examples include the Natural Resources Conservation Service's Environmental Quality Incentives, Conservation Stewardship, Wetlands Reserve Easements and Working Lands for Wildlife programs, and the U.S. Fish and Wildlife Service's Partners for Wildlife Program.

Nongame Conservation also:

- Participated in Project Pine Snake, a Reinhardt University-led effort to better understand the range and habits of the northern pine snake, a subspecies of pine snake considered of conservation concern. Activities by agency staff concentrated on landowner education about snake habitat needs and management.
- Helped develop the Upper Little Tennessee River Watershed Management Plan. This plan provides communities in Georgia's portion of the watershed a roadmap that defines and will help them address watershed pollution through management strategies. The cooperative planning effort involved DNR's Wildlife Resources and Environmental Protection divisions, Coweta Hydrologic Laboratory, the Natural Resources Conservation Service, Mainspring Conservation Trust (formerly Land Trust for the Little Tennessee), Rabun County and its municipalities, Rabun Gap-Nacoochee School, the U.S. Fish and Wildlife Service, Broadfork Consulting, and others. The plan already has led to a major landowner in the area making livestock watering improvements on an ecologically important stream.
- Provided threatened and endangered species training to loggers and others at quarterly Master Timber Harvester events around the state. The training includes a review of how timber harvesting affects wildlife habitat. Staff also served on the Sustainable Forestry Initiative Implementation Committee and its Private Landowner Outreach Subcommittee. Additional education activities included training sessions at Southeastern Wood Producers workshops.

Nongame Conservation was involved in Natural Resources Conservation Service State Technical Committee meetings to identify wildlife conservation priorities relevant to Farm Bill programs for private landowners. Staff

***Female pearl crescent** (Linda May/DNR)*

Gov. Deal recognizes 2015 Forestry for Wildlife Partners

cooperated, as well, with the Game Management Section's Private Lands Program and the Natural Resources Conservation Service to coordinate four temporary biologist positions stationed at Natural Resources Conservation Service field offices in Blakely, Douglas, Swainsboro and McDonough. These biologists work with local landowners to implement National Resources Conservation Service programs aimed at restoring and managing longleaf pine systems, including the Working Lands for Wildlife initiative that targets gopher tortoises and addresses other conservation needs for priority species and habitats.

Along with Game Management and State Parks and Historic Sites personnel, staff visited DNR-held conservation easements to ensure compliance with easement terms and renew relations with landowners.

Forestry for Wildlife Partnership

The Nongame Conservation Section plays a strong role in the DNR Wildlife Resources Division's Forestry for Wildlife Partnership. This voluntary program encourages conservation of wildlife habitat on corporate forestlands in Georgia and provides public access to privately owned wildlife management areas for hunting, fishing, wildlife viewing, hiking and camping.

Corporations participating in Forestry for Wildlife are among the largest landowners in Georgia, directly affecting wildlife habitat on approximately 1 million acres.

Coordinated by Game Management and Nongame Conservation Section biologists, this public-private partnership provides opportunities to enhance wildlife conservation practices on these lands and benefit companies with public recognition for their conservation achievements. Companies are evaluated on wildlife conservation planning, education and outreach, management practices, sensitive sites and rare-species concerns, recreation and partnerships.

Georgia Power, Weyerhaeuser (which merged with former partner Plum Creek) and CatchMark Timber Trust were the Forestry for Wildlife partners for 2015.

Forestry for Wildlife conservation targets include red-cockaded woodpecker habitats, bald eagle and swallow-tailed kite nests, isolated wetlands critical to protected reptiles and amphibians, and rare remnant Coosa Valley prairies, home to endangered plants. The partnerships also provide the public with many opportunities to enjoy the outdoors through wildlife viewing, hunting and fishing. All partners are committed to the Sustainable Forestry Initiative, ensuring that their forest managers and loggers have completed the Master Timber Harvester workshop and continue their education to maintain certification or designation.

Here are some of the highlights of partner companies' conservation work.

Georgia Power burns more than 6,000 acres a year through its prescribed fire program and participates in DNR's Safe Harbor program for endangered red-cockaded woodpeckers. The company has worked with The Nature Conservancy and other partners to establish a test plot for federally endangered hairy rattleweed on a Georgia Power right of way. Overall, company power lines and rights of way are home to nine federally listed plant species. Designated as special management areas, activities can be restricted in these rights of way.

Georgia Power also has initiated bat habitat surveys on its lands to aid in supporting conservation plans to improve those habitats; provided more than 20,000 acres to DNR for use as wildlife management areas; and, along with eight other partners, worked to protect Georgia aster and its ecosystem as part of a 2014 Candidate Conservation Agreement. In part because of the agreement, the Fish and Wildlife Service decided not to list Georgia aster, an uncommon wildflower, under the Endangered Species Act.

The company has helped relocate gopher tortoises displaced by development to the company's Plant Vogtle near Waynesboro. And in 2016, Georgia Power converted 221 acres from loblolly to longleaf pine stands, increasing to 471 the number of acres changed to longleaf over the last two years.

Former partner **Plum Creek** merged with **Weyerhaeuser** in February 2016. Weyerhaeuser continues to integrate conservation into its working forests, now as part of the Forestry for Wildlife Partnership. A key Weyerhaeuser initiative is gopher tortoise conservation. The company focuses management on preferred soils with viable tortoise populations and helps with Nongame Conservation tortoise surveys. Through the surveys, Weyerhaeuser learned more about tortoise populations on these tracts, and the company is working with DNR, the National Council for Air and Stream Improvement and the University of Georgia to better understand the response of gopher tortoises to the shifting mosaic of suitable habitat conditions on working forestlands.

The company also is managing several unique habitats in northwest Georgia, including the Coosa Valley Prairie property (permanently protected under a conservation easement held by The Nature Conservancy), a cave that is home to a bachelor colony of gray bats (federally listed as endangered) and rock outcrops that shelter the cliff-dwelling green salamander. A successful prescribed burn was completed on the Coosa Valley Prairie easement in fiscal 2016 to maintain the unique flora found in this fire-adapted ecosystem. Weyerhaeuser also played host at the site to researchers examining the pollinator community and pathogens that may be affecting federally endangered whorled sunflower.

In the lower Coastal Plain, work continues with Nongame Conservation on projects, including managing Henslow's sparrow habitat and wood

stork rookeries, preserving isolated wetland habitats, and protecting swallow-tailed kite nesting areas. Weyerhaeuser is also engaged in cooperative conservation of hairy rattleweed with the U.S. Fish and Wildlife Service and DNR. Hairy rattleweed is a federally endangered plant species known to exist in only three counties in Georgia.

Conservation and wildlife habitat improvements by **CatchMark Timber Trust** in fiscal 2016 included working with the Fish and Wildlife Service to protect habitat for federally endangered fringed campion on company lands, playing host to a Fish and Wildlife Service bat survey on CatchMark property, allowing Nongame Conservation to conduct prescribed burns on native montane longleaf habitat, and planting longleaf pine at Sprewell Bluff on Pine Mountain. Company staff members were trained by Nongame Conservation regarding gopher tortoises and silvicultural treatments that improve tortoise habitat.

CatchMark leases more than 4,000 acres to the DNR Wildlife Resources Division for Ocmulgee Wildlife Management Area near Cochran. Overall, the company leases 100 percent of its available lands to the public for hunting and recreation. CatchMark also sponsors Outdoor without Limits hunts, providing outdoor recreational opportunities for people with physical and mental challenges.

The company allows universities access to company lands for research. Projects include a University of Georgia study of pine decline and root rot, DNR research on black bears, and a Columbia University seismic imaging study. CatchMark supports a program of robust thinning on pine plantations, improving wildlife habitat and diversifying the landscape; monitors and treats its lands for invasive species; and maintains portable bridges for loggers to use, minimizing the impact of stream crossings.

Army Compatible Use Buffer Conservation

The Army Compatible Use Buffer program, often referred to as ACUB, is focused on protecting priority conservation lands around military installations from development that would restrict key military activities such as training. This buffering is provided primarily through permanent conservation easements. In recent years, the Nongame Conservation Section has joined with forts Stewart and Benning to identify easement priorities and draft plans to conserve critical lands adjacent to these installations. The areas include some of the best habitat in Georgia for rare or uncommon species, such as eastern indigo snakes, gopher tortoises and southeastern pocket gophers, as well as potential future habitat for red-cockaded woodpecker groups.

Nongame Conservation Section is involved with the Chattahoochee Fall Line Conservation Partnership, which also is geared toward conserving lands along the eastern edge of Fort Benning. Staff involvement included teaming with land management activities to enhance gopher tortoise habitat, serving as chair of the group's steering committee and supporting efforts to bring more tracts under conservation ownership and management.

The new Chattahoochee Fall Line Wildlife Management Area, which includes the Fort Perry Tract in Marion County and the Almo area in Marion and Talbot counties, is an example of this partnership, which helps the Army with its mission, protects rare species and provides for public recreation.

Community Wildlife Project

The Community Wildlife Project, an award-winning initiative of the Nongame Conservation Section and the Garden Club of Georgia, seeks to:

- Enhance native nongame animal and plant populations and their habitats in urban, suburban and rural communities throughout the state.
- Foster wildlife conservation stewardship and education in Georgia communities.
- Promote respect and appreciation of wildlife in combination with community beautification.
- Improve the quality of life for Georgians living in these communities.

More than 750 communities, cities and counties have been awarded full certification, with more than 600 in various stages of completing certification standards. Since 2005, the Backyard Wildlife Certification survey has added about 3,200 certified backyards, 550 of which were certified with two or more adjoining neighboring yards for Neighborhood Backyard Certification.

At the start of fiscal 2016, a Nesting/Roosting Box Certification was created to promote adding nest and roost boxes to certified backyards. The count of certified yards is up to 35. This program is in the vein of the Hummingbird Haven Certification, started in 2013 and focused on attracting hummingbirds to yards. About 320 yards have been certified as hummer havens.

The Community Wildlife Project also helps Nongame Conservation build constituency through the 11,000-member Garden Club of Georgia via habitat programs at local, state and region levels.

Pine warble at suet feeder *(Linda May/DNR)*

Invasive species work is helping rare native plants such as Radford's mint (Eamonn Leonard/DNR)

Invasive Species Assessment and Management

Georgia's State Wildlife Action Plan, the 2005 original and 2015 revision, emphasizes increasing efforts to detect, monitor and control invasive species to conserve native wildlife and their habitats. Invasives have negative impacts on native species and represent one of the greatest threats to biodiversity. Controlling and treating invasives can yield positive, cascading effects for many native species and for the benefits that people derive from ecosystems.

Following completion of the Georgia Invasive Species Strategy in 2009, the Nongame Conservation Section sought State Wildlife Grants funding to implement invasive species assessment and management programs, with a focus on the state's coastal region. The current project is aimed at enhancing methods for assessing and controlling invasive nonnative species on public and other conservation lands. Objectives also include providing land managers better technical and informational resources to help control invasives, along with promoting appropriate use of native plant species by public and private land managers.

During fiscal 2016, Nongame Conservation staff:

- Continued a multiyear control project to eradicate common reed from the Altamaha River delta. New sites found this year are being added to the control program.
- Coordinated a meeting to reassess management of water hyacinth in coastal Georgia, with the result being to focus on source populations and explore potential biocontrols. The meeting followed several years of herbicide treatments and volunteer

pulls on the Altamaha and Satilla rivers that had only a moderate effect on water hyacinth populations.

- Coordinated the fifth annual meeting of the Coastal Georgia Cooperative Invasive Species Management Area, or CISMA. This joint meeting with Coastal WildScapes featured participants' species management projects. More than 100 people attended, including representatives from government agencies, nonprofits and citizen groups.
- Using National Fish and Wildlife Foundation funding, supported a co-coordinator for the region's Cooperative Invasive Species Management Area, two Student Conservation Association interns and herbicide and other supply purchases. Supervised the interns, who spent 15 weeks helping partners in the 11-county coastal area complete invasive species projects. Partners varied from DNR divisions to Savannah Tree Foundation, Little St. Simons, St. Simons Land Trust, Bethesda Academy, the U.S. Fish and Wildlife Service, Jekyll Island Authority and the communities of Kingsland and Pooler. The interns worked on projects targeting sand pine, salt cedar, apple snails, common reed, Chinese tallow, tree of Heaven, big-leaf lantana, wisteria, flathead catfish, Chinese privet and Japanese climbing fern.
- Worked with residents in Kingsland and Pooler on awareness, assessment and removal of invasive apple snails.
- Monitored invasive species treatment plots in areas of Sapelo and Ossabaw islands infested with Chinese tallow, measuring the effectiveness of control methods and recovery of the natural communities.
- Worked with Nature Conservancy staff and a Job Corps team to focus on removing sand pine from longleaf pine restoration sites at Townsend Wildlife Management Area near Ludowici. Nongame Conservation also took the lead in developing a restoration plan to remove at Townsend the remaining mature sand pine surrounding one of two known populations of rare Radford's mint. This is a multiyear project to safeguard the species while converting the remaining sand pine to a longleaf canopy.

Monitoring invasive Chinese tallow on Ossabaw *(Eamonn Leonard/DNR)*

- Collaborated with University of Florida researchers on collecting samples of common reed in coastal Georgia. The samples will be used in a study to determine the genetic diversity of common reed along the East Coast. Nongame Conservation also worked with a University of Florida post-doc researcher to collect samples of surviving, large red bay trees on St. Simons. The cuttings will be grown and incorporated into resistance trials. Surviving red bays are being monitored in situ by a College of Coastal Georgia assistant professor and students in his coastal ecology class.
- Released more than 600 alligator weed flea beetles at Cay Creek Wetlands Interpretive Center in Midway in April to reduce the biomass of aquatic invasive alligator weed.
- Directed a College of Coastal Georgia intern in her work on a remote sensing project to map the extent of apple snail in coastal Georgia.
- Worked with Coastal Wildscapes, a nonprofit group that promotes gardening with natives, to increase volunteer opportunities in collecting native seed and identifying and removing invasives. Staff also teamed with the Jekyll Authority to grow native plants from seeds collected by volunteers and offer the plants to the public at two plant sales.
- Continued efforts with the Cannon's Point Conservation Task Force to manage invasive species according to the preserve's management plan.
- Assisted First Coast Invasive Working Group in northeast Florida with the detection and management of novel invasive species in the north Florida/south Georgia coastal region.

Apple snails from volunteer work day in St. Marys *(Eamonn Leonard/DNR)*

In fiscal 2016, the Coastal Georgia Cooperative Invasive Species Management Area was awarded another $50,000, two-year grant from the National Fish and Wildlife Foundation. Funds will be used to pay two Student Conservation Association interns for the next two years. Also, about $25,000 will be allocated to establish a private landowner cost-share program focused on managing one of five high-priority species: salt cedar, Chinese tallow, common reed, water hyacinth or sand pine.

Law Enforcement for Nongame

Rangers prepare to check trawler for TED compliance (Mark Dodd/DNR)

During fiscal year 2016, the DNR Law Enforcement Division conducted 49 commercial trawling boardings along Georgia's coast to check compliance with turtle excluder device regulations. Rangers documented four state and two federal TED violations under the Endangered Species Act.

The checks were part of nearly 700 hours the Law Enforcement Division spent at sea this year. Activities included 50 hours patrolling for violations of laws protecting North Atlantic right whales and 66 hours at Gray's Reef National Marine Sanctuary. Rangers also logged 104 hours on public outreach involving marine mammals and the laws and regulations protecting them.

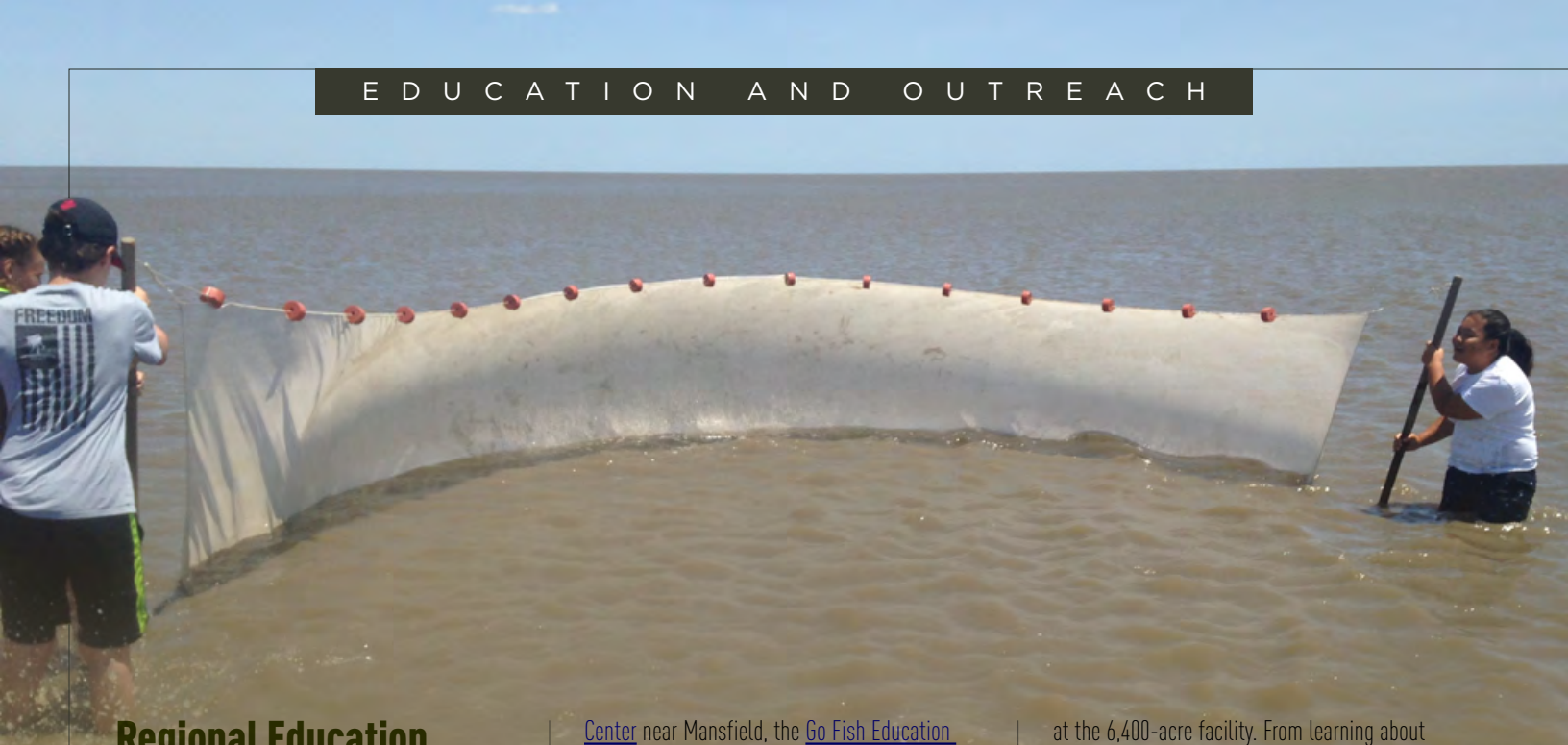
Vessel patrol hours focused on:

- Shrimp trawler checks for TED compliance.
- Intercepts of recreational and commercial fishing vessels returning to Georgia seaports from fishing trips in federal waters.
- Offshore patrols to Special Management Zones and Gray's Reef National Marine Sanctuary.
- Concentrations of fishing vessels wherever they occurred in the Exclusive Economic Zone adjacent to the state.
- Offshore and near-shore patrols for compliance with the Atlantic Whale Take Reduction Plan.

Other Law Enforcement Division work involving nongame included:

- A Brunswick man caught a second time stealing sea turtle eggs pleaded guilty. A DNR technician noticed eggs missing from a Sapelo Island nest July 6. Rangers arrested Lewis Jackson the next day as he tried to leave the island with a cooler full of loggerhead sea turtle eggs. Convicted for the same crime in 2012, he faced a maximum of five years in prison and a $250,000 fine.
- Cpl. Greg Wade of Tift County was named North America's top ranger, receiving the 2015 Conservation Law Enforcement Award from the Association of Fish & Wildlife Agencies. Cpl. Jason Roberson, who is based on Lake Lanier, was named the National Association of State Boating Law Administrators' Boating Officer of the Year.
- A search with Pickens County Sheriff's Office deputies following a home invasion led to charges in a case involving a large amount of illegally obtained ginseng. Charges included burglary, digging ginseng without permission, child endangerment, trespass and possession of marijuana.
- Rangers teamed with the U.S. Fish and Wildlife Service for separate investigations after two bald eagles were found shot to death, one in Banks County in September 2015 and the other in Polk County in February 2016.
- As part of a Decatur County Sheriff's Office drug investigation, Cpl. Tony Cox charged a suspect with multiple wildlife violations, including the taking of alligator snapping turtles, a protected species in Georgia. During an interview with Cox, the suspect admitted to the violations but said most of the wildlife in question had been taken in Florida. That led to Florida officials also citing him.
- Responding to a complaint about an angler keeping a sea turtle at the Sapelo Island ferry dock, Sgt. Damon Winters and Ranger Jay Bright found that the man had the live immature turtle in a cooler. The turtle was turned over to the Georgia Sea Turtle Center for rehabilitation; the fisherman was cited for taking a protected species.

The division's annual reports are available at www.gadnrle.org/annual-reports. Report poaching and violations of protected species laws and regulations by calling the Ranger Hotline, 1-800-241-4113, or emailing rangerhotline@dnr.ga.gov.



Students seining in a Sapelo education program (Adam Mackinnon/DNR)

Regional Education Centers

The DNR Wildlife Resources Division is charged with promoting the conservation and wise use of Georgia's natural resources. This educational mission involves cultivating an appreciation and understanding of wildlife resources, fostering wise stewardship of these resources, and promoting safe and ethical natural resource-based recreation.

Throughout its history, the Wildlife Resources Division has educated Georgia youth and families to increase awareness, engagement and stewardship regarding the state's habitats, wildlife and natural resources. These education efforts began when Charlie Elliott, first director of what is now DNR, started the Junior Ranger Program in 1940. In its first year, more than 25,000 children became involved in the program, conducting nature surveys, planting wildlife food crops and helping "senior rangers" – in short, learning and practicing conservation.

Elliott's vision of a conservation education program is reflected through the Wildlife Resources Division's seven regional education centers, as well as the continuation of the Junior Ranger Program in DNR's State Parks & Historic Sites Division. Wildlife Resources operates the centers with local school systems, Regional Educational Service Agencies and other state and federal agencies to deliver wildlife-focused education. The centers are Charlie Elliott Wildlife Center near Mansfield, the Go Fish Education Center in Perry, Smithgall Woods near Helen, McDuffie Environmental Education Center near Dearing, Arrowhead Environmental Education Center near Armuchee, Grand Bay Wetland Education Center near Valdosta and Sapelo Island National Estuarine Research Reserve.

Visitors learn about natural and cultural resources through hands-on experiences. More than 93,700 students and adults visited the centers in fiscal 2016.

At **Charlie Elliott Wildlife Center**, day programming continued to grow. More than 2,038 people of all ages attended programs at the 6,400-acre facility. From learning about birds, reptiles and amphibians to enjoying a family campfire with s'mores, the events attracted Georgians from across the state. The center's annual JAKES day program (Juniors Acquiring Knowledge, Ethics and Sportsmanship) drew an estimated 1,650 guests, the second-most at a JAKES event since its start in 2000. Day field trips also surged in popularity, totaling more than 1,300 students in fiscal 2016. Among the new trips created by staff was a museum and nature tour for special needs students.

Helping support this interest, the Brooke Ager Discovery Area was renovated by Charlie Elliott's spring 2016 seasonal naturalists. The room

Charlie Elliott Wildlife Center's Pete Griffin at work (Linda May/DNR)

now features updated information, interactive stations and exhibits that target Georgia's five major ecoregions.

Teacher workshops at Charlie Elliott are part of Project WILD (Wildlife in Learning Design). This is an interdisciplinary curriculum for students in pre-K through 12th grade that uses nature as the backdrop for the lessons. The center continues to experience success in Project WILD, training 525 teachers in 2016. Thirty educators took part in the Teacher Conservation Workshop, a partnership with Project Learning Tree and Project WET, or Water Education for Teachers. This weeklong event held each June uses the forest as a window to environmental education, with activities led by foresters, wildlife biologists, educators and industry professionals. The workshop is interdisciplinary and centered on the environmental, economic and social benefits of Georgia's forestry and wildlife communities. Educators visited sites including the lands of Plum Creek (which merged with Weyerhaeuser in 2016), Barkaloo Farm and Gully Branch, plus lumber mills and the Georgia Forestry Commission's Flint River Nursery.

For the second time, Project WILD also held its Outdoor Wildlife Leadership School II, or OWLS II, at Charlie Elliott Wildlife Center. Eighteen K-12 educators took part, receiving concentrated lessons in wildlife management and biology. Unlike OWLS I, this highly praised workshop focuses on North Georgia's ecosystems. Trips with wildlife experts included Panola Mountain State Park, where educators learned about grassland bird banding and plant life on granite outcrops; Crockford-Pigeon Mountain Wildlife Management Area to explore for salamanders in caves; the Go Fish Education Center to learn more about lake sturgeon and fish habitats; and Oaky Woods Wildlife Management Area to study middle Georgia's black bear population.

On the residential side of Charlie Elliott, there were significant changes in fiscal 2016. The center's education team helped create and expand several environmental education courses that, along with regular programming, will be offered to the public and visiting school groups. Those programs include a Lake Margery Canoe Eco-tour, a Native American History Hike, Dutch Oven Cooking and History, and an Edible and Medicinal Plants Hike. The year already had been a busy one for residential programming.

Charlie Elliott's nine Hunt and Learn programs, held primarily at the center but also at Chattahoochee Fall Lines Wildlife Management Area near Geneva, introduced more than 100 parent-and-child pairs to the dynamics of the hunt, game animal biology and hunting as a means of conservation. These programs are a bridge to young people being taught firearm safety basics and hunting ethics.

The center's five summer camps were a success as well, averaging 20 participants each and immersing more than 100 children – mainly middle school-aged – in a week of outdoor activities. Targeted camps such as Shooting Sports and ACE continue to draw a crowd. Throughout the year, Charlie Elliott played host to 240 area schoolchildren through The Outdoor Discovery School. Educators from surrounding counties also found the ecology and outdoor recreation programming beneficial to their students, and the center has seen more interest in its overnight field-trip courses than can be accommodated.

Charlie Elliott Wildlife Center's Outreach Program stayed busy, too. Staff helped with CoastFest in Brunswick, Weekend for Wildlife on Sea Island, events at the governor's mansion and promotions to help DNR Public Affairs market the Wildlife Resources Division's license plates. Assignments also included Outdoor Adventure Days, JAKES Day and programming for the University of Georgia's agricultural department and Warnell School of Forestry and Natural Resources. Outreach staff traveled to schools, ranging from kindergarten to universities, and provided presentations for civic groups and homeschoolers.

In all, an estimated 26,000-plus students, teachers and other participants were involved in the center's outreach efforts. Those programs included Georgia's five physiographic regions, vertebrates, endangered species, birds of prey and reptiles. The Outreach Program also helped with the center's camps and day-use, residential and visitor programming. Related to outreach, Charlie Elliott's "Talking Nature Tuesday" video series was continued in spring 2016, drawing viewers and increasing engagement on the center's social media outlets. Plans are to explore more wildlife conversation topics in fiscal 2017.

Set on 6,000 acres in the Blue Ridge Mountains, **Smithgall Woods Regional Education Center** offers an assortment of environmental education programs for students of all ages. Smithgall was established in 1997 as an outdoor classroom in which students and teachers can learn to evaluate environmental impacts and make sound ecological decisions. Adding to the educational value of the instruction provided, programs are led by professionals associated with DNR's State Parks and Historic Sites and Wildlife Resources divisions and Georgia State Parks-certified volunteers. Teachers also can choose to lead activities themselves. Financial support for programming is provided through the Wildlife Resources Division, donations and Georgia Trout Unlimited chapters.

During the fall 2015 and spring 2016 semesters, approximately 11,000 students took part in 589 educational programs. Of these, more than 3,000 students visited Smithgall's living laboratory to learn the importance of managing, protecting, preserving and conserving Georgia's natural, historic and cultural resources.

Smithgall Woods' diverse catalog of nearly 50 programs is adaptable to reach students from pre-K through college. Although broad in age range, most programs correlate to Georgia Performance Standards and focus on resources unique to the north Georgia mountains. This approach familiarizes students with local issues and demonstrates biological principles at work in their region. Most of the students served are in school districts belonging to the Pioneer Regional Education Service Agency. Programming is divided into two categories: on-site and outreach.

On-site programs in fiscal 2016 included lessons in ecology, forestry, wildlife, aquatic habitats, archery and orienteering. While largely school-related, programming is not restricted to students. Smithgall Woods offers many programs to the general public. These opportunities allow "students" of all ages to take part in environmental-themed events. However, on-site field trips requested by schools are a large portion of Smithgall's programming. Approximately 91 percent of all educational programs presented this fiscal year were given at the center, a 35-percent increase from 2015 that is mostly due to more out-of-region field trips to the park. The number

of on-site, out-of-region students reached increased by 122 percent. This increase may be due to more homeschool groups using the park for field trips.

Outreach programming accounted for only 9 percent of the programs given but 70 percent of the students involved in educational programs. These lessons lasting 45 to 60 minutes extend programming into the winter months and serve schools experiencing budget cuts or logistical limitations. This outreach gave approximately 7,320 students – most of them from middle schools – opportunities to learn about animal adaptations, arachnids, birds of prey, conservation practices, genetics, Native American history and snakes and other reptiles.

The Georgia Council of Trout Unlimited again provided scholarship funding to support free outreach programming for seven counties in Pioneer Regional Education Service Agency school districts. Although schools in those counties took advantage of the funding, several that participated the previous school year did not book programs this year. This change can be accounted for as a misunderstanding in the schools. The retirement of the previous interpretive specialist at Smithgall Woods was mistaken as the end of available programming, a misperception staff then worked to correct.

Glynn Middle School students in Sapelo Seeds to Shoreline program (Adam Mackinnon/DNR)

Despite outreach programming suffering decreased numbers this year, on-site attendance increased by 16 percent. As mentioned, employee changes can account for the decline in outreach programming, while the introduction of regular homeschool and school-break programs can explain the increase in on-site programming. The addition of a new interpretive ranger in March 2016 holds promise for an increase in overall programming. With more available programming providers, fiscal 2017 should see an increase in attendance and numbers of programs. The public can expect more opportunities to experience beloved programs such as Stream Ecology, Animal Adaptations and Snakes Alive!

At **Arrowhead Environmental Education Center**, anyone following fifth-graders along one of the paths through the center's 350 acres may hear the naturalist chant, "Toxico!" "Toxico!" The students echo. "Dendron!" "Dendron!" "Toxicodendron radicans!" "Toxicodendron radicans!" And soon the gleeful strains of the old rock song "Poison I-vee-ee-ee-ee-eeeee!" is wafting through the woods.

Visitors might also see a third-grader standing before his peers and gradually donning the adaptations of a beaver: lotion to represent waterproofing oils, goggles to represent nictitating membranes over the eyes and swim fins to remind onlookers of webbed feet. Or a group of kindergartners gather around a plant to observe its seeds and imagine how they travel to find the right spot to grow: cockleburs on dogs, cattail fluffs in the wind, sycamore balls floating down the creek.

During the 2015-16 school year, students came to Arrowhead to study the collection of live Georgia snakes, turtles, frogs, fish and other live or mounted specimens. They walked through beaver ruins, along streams and through woods to observe life cycles, habitats and food chains studied at school. And in hundreds of outreach lessons, Arrowhead teachers brought animals, stories and lessons to schools.

Through songs, chants and stories, sometimes armed with nets, pet-pals, hand lenses and binoculars, measuring tapes, pencils and notepads, 8,966 youth and adults learned in and from Arrowhead about the world around them. Another 1,700 learned about the biodiversity

of northwest Georgia's lush ridges, valleys and streams at special events, displays and programs where Arrowhead was involved.

Through the center's partnership between DNR and Floyd County Schools, three teachers planned and taught lessons, developed and staffed displays, and created and presented programs for pre-K through 12th-grade students, as well as provided displays and programs for public events. Some highlights:

- DNR's Outdoor Adventure Day, Trout Unlimited's Trout Expo, Duck's Unlimited's GreenWings day, outdoor PTO (parent-teacher organization) programs and other special events included Arrowhead's storytelling, live animals, educational scavenger hunts and hands-on activities focused on nature.
- Nature-trail lessons were led on school campuses, including for every class at one school.
- Several classrooms and individual children helped feed Arrowhead animals through the center's Adopt-An-Animal program.
- For the 14th year, students helped with the DNR project to restore lake sturgeon to the Coosa River basin, with follow-up lessons held at the schools.
- Arrowhead staff visited classes at Berry College and Shorter University to teach future Georgia teachers about wildlife and how to use the environment as a context for learning.
- Arrowhead joined with the Coosa River Basin Initiative, the upper Coosa Riverkeeper, to visit each kindergarten in Floyd County Schools, teaching about watersheds and water conservation.
- The center also worked with the Coosa Basin Initiative to hold the 2016 Environmental Quiz Bowl at Arrowhead.
- Arrowhead Director Vivian Davis was presented the 2016 Environmental Educator of the Year Award by the initiative. Storyteller and naturalist Terrell Shaw earned the group's Margie T. Harbin Environmental Advocacy Award.

Whether displaying an alligator and discussing adaptations in schools or observing green treefrog tadpoles at Arrowhead to learn about life cycles, in fiscal 2016 Arrowhead teachers tailored lessons to Georgia's educational standards and the center's mission – using Georgia's natural systems as a context to help students in Floyd County Schools learn.

Sapelo Island National Estuarine Research Reserve Education Program offered a range of environmental educational programming during 2015-2016. School programs (K-12th grade and college-level programs) were held on-site and at local schools and universities. In all, 54 programs were delivered during this reporting period, reaching 2,406 students. This total included students from nine Georgia counties and four states. Programs were offered three days a week, with a limit of 40 participants per program due to ferry and on-island transportation limitations.

Sapelo Island Reserve sees seasonal ebbs and flows in K-12 participation. Data show a significant increase in student participation during February and April due to additional off-site programs conducted in the regional schools.

Overall, Sapelo Island Reserve's K-12 participation numbers appear to be growing, with calendar year 2016 numbers – at 1,614 – already surpassing 2015's participation total of 1,504 students. No comprehensive participation database existed prior to calendar 2012, when enrollment was an estimated 871.

Staff began a new student program during fiscal 2016 called Seeds to Shoreline. For this EPA grant-funded program, 10 teachers were trained and sent back into the classroom to enable coastal students to collect and experiment with *Spartina* propagation. (*Spartina*, or cordgrass, is the genus of grass commonly found in coastal salt marshes.) Students then were allowed to plant their seedlings in the salt marsh at designated "living" shoreline and restoration sites. Not only did this prove a superb application of the scientific method, the program also re-enforced a strong stewardship principle for young learners. A total of 235 students from five coastal counties took part. This novel program was conducted in partnership with South Carolina and North Carolina national estuarine research reserves, the University of Georgia Marine Extension Service and DNR's Coastal Resources Division.

Sapelo Island Reserve also conducted programs for 396 road scholars from the national Elderhostel program. In addition, educational opportunities were provided for 213 participants from various special-interest groups on and off the island, including churches, birding groups and other organizations. An additional 511 people took part in tours of the island's north end and the reserve's Christmas tours.

The Sapelo education program also conducted or partnered with other institutions to train 135 teachers through seven teacher workshops. Partners included Georgia Southern University, the Georgia Association of Marine Educators, the Coastal Resources Division and the UGA Marine Extension Service. These teacher workshops focused on coastal ecosystems and issues, as well science, technology, engineering and math. In addition, Sapelo Island Reserve's education coordinator served as an Institute for Georgia Environmental Leadership instructor for 31 Georgia decision-makers.

The reserve offered a variety of programming to the general public, such as regular public tours, outreach events and a lecture series highlighting coastal issues and Georgia's rich coastal ecosystems. In all, 1,664 people were given ecological- and historical-based tours of the reserve and surrounding property on Sapelo.

The program's education coordinator conducted four lectures for 81 participants. Topics included Georgia's coastal changes and a selection of coastal organisms. A special Crab and Shrimp Day held by the Sapelo education program highlighted the life history and management of Georgia's crabs and shrimp. Fifty people attended this on-island event. The education coordinator also supervised about 130 volunteers who contributed 2,483 hours to service projects on and around Sapelo.

Sapelo Island Reserve staff worked several outreach events such as CoastFest, Sapelo's Culture Day, Coast Day at the Capitol and Beach Week, engaging an estimated 9,500 participants. The island's Visitor Center reported 10,880 walk-in guests who were not associated with a state program.

McDuffie Environmental Education Center provides a range of activities designed to fully immerse students, parents and teachers in the natural world in order to develop a lifelong

appreciation for nature and conservation. Activities available for grades K-7 are aligned with Georgia educational standards and delivered under the direction of three experienced state-certified teachers. Reservations for school field trips begin on April 1 each year. During the 2015-2016 school year, attendance reached 5,471 students and teachers for on-site visits. The high demand resulted in a waiting list for would-be visitors in case of cancellations.

McDuffie offers firsthand experiences in three distinctive habitats: sandhills, water and wetlands. Younger students explore the Longleaf Pine Trail, which leads through a mature pine forest. By third grade, students are hiking the Blackwater Creek Swamp Trail, which starts in a typical sandhill habitat and then follows the banks of McDuffie Public Fishing Area lakes and hatchery ponds to a hardwood wetland habitat.

One of the education center's areas of emphasis is wetlands conservation. Best practices in maintaining the area's wetland are demonstrated to support this focus. The Blackwater Creek Swamp Trail is a combination of raised boardwalks and compacted ground covered in leaf litter. A generous grant from the Georgia Soil and Water Conservation Commissions of McDuffie and Columbia counties was used to build additional boardwalk through the trail's wetland section. The new boardwalk connects two existing sections, reduces the impact of the trail through the sensitive wetland, provides a platform for observation and instruction, and allows easier accessibility for the disabled. DNR Fisheries Management and education center staff at McDuffie built the new section. Additional boardwalk and trail work on the Blackwater Creek Swamp Trail is planned for completion in early 2017. The value of this trail for teaching the importance of wetlands and the interrelatedness of nature is immeasurable.

McDuffie does not limit its educational efforts to field trips. Staff took part in the McDuffie Outdoor Adventure Day in September, touring visitors through the education building's Discovery Room and providing nature crafts in the classroom. At the 2015 Eco-Meet, held at Phinizy Nature Park in Augusta, McDuffie continued its involvement with the Environmental Sciences Education Cooperative by providing a competition station on animal tracking.

The Go Fish Education Center provides quality on-site environmental education programs focused on aquatic resource education and conservation. The center met several goals in 2015-2016 that helped boost education program opportunities and increase participation. Students varying from preschool to college levels took part in unique activities that met Georgia Performance Standards and creatively used classroom presentations, aquarium tours and the center's hunting and fishing simulators. Go Fish staff also conducted off-site fish dissections at a local middle school. The dissection program reached 300 seventh-graders and brought in roughly $1,500 in revenue over four days.

During the 2015-2016 school year, the Go Fish Center partnered with a local elementary school to assist with the school's certification in STEM (Science, Technology, Engineering and Mathematics). Throughout the year, staff conducted 13 specialized programs for 245 students from the school. The school earned its STEM certification and asked to continue this program during the 2016-2017 school year.

In addition to school field trips, several unique fishing-related programs were held for a local school's fishing club. Topics included fish identification, fish anatomy, angler ethics and conservation, fishing regulations, and making lures.

Staff continued the center's homeschool program, which included various programs highlighting seasonal topics such as owl pellets in winter and severe weather in the spring. Also during 2015-2016, Go Fish began a toddler program. The first program had 10 registered participants the day before it opened. The day of the program, 94 toddlers and their parents and guardians filled the classroom and theater at Go Fish. Such popularity has resulted in the addition of four more toddler sessions.

Go Fish initiated its community programming with a public seminar in fiscal 2016. Led by DNR fisheries biologist Tim Bonvechio, the seminar focused on Bonvechio's experiences mitigating invasive flathead catfish in Georgia waterways such as the Satilla River.

Staff educators also attended seven promotional outreach events across the state during the year. And Go Fish saw a dramatic increase in State Fish Art entries, a change attributed to the social media and online marketing push from the center's educator.

Looking ahead to fiscal 2017, Go Fish will continue providing quality education programs for the public, with goals set at increasing opportunities, offering a variety of program choices for school field trips, creating and implementing an online field-trip survey, and using the Internet for reserving groups. The staff also plans to work with the local elementary school again to complete a new STEM project focused on fish attractors and aquaponics, which merges growing fish with growing plants in water.

Grand Bay Wetland Education Center, a partnership between DNR and the Coastal Plains Regional Educational Services Agency, maintained a full schedule this year. During the 2015-2016 school year, approximately 9,500 students and 3,000 adults attended day classes at the center. With the support of superintendents, principals, teachers and parents in 12 school districts, Grand Bay filled its scheduling calendar for the school year in one week.

While the busy schedule and limited staff do not allow for outreach programs during the school year, Grand Bay had a full summer program in 2016. Valdosta State University and Wiregrass Technical College took part in day camps and attended lessons at the facility as well. About 1,000 children and students attended lessons during camps and school outreach programs concerning mammals, birds, reptiles, amphibians and fish found in south Georgia, as well as local plant communities and current environmental issues. All activities met Georgia Performance Standards.

Youth Birding Competition

The Nongame Conservation Section held the 11th annual Youth Birding Competition on April 22-23, 2016. Participants again broke records for the number of bird species seen or heard within the 24-hour birdathon, with the overall winning team counting 170 species. Twenty-five teams signed up, underscoring the popularity of this annual spring event that promotes birding and conservation among young Georgians. Ten new teams competed in 2016.

***Grand-prize winner in Youth Birding Competition Art Contest** (Linda May/DNR)*

During the Youth Birding Competition, teams of pre-K through 12th-grade birders representing schools, Scout troops, science clubs and other groups compete with teams of similar-aged youth to identify as many bird species as they can in the state.

As part of the 2016 event, the young birders also raised almost $1,700 for conservation projects throughout the state, pushing the cumulative fundraising for this event to more than $20,000. The event's T-shirt Art Contest attracted 163 drawings and paintings of native Georgia birds. A male Anna's hummingbird by Anna Zhu, a 14-year-old from Alpharetta, proved the grand-prize winner and adorned the competition's T-shirts.

The Youth Birding Competition is aimed at cultivating an interest in birds and conservation. Sponsors include TERN, friends group of Nongame Conservation; the Georgia Ornithological Society; and the Atlanta and Albany Audubon societies. The event's reach is being multiplied by Race4Birds, a foundation that is helping spread the Youth Birding Competition concept. Volunteers also are key to holding the competition banquet, awards ceremony and T-shirt art contest.

Give Wildlife a Chance Poster Contest

Kindergarten through fifth-grade students submitted about 1,450 posters for the 2016 Give Wildlife a Chance Poster Contest. This annual event has encouraged students to explore the wonders of Georgia's native plant and animal species through art for 26 years.

Students from 23 public schools, private schools and homeschool groups participated in 2016, taking to heart the event's theme "Every Species Matters!" Artwork was judged based on aspects such as theme, originality, quality and impact.

The posters of state-level contest winners were displayed at the State Botanical Garden in Athens and posted on the Wildlife Resources Division's Flickr site. In addition, the parents and teachers of winners were offered free wildlife license plates.

The contest is organized and sponsored by DNR, the State Botanical Garden of Georgia and The Environmental Resources Network (TERN), the friends group of Nongame Conservation.

Social Media

The DNR Wildlife Resources Division's social media sites – Facebook, Twitter, Instagram, YouTube, Flickr and a blog – continued to grow in popularity, spreading awareness of the division's conservation efforts and engaging constituents. Wildlife Resources' Facebook page had recorded 90,048 likes through June 2016, the end of the fiscal year. Twitter had nearly 6,927 followers, up from 4,900 the year before. The YouTube channel drew 107,499 views during the fiscal year, compared to about 93,500 in 2015.

The division's blog, which has a conservation-specific section, racked up 68,398 views for calendar year 2015. Instagram grew from 3,500 to 4,980 followers all-time.

Public Affairs posted and helped produce videos on nongame-related topics, most using footage taken in the field by biologists. The most popular video during the fiscal year was a clip of loggerhead sea turtle hatchlings scrambling for the ocean: Its Facebook reach exceeded 123,100.

The most popular post, however, didn't involve video, only a very unusual photograph. Provided by the public, it showed a northern watersnake caught in the valves of a southern rainbow mussel – a seldom-seen standoff that likely proved fatal for both creatures, according to

***Georgia Wild** enewsletter (Ryan Holt/DNR)*

wildlife biologists. That Facebook post, which also provided the foundation for a story in DNR's Georgia Wild e-newsletter, compiled a reach topping 131,200.

Just after the close of fiscal 2016, Public Affairs and Nongame Conservation staff created a #7Days4SeaTurtles social media campaign that used images, video and text on all Wildlife Resources Division platforms, including blog posts from a sea turtle technician, to raise awareness of sea turtle conservation and celebrate loggerheads surpassing one of the species' recovery benchmarks in Georgia – 2,800 nests. The campaign racked up 212,011 reaches and impressions, 6,180 engagements and reactions, and 965 comments and shares.

Environmental Outreach Coordinator Linda May also teamed with Public Affairs' Heidi Ferguson, Wildlife Resources social media and outreach coordinator, to begin producing a Georgia Wild video series focused on backyard wildlife. With the first video airing in early fiscal 2017, early results showed promise. The "Little Snakes" episode had more than 121,000 views and nearly 640 likes on Facebook.

The increasing circulation of the nongame e-newsletter Georgia Wild was encouraging as well. The number of subscribers grew by nearly 35 percent to more than 80,000. Public Affairs also redesigned the newsletter in fall 2015, improving the look and making issues easier to read on phones and other mobile devices. Reader response to the redesign was positive. In summer 2016, Georgia Wild won first in the external newsletter category at the annual Association for Conservation Information conference. The DNR e-newsletter, which turned 9 in fiscal 2016, placed third in the national competition the year before.

Georgia Wild remains an effective platform for delivering nongame news and raising awareness. Features and videos are cross-promoted on the division's social media sites, increasing the size of the audience and potential impact of the conservation information.

In all, social media efforts and the e-newsletter not only broaden the reach of the Nongame Conservation communications, they enhance interactivity and customer service.

***DNR's Tom Patrick interviewed by Atlanta's WABE-FM** (Rick Lavender/DNR)*

Promoting Awareness

Beyond youth contests and social media, the Nongame Conservation Section promotes awareness of nongame wildlife and issues in a myriad of ways – speaking to civic, technical and special-interest groups, informing lawmakers on rare species, showing journalists research in the field, and working with other conservation organizations, to name a few examples.

In fiscal 2016, the agency staffed events varying from CoastFest in Brunswick and Endangered Species Day at Atlanta Botanical Garden to the Georgia Association of Tax Officials' spring conference in Athens, the Atlanta Science Festival Environmental Education Day and the Rattlesnake & Wildlife Festival in Claxton. Employees provided interviews about wildlife to media, including The Weather Channel, Savannah Morning News, The Atlanta Journal and Constitution, The Augusta Chronicle, Georgia Public Broadcasting and The Associated Press. Topics varied from sea turtle nesting and summer snake activity to a satellite-tracking project focused on endangered manatees.

***Rabun Gap-Nacoochee School students thrilled by a hellbender** (Johnathan BySura/Rabun Gap-Nacoochee)*

DNR's Jordan Wallace at Endangered Species Day *(Rebecca Byrd/DNR)*

While outreach efforts are mentioned throughout this report, other examples include:

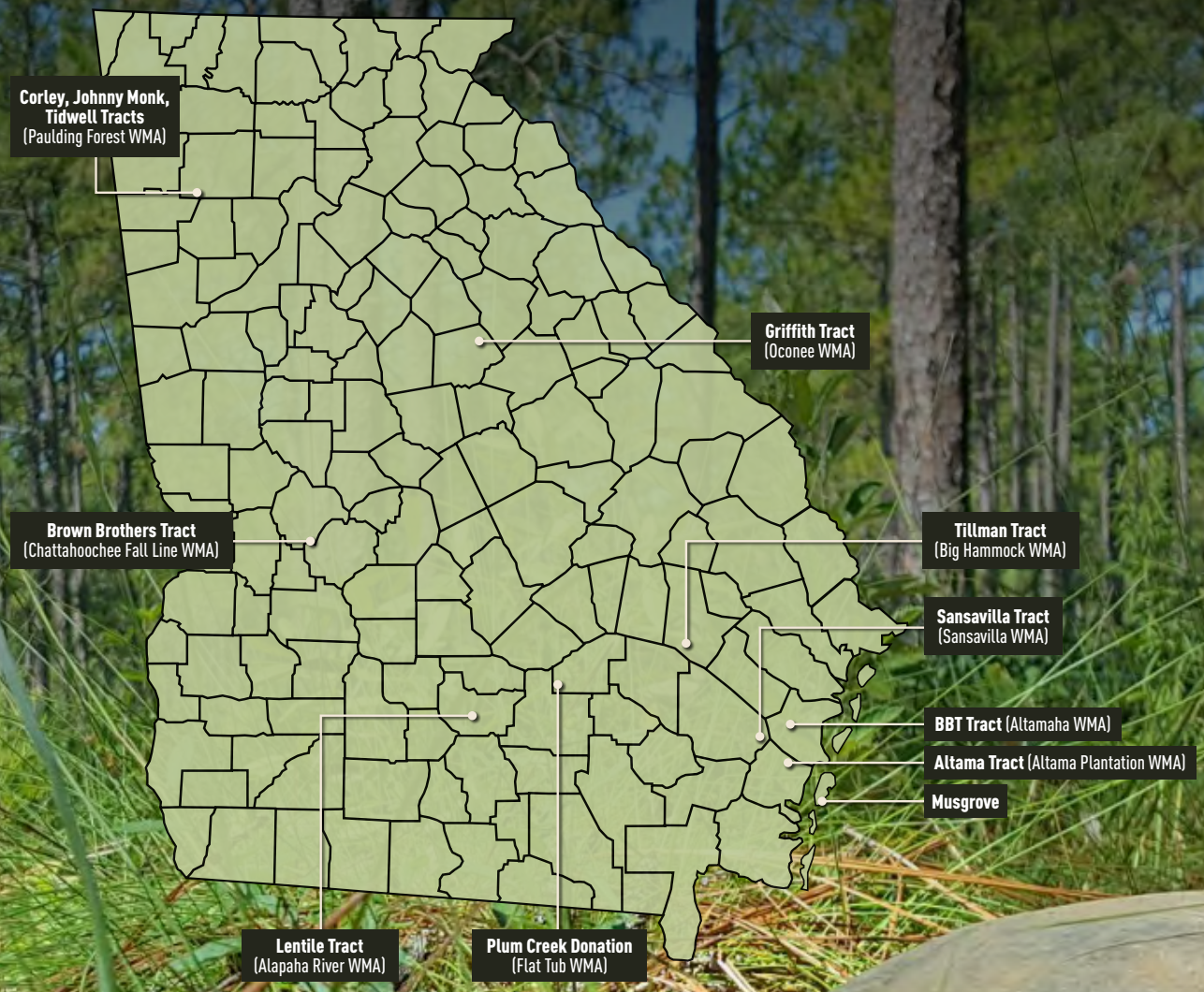
- Environmental Outreach Coordinator Linda May and Georgia artist Ami Flowers created a children's coloring book for Nongame Conservation. "Exploring Georgia's Wildlife" doubles as a promotion of Wildlife Resources Division license plates and a teaching aid regarding wildlife and conservation. Funded by The Environmental Resources Network (TERN), friends group of Nongame Conservation, and released at the 2016 Weekend for Wildlife, the book has been praised by First Lady Sandra Deal.
- May and Anna Yellin, Nongame Conservation's environmental review coordinator, organized and awarded a $1,000 grant to fifth-grade teacher Melanie Hartfield of Unity Grove Elementary in Locust Grove as part of a TERN-sponsored grant to recognize Georgia's exceptional third- through fifth-grade teachers in life sciences.
- Promotion of wildlife cams shared on the Wildlife Resources Division's website – Berry College's bald eagle nest cam and the Savannah-area great-horned owl nest cam provided by The Landings – plus the agency's peregrine falcon and Go Fish Education Center cams, helped the division land second in the Association for Conservation Information 2014 awards category "Supporting conservation and increasing online engagement." The award was given in summer 2015.
- Nongame Conservation biologist Steve Raper and DNR Private Lands Program Manager Dr. Jessica McGuire set up and staffed an information booth at the annual Southeastern Wood Producers Association meeting in Valdosta. In addition to general outreach topics, they emphasized gopher tortoise habitat protection as part of the effort to avoid federal listing of the tortoise.
- Raper also helped update a landowner information package provided to private landowners in Georgia interested in forest certification. The package is produced by the Sustainable Forestry Initiative. He worked, as well, with Nongame Conservation botanist Lisa Kruse to help a land trust develop a fundraising brochure for a land-protection project in southeastern Georgia, providing information about natural communities at the site and land-protection strategies.
- Nongame Conservation Assistant Chief Mary Pfaffko and botanist Dr. Mincy Moffett teamed with Jennifer Ceska, conservation coordinator of the State Botanical Garden of Georgia, to present a webinar on plant conservation and State Wildlife Action Plans to Association of Fish & Wildlife Agencies members.
- Moffett and fellow DNR botanist Tom Patrick helped with a long-range lesson on cotton, providing teacher Missy Biddinger of St. Joseph Consolidated School in Hamilton, Ohio, details on cotton biology and ecology, and even plants, for early American history lessons on natural resources and trade. "The kids loved it!" Biddinger wrote, noting that fellow teachers also used the plants with their students.

Weather Channel's Jim Cantore with DNR's Linda May and indigo *(Chris May)*

- Nongame Conservation wildlife biologist Eamonn Leonard gave lectures about invasive species to professional organizations, garden clubs and volunteer groups. Leonard also set up an outreach booth on invasives at the 2015 CoastFest. The annual event drew more than 7,500 people to DNR Coastal Regional Headquarters in Brunswick.
- Leonard helped coordinate and plant 20 wildflower plots along Ga. 99 north of Darien to promote native pollinators. Nongame Conservation, Ashantilly Center, McIntosh County 4-H and Coastal WildScapes seeded 14 of the plots with species native to coastal Georgia and collected locally.
- Linda May was featured on The Weather Channel in a Facebook Q&A and a live segment about snakes and why the public should not fear them.
- Wildlife biologist Katrina Morris worked with media outlets to publicize the plight of Georgia's bats during DNR's annual white-nose syndrome surveys. Coverage included reports such as this one on WSB-TV in Atlanta.
- Wildlife biologist Thomas Floyd updated DNR's Venomous Snakes of Georgia brochure for a fourth printing. The popular guide, funded largely by TERN and available online, features new range maps, occurrences and regulation details.
- Many biologists wrote popular articles and published research. Examples include: Senior wildlife biologist John Jensen worked with Dirk Stevenson (The Orianne Society), Elizabeth Schlimm (Joseph W. Jones Ecological Research Center at Ichauway) and Matt Moore to publish a review of records on the distribution, habitat and status in Georgia of the imperiled spotted turtle. Jensen also co-wrote with Private Lands Program Manager Dr. Jessica McGuire a paper on disease dynamics of red-spotted newts and their prey in the journal Disease of Aquatic Organisms. For River Research and Applications, malacologist Jason Wisniewski co-authored with former DNR employee Andrew Gascho Landis and Sandy Abbott (U.S. Fish and Wildlife Service) an evaluation of augmenting stream flows as a short-term strategy to conserve mussels. Assistant Chief Mary Pfaffko teamed with Jonathan Mawdsley and Mark Humpert of the Association of Fish and Wildlife Agencies to write an article on State Wildlife Action Plans for Wildlife Professional, journal of The Wildlife Society. Senior wildlife biologist Nathan Klaus wrote a Georgia Forestry Today article exploring research insights into conserving groundcover when planting longleaf pine. Steve Raper co-authored with Game Management's Eric Darracq a cover article in the same magazine describing the Forestry for Wildlife Partnership.
- Wildlife Resources Division blog posts by Nongame Conservation staffers featured wildlife technician Nate Thomas' work with local groups and governments to conserve rare large-flowered skullcap in the Resaca area, Georgia Botanical Society's "Year of the Bog" spotlight on Coastal Plain bogs, Sara Weaver's insights during the #7Days4SeaTurtles social media campaign on her work as a Sapelo Island sea turtle tech, and a partnership with Rabun Gap-Nacoochee School in a State Wildlife Grants project to help conserve hellbenders in northeast Georgia.

***DNR's Nate Thomas shows large-flowered skullcap** (Rick Lavender/DNR)*

LAND ACQUISITION AND CONSERVATION EASEMENTS



Through its Real Estate Office, DNR acquired fee ownership of 18,790 acres for public recreation and conservation as well as a 58-acre conservation easement in fiscal 2016. Acquisitions expanded ownership in seven wildlife management areas: Sansavilla, Paulding Forest, Altamaha, Big Hammock, Chattahoochee Fall Line, Flat Tub and Oconee. Also, two new WMAs, Altama Plantation and Alapaha River, were formed from acquisitions.

Gopher tortoise (Joe Burnam/DNR)

Sansavilla WMA
(Sansavilla Tract, Phase I)

The Sansavilla Tract covers 19,500 acres in Wayne and Glynn counties. Since 1972, DNR has leased the majority of Sansavilla each year as a wildlife management area. The Conservation Fund bought the property in 2014 and, while leasing 16,379 acres to DNR, is selling it to the agency in stages as funding becomes available.

For Phase I, DNR acquired fee ownership of 3,012 acres. The agency expects to acquire Phase II late in calendar year 2016 and the remaining acreage as Phase III in mid-2017.

Sansavilla has a large population of gopher tortoises, a candidate species for listing under the Endangered Species Act. The property also has federally threatened eastern indigo snakes and intact longleaf pine forests, as well as areas suitable for restoring longleaf pine.

Paulding Forest WMA
(Johnny Monk, Corley and Tidwell tracts)

During fiscal 2016, DNR acquired the 1,432-acre Johnny Monk Tract, the 217-acre Corley Tract and the 80-acre Tidwell Tract, adding 1,729 acres to Paulding Forest WMA in Paulding and Polk counties.

These tracts increase the recreational value of Paulding Forest, while also improving management options and allowing DNR to restore the tracts' montane longleaf pine habitat. Within Paulding and nearby Sheffield Forest WMA, DNR manages more than 30,000 acres. These WMAs are very popular due to their proximity to Atlanta. Both are available for hunting, fishing, hiking, bike riding and wildlife-watching pursuits such as birding.

Altamaha WMA
(BBT Tract)

The BBT Tract in McIntosh County is within the Altamaha River floodplain and surrounded on three sides by Altamaha WMA. DNR acquired 792 acres featuring high-quality floodplain forests, flatwoods and xeric longleaf pine uplands.

The combination and closeness of these habitats creates tremendous biological diversity, including habitat for the gopher tortoise, eastern indigo snake and swallow-tailed kite. This property is sometimes referred to as the Altamaha "Connector" Tract.

Prescribed fire crew at Altama Plantation (DNR)

Big Hammock WMA
(Tillman Tract)

Big Hammock WMA and the Tillman Tract in Tattnall County support diverse habitat for wildlife along the Altamaha River. Of particular importance is the regeneration of longleaf pine and the preservation of species such as the gopher tortoise and eastern indigo snake. Protecting enough habitat to preclude the need to federally list the gopher tortoise is a priority for DNR.

The Tillman Tract adjoins Big Hammock and totals 323 acres.

Chattahoochee Fall Line WMA
(Brown Brothers Tract)

The Brown Brothers Tract is a strategic site within a buffer area around Fort Benning, important to protect for reasons that include national security and the region's economy. The 277-acre Talbot County site adjoins the 7,495-acre Almo Tract, which was acquired in 2014 and became Chattahoochee Fall Line WMA. Georgia's State Wildlife Action Plan includes the Brown Brothers Tract within a high-priority zone for protection, important for recreation and for conservation because it has gopher tortoises.

As a partner in the acquisition, The Nature Conservancy retained a conservation easement on the Brown Brothers Tract that greatly reduced the purchase price for DNR.

Flat Tub WMA
(Plum Creek donation)

In 2005, DNR partnered with The Nature Conservancy and Plum Creek Timber Co. to protect 3,653 acres and 3.5 miles of Ocmulgee River frontage. A portion of this property was bought in 2005, and 1,661 acres in Jeff Davis and Coffee counties that would eventually be donated to the state were placed in a mitigation bank and leased to DNR as part of Flat Tub WMA.

With the mitigation bank monitoring requirements met in 2015, the donation was completed in fiscal 2016. Plum Creek has since merged with Weyerhaeuser.

Hatchling Florida pine snake (Matt Moore/DNR)

Oconee WMA
(Griffith Tract)

The Griffith Tract is a donated inholding within Oconee WMA. In December 2001, Georgia Power Co. donated 430 acres to DNR for the WMA. This acquisition in Putnam County included property along Lake Oconee's southern shore, but it did not include an undeveloped 0.86-acre lot. Development of that lot would have negatively affected the WMA.

The owner of the inholding donated the property to the state for a tax credit.

Altama Plantation WMA
(Altama Tract)

Acquiring the Altama Tract in Glynn County permanently preserved 4,123 acres for a new WMA. The tract is home to a vast ecosystem of plant and animal life, including longleaf pine and gopher tortoises. The Nature Conservancy acquired the property and then sold a restrictive easement to the U.S. Marine Corps via the Navy. This restrictive easement reduced the purchase price for DNR and provided the Marines a buffer to Townsend Bombing Range in McIntosh County. DNR partnered with The Nature Conservancy to allow the conservation organization to use houses and other structures on the property for conservation research.

Alapaha River WMA
(Lentile Tract)

Acquisition of the Lentile Tract in Irwin County formed the new Alapaha River WMA. While known locally as an exceptional recreational tract for hunting, fishing, hiking and wildlife watching, the 6,869-acre site is also prized for its conservation value.

The Lentile Tract has the third-largest population of gopher tortoises in the state. Georgia's state reptile is a candidate for listing under the Endangered Species Act. It's also a keystone species. More than 300 other animal species use the burrows tortoises dig for shelter, underscoring the importance of the gopher tortoise's impact on the ecosystem.

Lentile also provides habitat for the federally threatened eastern indigo snake; the striped newt, a candidate for federal listing; and five species petitioned for federal listing – alligator snapping turtle, eastern diamondback rattlesnake, Florida pine snake, gopher frog and Say's spiketail, a dragonfly.

Musgrove Plantation
(Phase 1)

DNR acquired a 58-acre conservation easement on St. Simons Island's Musgrove Plantation in fiscal 2016. Although targeted for development, the property has habitats identified in the State Wildlife Action Plan as a high priority for conservation, including brackish and saltwater marsh, maritime forest, coastal hammocks, pine flatwoods, and tidal rivers. A number of high-priority bird species, such as the federally endangered wood stork, use these habitats for foraging.

St. Simons Land Trust bought the 58 acres, known as Phase I of the 465-acre Musgrove Plantation, and sold a conservation easement to the state.

Georgia Conservation Tax Credit Program

The Nongame Conservation Section administers the Georgia Conservation Tax Credit Program in conjunction with the State Properties Commission. This program provides a tax credit for taxpayers who place conservation easements on their land or make fee-simple donations to qualified organizations.

Of the 13 applications in 12 counties received in fiscal 2016, six were approved by the State Properties Commission and received the tax credit. Four of the 13 applications received pre-certification for the program and most have submitted final applications. In addition to the six certified applications received in fiscal 2016, 18 applications received prior to the fiscal year were certified.

These 24 certifications protected a total of 10,732 acres with conservation easements and fee-simple donations.

The staff managing the program is funded in part through the Georgia Environmental Finance Authority. The funding was continued for fiscal 2016. The Legislature extended the program for five more years.

State Wildlife Action Plan Revision

As coordinator of the State Wildlife Action Plan in Georgia, the Nongame Conservation Section completed and submitted a draft of the 2015 revised plan for review by the U.S. Fish and Wildlife Service in September 2015 and approved a year later. The Wildlife Action Plan outlines critical areas of need, with a focus on keeping native species from declining to the point of requiring federal protection as threatened or endangered species. Developing, revising and implementing the plan are required to receive State Wildlife Grants.

With the help of DNR's conservation partners, this 10-year roadmap for conservation was updated with the most current information. The Fish and Wildlife Service approved the revised plan in September 2016, after which DNR and its partners began putting the updated strategy into action. Many of the conservation successes accomplished through the Wildlife Action Plan are described elsewhere in this report, but highlights from regional conservation efforts are discussed in the following section.

Also in fiscal 2016, DNR continued to serve with the Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission on a Regional Review Team to review each of the revised 2015 State Wildlife Action Plans in the Southeast.

Regional Conservation Partnerships

Since 2010, the U.S. Fish and Wildlife Service has received three mega-petitions to list a total of 496 species under the Endangered Species Act. In 2011, the service reached a settlement with the Center for Biological Diversity and WildEarth Guardians under a national multidistrict litigation to evaluate and make listing decisions on petitioned and candidate species. The Fish and Wildlife Service's Southeast Region is responsible for roughly 60 percent of the workload to evaluate these species. More than 100 of the species are found in Georgia, amplifying the need for up-to-date status information to help inform the service's 90-day findings and 12-month findings to determine whether a listing is warranted.

Tackling emerging issues such as mega-petitions to list species under the Endangered Species Act requires innovative approaches. One is the creation of regional conservation partnerships, such as the Southeast At-risk Species Program, that are capable of achieving success that could not be accomplished by individual states. Often referred to as SEARS, the Southeast At-risk Species Program was implemented by the Southeastern Association of Fish and Wildlife Agencies in cooperation with the Fish and Wildlife Service and the Wildlife Management Institute. The goal is to preclude the need to federally list species.

In fiscal 2016, the southeastern association's Wildlife Diversity Committee, of which DNR is a member, marked its first year in the SEARS grant program. This program is funded by pooling a portion of State Wildlife Grants and other funds from participating states in the Southeast. Grants support research, surveys and restoration projects to inform listing decisions and conserve petitioned species before they require protection under the Endangered Species Act.

This and other proactive measures are contributing to conservation gains. Since 2011, the Fish and Wildlife Service, working in partnership with state fish and wildlife agencies, has determined that 72 of the petitioned species did not warrant federal listing as a result of research or conservation actions. Another 12 species that were federally listed have been either downlisted or delisted.

Landscape Conservation Cooperatives, or LCCs, are another type of regional conservation partnership developed since the first version of Georgia's Wildlife Action Plan. The aim here is using a network of resource managers and scientists from a wide range of sources to more effectively integrate science and management in addressing climate change and other landscape-scale issues across regions. DNR is represented on each of the three cooperatives that include parts of the state: the South Atlantic, Appalachian, and Gulf Coastal Plains and Ozarks LCCs. In June 2016, Nongame Conservation Chief Dr. Jon Ambrose was elected vice chair of the South Atlantic LCC Steering Committee.

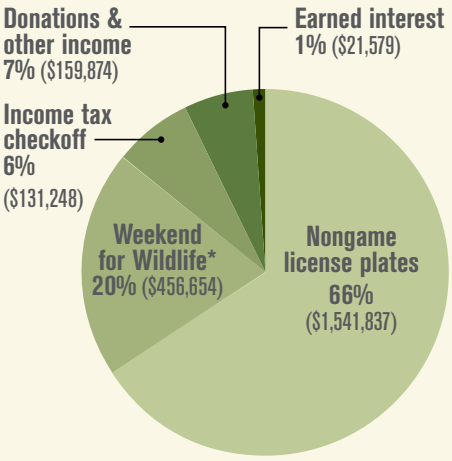
Early in fiscal 2017, the South Atlantic LCC released Blueprint 2.1, an adaptable, spatial plan that describes the places and actions needed to conserve natural and cultural resources for future generations. The blueprint provides a consistent plan that transcends boundaries and organizations in mapping out how the conservation community can respond to change.

The work of Landscape Conservation Cooperatives has led, in turn, to the Southeast Conservation Adaptation Strategy, referred to as SECAS, an initiative by the Southeastern Association of Fish and Wildlife Agencies and others to knit together the conservation blueprints of LCCs in the region. Scheduled for release in mid-October 2017, a first draft for the Southeast and Caribbean LCCs will combine conservation priorities of LCCs across the region into one map.

Monitoring prairie restoration at Oaky Woods WMA

REVENUE

TOTAL: $2,311,192*

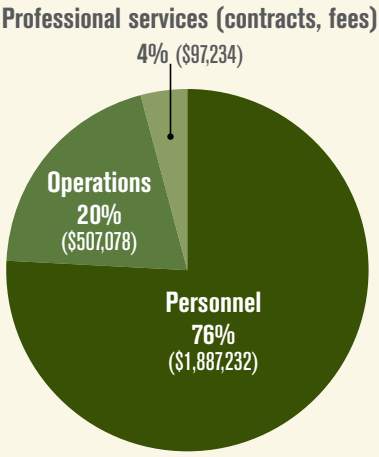


Does not include federal and other grants or $429,318 in state appropriations.

** Includes estimated revenue from Weekend for Wildlife that will be disbursed through the Georgia Natural Resources Foundation.*

EXPENDITURES

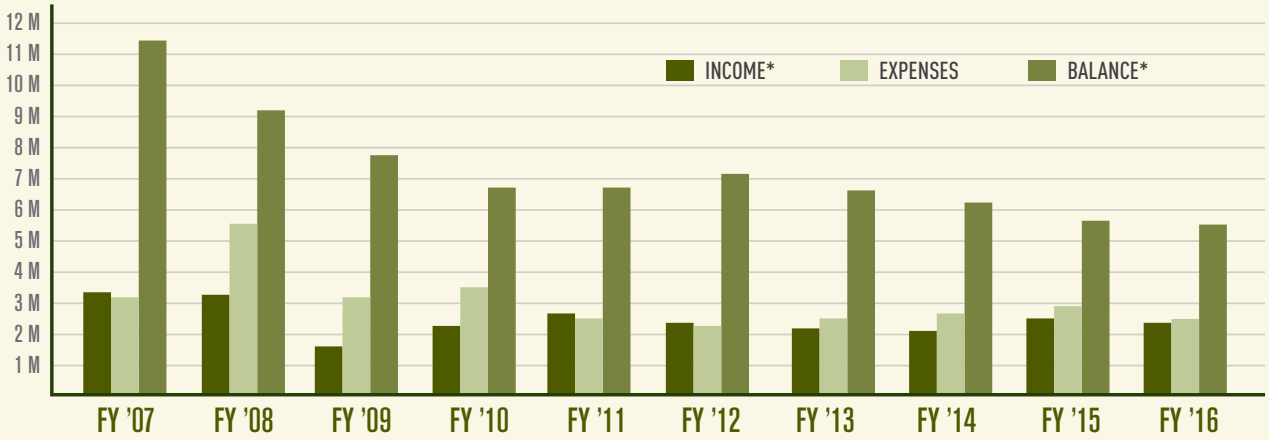
TOTAL: $2,491,544



Through Nongame Fund.

NONGAME CONSERVATION FUND

Listed in millions per year.



** Includes estimated revenue that will be disbursed through the Georgia Natural Resources Foundation.*

Nongame Wildlife Conservation Fund

For the first time in years, the Nongame Conservation Section received state appropriations in fiscal 2016. The General Assembly budgeted $429,318 for the agency. However, because those appropriations made up only about 6 percent of the section's research and conservation budget, fundraising remained a priority.

Nongame Conservation depends largely on three fundraisers: the nongame wildlife license plates, Weekend for Wildlife and the Give Wildlife a Chance state income tax checkoff. Contributions go into the Nongame Wildlife Conservation and Wildlife Habitat Acquisitions Fund, often referred to as the Georgia or Nongame Wildlife Conservation Fund. (Learn more about these fundraisers at www.georgiawildlife.com/conservation/support.)

The Environmental Resources Network (TERN), the friends group of Nongame Conservation also provides significant support.

In fiscal 2016, the Nongame Wildlife Conservation Fund totaled an estimated $2.3 million in revenue – including an estimated $456,654 raised at Weekend for Wildlife that will be disbursed through the Georgia Natural Resources Foundation to the fund – and not counting federal and other grants. Expenses paid through the fund totaled $2.49 million. In addition to the three primary fundraisers, revenue included $21,579 in earned interest and $159,874 in donations and other income.

Nongame License Plates

The bald eagle and ruby-throated hummingbird tags are the Nongame Conservation Section's largest fundraiser, a standard of support for more than 15 years. Sales and renewals average more than half the annual revenue for the Nongame Wildlife Conservation Fund. In fiscal 2016, these license plates accounted for 66 percent of the fund's estimated revenue, up from 55 percent in 2015 and 41 percent in 2014.

One reason for the increase is 2014 legislation that lowered the cost of buying or renewing all DNR wildlife plates to only $25 more than a standard design tag and dedicated up to 80 percent of those fees ($19 per sale and $20 of each renewal) to the wildlife programs the plates benefit. Since July 1, 2014, $19 for each eagle and hummingbird tag bought and $20 for each renewed has gone to help conserve nongame wildlife and natural habitats.

Sales and renewals of nongame plates exceeded $1.5 million in both fiscal 2016 and 2015, compared to $841,160 in 2014. However, the number of eagle and hummingbird tags in circulation continues to shrink. From 2010 to the close of fiscal 2016, the total declined 78 percent, from 347,401 to 77,700 plates, and there were 4,169 fewer plates in circulation in 2016 than the previous year.

The drop in tag numbers and, before 2015, tag revenue trailed 2010 legislation that raised the price for these and most specialty plates, reduced to $10 the share going to sponsor groups, and added an annual renewal fee. While the renewal fee initially increased revenue – eagle and hummingbird tag sales and renewals peaked at $1.88 million in 2011 – the price increase and additional fee undercut sales and the rate of renewals.

DNR Wildlife Resources Division Public Affairs and The Environmental Resources Network, friends group of Nongame Conservation, have worked to reverse those trends. In 2016, those efforts included:

- Working with the state Revenue Department to bring online a new plate featuring a bald eagle and the U.S. flag. This iconic combo, created by Wildlife Resources graphic artist Ryan Holt, is a redesign of DNR's smaller eagle-and-flag tag sold from 2004-2013 and considered Georgia's most popular specialty plate. The tag replaces the flying eagle design introduced in 2013. Early results are promising: 68 percent more eagle plates were sold in August 2016 than in August 2015.
- Continuing to raise awareness of the 2014 pricing change and the support that plates provide nongame conservation. County tag offices and car dealers (which can sell plates to vehicle buyers) were contacted. TERN provided a $3,000 grant for a tag office contest. Wildlife Resources targeted promotions, including eagle tag advertisements at football games of Georgia Southern University's Eagles.

Weekend for Wildlife

Weekend for Wildlife is one of the country's most successful fundraisers for nongame conservation, grossing more than $10 million since 2001. The annual event started in 1989 draws 200-400 guests to the prestigious Cloister at Sea Island for a weekend of outdoor trips, auctions and dining.

The celebration in 2016, the 28th annual Weekend for Wildlife, raised more than $1 million, a record for the event. Excluding some event-related expenses and fees as well as directed giving for targeted programs, an estimated $456,654 will be disbursed through the Georgia Natural Resources Foundation to the Nongame Wildlife Conservation Fund.

'Give Wildlife a Chance' State Income Tax Checkoff

The state income tax checkoff offers Georgians a convenient way to contribute to the Nongame Wildlife Conservation Fund. Since the checkoff's creation in 1989, net contributions have averaged about $300,000. In fiscal 2016, however, contributions hit a new low of $131,248.

That total undershot the previous low of $184,065 in 1994. In 1991, the checkoff hit an all-time high, raising $510,910. 2016 marked a 45 percent decline from the previous year's contributions of $240,443.

The Give Wildlife a Chance checkoff is line 26 on the long state income tax form (Form 500) and line 10 of the short form (Form 500-EZ).

The Environmental Resources Network

The Environmental Resources Network, or TERN, is a nonprofit organization founded in 1992 to support Nongame Conservation Section activities. TERN, online at http://tern.homestead.com and on Facebook, raises most of its funds through membership dues and through auction, raffle and sale items at Weekend for Wildlife.

In fiscal 2016, TERN funded 20 project proposals submitted by Nongame Conservation staff and totaling $69,918. Those projects included:

Summer Camp ACE (Adventures in Conservation Education)	$8,000
Outdoor Wildlife Leadership School	$7,800
Youth Birding Competition	$7,400
Revitalizing the Big Hammock WMA nature trail	$7,200
Manatee satellite telemetry equipment	$6,100
Study of the impacts of extreme high-tide events on sea turtle nesting	$4,800
Automated recorders for anuran survey and monitoring	$4,500
Additional transmitters for study of ranges and potential habitat of cave-dwelling bat species in north Georgia	$4,445
Camp TALON (youth birding camp)	$3,000
Tag office contest to promote DNR nongame license plates	$3,000
Give Wildlife a Chance poster contest	$2,600
Teacher Conservation Workshop	$2,000
Hellbender informational signage and education/outreach poster	$1,890
2016 Christmas Bird Count for young birders	$1,640
TERN Outstanding Teacher Award	$1,250
Festival booth activities for Nongame Conservation outreach	$1,150
Nongame Conservation prescribed fire equipment	$1,000
Radford's mint habitat restoration at Townsend WMA	$805
Furniture upgrades at Forsyth Nongame Conservation office	$763
Equipment for red-cockaded woodpecker restoration	$575

Sea turtle hatchling on Cumberland (DNR)

TERN provided financial support, as well, to several other projects and nongame-related conferences throughout the year.

Officers for the group include Brooks Schoen as president, Vice President Joey Slaughter, Secretary Leigh Callan, Treasurer Eva Persons, Executive Director Terry W. Johnson and Executive Secretary Wanda Granitz.

In fiscal 2016, Executive Director Johnson started a blog called Backyard Wildlife Connection. The blog features Johnson's insights into nature, from rose-breasted grosbeaks to flying squirrels to butterflies and native plants that benefit wildlife. Johnson is the former manager of what was DNR's Nongame Conservation Program.

Federal and Other Funding

The Nongame Conservation Section received nearly $10.1 million in federal and other grants during fiscal year 2016 to support projects that benefit nongame wildlife species and their habitats. The grants included $7 million for land acquisition. Sources varied from the State and Tribal Wildlife Grants Program, the Cooperative Endangered Species Conservation Fund and National Coastal Wetlands Conservation Grant Program – all administered by the U.S. Fish and Wildlife Service – to the National Oceanic and Atmospheric Administration and the U.S. Navy.

Use of these targeted grants, usually matched with funds from the Nongame Wildlife Conservation Fund, included acquiring habitat for conservation and research, surveys and occurrence data collection focused on at-risk species.

As part of that total, Nongame Conservation received $1.3 million in State Wildlife Grants. That amount marked a slight increase over fiscal 2015, yet still registered 36 percent or $731,000 less than in fiscal 2010, the program's funding high-point. A suite of federal conservation programs, including State Wildlife Grants, have been cut since 2010. State Wildlife Grants, which has bipartisan support, saw an overall funding increase in fiscal 2014 and remained stable in 2015. However, the funding is not sufficient for states to meet the conservation needs outlined in their State Wildlife Action Plans.

State and Tribal Wildlife Grants is the only federal program designed to prevent wildlife from becoming endangered through voluntary, proactive conservation. The DNR Wildlife Resources Division uses the funding to research and monitor species of greatest conservation need, restore habitat, acquire land, and accomplish other work identified in Georgia's State Wildlife Action Plan. This plan, a comprehensive wildlife conservation strategy created in 2005 and revised in 2015 with partner agencies, organizations, stakeholders and the public, is required to receive State Wildlife Grants.

Conservation work spurred by the Wildlife Action Plan contributes to local and state economies by supporting the nation's more than 90 million wildlife watchers 16 years old and older, a group that spends some $55 billion a year on wildlife-related recreation, according to the Teaming with Wildlife Coalition and a 2011 U.S. Fish and Wildlife Service survey.

In Georgia, State Wildlife Grants are critical to helping conserve wildlife and natural places for current and future generations. Wildlife watching included more than 2.2 million Georgians and $1.8 billion in related expenditures in the state in 2011, according to the Fish and Wildlife Service survey.

In February 2016, DNR Wildlife Resources Division leaders spread the word about nongame conservation and key funding at the Teaming with Wildlife Fly-in in Washington, D.C. The annual event is an opportunity to inform members of Congress about how federal programs such as State Wildlife Grants help prevent wildlife from potentially becoming rarer or too costly to restore, though more resources are needed. Teaming with Wildlife is a national coalition working to support State Wildlife Grants and secure dedicated funding to prevent America's wildlife from becoming endangered.

In fiscal 2016, that work was highlighted by recommendations from the Blue Ribbon Panel on Sustaining America's Diverse Fish and Wildlife Resources that led to introduction of federal legislation to provide critical funding for states to conserve species of greatest conservation need, as determined by their Wildlife Action Plans. Panel members – national leaders representing outdoor recreation retail and manufacturing, energy and automotive industries, private landowners, educational institutions, conservation organizations, sportsmen's groups, and state fish and wildlife agencies – were charged with identifying a new funding mechanism to support state fish and wildlife conservation to ensure the sustainability of wildlife.

Their recommendation, announced in spring, was twofold:

- Congress should dedicate $1.3 billion annually in existing revenue from the development of energy and mineral resources on federal lands and waters to the Wildlife Conservation Restoration Program. Without requiring a new tax, these funds would provide states with the resources needed to implement Wildlife Action Plans. Georgia's share would be an estimated $31 million annually, compared to less than $1.3 million from State Wildlife Grants.
- Second, a working group should be convened to examine the impact of societal changes on the relevancy of fish and wildlife conservation and make recommendations on how programs and agencies can evolve to engage and serve broader constituencies.

In July, at the start of fiscal 2017, the Recovering America's Wildlife Act of 2016 was introduced in the House of Representatives. As outlined in the Blue Ribbon Panel's recommendations, H.R. 5650 would provide dedicated funding for the Wildlife Conservation Restoration Program, which was established as a subaccount under the Pittman-Robertson Wildlife Restoration Act in 2000.

The Wildlife Resources Division has helped lead the effort to identify dedicated funding for states to conserve nongame. That effort included former directors Dan Forster and David Waller taking part in the Blue Ribbon Panel's first meeting.

Administration and Personnel

In early fiscal 2017, Rusty Garrison was named director of the DNR Wildlife Resources Division. The 18-year DNR employee had served most recently as manager of Charlie Elliott Wildlife Center in Mansfield. Garrison previously worked as assistant chief of the Game Management Section and state coordinator of Project WILD (Wildlife in Learning Design), a wildlife-based conservation and environmental education program. On Aug. 1, he took the position left vacant by retiring Director Dan Forster.

Dr. Bob Sargent became program manager at the DNR Nongame Conservation Section's Forsyth office in January 2016. He replaced Jim Ozier, who retired and now works with Georgia Power Co. Sargent formerly worked as Robins Air Force Base natural and cultural resources manager and served eight years as Georgia Ornithological Society president.

In other personnel news:

Wildlife Resources Division Director Rusty Garrison

- Wildlife biologist Clay George earned the National Marine Fisheries Service's Team Member of the Year Award in summer 2015. George, who leads Nongame Conservation's work with North Atlantic right whales and other marine mammals, was recognized by peers at the federal agency for his "contributions to the nation toward the stewardship of living marine resources."

DNR's Clay George was awarded National Marine Fisheries Service's Team Member of Year

- The Garden Club of Georgia presented its Seal of Honor to Melissa Hayes, who handles administrative support at Nongame Conservation's Forsyth office. Hayes was honored at an April 2016 banquet for her dedication in helping Georgians manage wildlife habitat in their yards, neighborhoods and communities for Community Wildlife Project certification, an initiative of the Garden Club and Nongame Conservation.

- Dan Forster, retired Wildlife Resources Division director, received the Seth Gordon Award from the Association of Fish and Wildlife Agencies in September 2016. Named for a noted wildlife conservationist, the honor is the highest given by the organization and recognizes lifetime achievements of natural resources administrators. Forster began work with DNR in 1990. He is now the Archery Trade Association's government relations director.

- Longtime DNR educator Sheila Humphrey of Smithgall Woods Regional Education Center retired in fiscal 2016. Humphrey taught more than 150,000 children and teens about wildlife conservation and the environment.

- Todd Holbrook, former DNR deputy commissioner and Wildlife Resources assistant director, received the 2015 Clarence W. Watson Award, considered the most prestigious honor given by the Southeastern Association of Fish and Wildlife Agencies. Holbrook's late father, Duff Holbrook, also received the award in 1988.

- The Southwest Georgia Sportsmen's Club named DNR wildlife technician Russ Singletary its Habitat Manager of the Year. Game Management Section staff with DNR's Wildlife Resources Division nominated the Thomasville resident, who in 2005 began work at River Creek, the Rolf & Alexandra Kauka Wildlife Management Area, shortly after the state acquired the property.

DNR's Melissa Hayes with Garden Club of Georgia Seal of Honor

AFWA President Dave Chandra, left, presents the Seth Gordon Award to Dan Forster (AFWA)

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Child explores ABAC's Turner County pitcherplant bog (Lisa Kruse/DNR)