

Appendix I. Habitat Restoration Technical Team Report

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Technical Team Members

The following people served on the Habitat Restoration Technical Team. Several of these people had served on the original SWAP HRTT chaired by Shan Cammack, including Tim Beaty, Neal Edmonson, Malcolm Hodges, Nathan Klaus, and Jim Wentworth. This provided solid continuity and a longer range vision in the whole process.

Team Leaders

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Eamonn Leonard, Department of Natural Resources, Natural Resources Biologist

Team Members

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Jim Wentworth, US Forest Service, District Wildlife Biologist

Approach

A Habitat Restoration Technical Team (HRTT) was assembled to pull expertise from across the state representing agencies with major management responsibilities. Members reviewed materials on the original State Wildlife Action Plan (SWAP), attended a Technical Team meeting in December 2013, and prepared a chapter on habitat restoration for the SWAP revision.

The team was tasked with the following:

- review the relevant chapters and spreadsheet on threats from the original SWAP and determine if threats have changed significantly in the last ten years,
- review the Recommended Actions and Strategies and assess how well these have been addressed,
- determine which recommendations were implemented and which areas were not addressed,
- summarize the progress made on these issues and on the priority conservation strategies, and
- expand on and include more special sections (i.e. Coastal Invasive Species Management Area, Georgia Prescribed Fire Council, Longleaf Alliance Initiative, Forest Action Plan, Natural Resources Conservation Service).

The Team worked together from October 2013 to present. Much of the discussions and contributions were made electronically. The Technical Team members convened on December 10, 2013 at the Charlie Elliot Wildlife Center. Attendees presented briefly on how they have used the SWAP over the last 10 years and how they foresee its application over the next decade. Discussion was facilitated by Shan Cammack and Eamonn Leonard. Discussion points focused on HRTT tasks needed to revise the SWAP, including management needs, recommendations for future management approaches, revisiting the previously defined 25 habitat stressors, and examining the new natural environments of Georgia habitat names to determine the need to crosswalk past SWAP names to this scheme.

The following recommended actions and strategies were specifically addressed at the meeting:

- altered fire regimes,
- altered hydrology and water quality,
- habitat protection,
- reduction of development impacts,
- incompatible recreation,
- improved management practices,
- combatting invasive and alien species, and
- facilitating monitoring.

The following conservation goals and strategies were also a focus of discussion: wildlife conservation on private lands, wildlife conservation on public lands, conservation of high priority habitats and species, and reducing the impacts from development and other incompatible activities. Following the face to face meeting, communications continued through e-mail. HRTT interacted with several of the other SWAP teams on a number of high priority issues.

This chapter provides information collated from HRTT members and other contributors to highlight the management work across the state of Georgia that has occurred in the last ten years that supports SWAP objectives.

**ACHIEVING SWAP OBJECTIVES
OVER THE LAST TEN YEARS
Shan Cammack (GA WRD)**

The HRTT for the original SWAP defined high priority habitats by ecoregion, assessed problems affecting high priority habitats in each ecoregion, and identified habitat restoration techniques and strategies to address these problems. The current HRTT determined that these things have not changed significantly over the past ten years. Therefore the focus of this chapter is on upland management activities that have addressed SWAP objectives. Of the basic management needs that were identified in the original SWAP, the highlighted items to the right are the core of this chapter.

Management Needs
restoring fire
restoring hydrology
controlling invasives
restoring natives
protecting from disturbance
vegetation management

The following Recommended Actions and Strategies were identified in the original SWAP. A number of these have been addressed by different agencies state-wide and are discussed in this chapter.

<p><i>Address Altered Fire Regimes</i></p> <ul style="list-style-type: none"> • Develop partnerships among agencies to increase capacity to conduct prescribed burning and to identify priority areas in need of better fire management (appropriate timing and frequency) • Continue support of the Interagency Burn Team • Work with private landowners to encourage prescribed burns in fire-adapted habitats through technical assistance and incentive programs • Establish NWCG (National Wildfire Coordinating Group) certification standards for all state and federal practitioners
<p><i>Encourage Improved Management Practices</i></p> <ul style="list-style-type: none"> • Work with USFS, NPS, USFWS, and other public land managers at multiple levels to improve habitat management on all public lands, emphasizing restoration and maintenance of natural habitats and addressing regional conservation • Couple habitat management and educational outreach programs on public and private conservation lands to provide the public with examples of sound stewardship for all wildlife resources • Work with NRCS to promote the planting of native species through Farm Bill programs. • Improve public familiarity with and use of BMPs for agriculture, forestry, and land development practices • Engage local, regional, and state stakeholders to promote better land use and water use planning
<p><i>Combat Invasive/Alien Species</i></p> <ul style="list-style-type: none"> • Work with gardening groups, nurseries, and major retail corporations to reduce importation of invasive exotic species • Promote education about exotic species, including identification, effects, and eradication measures • Work with land management agencies to initiate integrated control measures that focus on early detection and eradication of alien

Statewide Initiatives

Georgia Prescribed Fire Council **Mark Melvin (Ichauway)**

The Georgia Prescribed Fire Council (GPFC) was established in 2001 to promote the use of prescribed fire and to encourage information and technology exchange between fire practitioners, policymakers, and the public. Led by a diverse group of agencies, organizations, and land owners, it grew quickly from a Southwest Georgia initiative into a statewide organization. GPFC promotes a unified message from all prescribed fire practitioners: *prescribed fire is a safe way to apply a natural process, ensure ecosystem health, and reduce wildfire risk.*

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
	<i>Combatted Invasive/Alien Species</i>

The GPFC works cooperatively with stakeholders to address issues ranging from education and training to policy and air quality. With support from the Georgia Forestry Commission, the council led an effort in 2007 that resulted in 157 of 159 Georgia County Commission Boards signing a proclamation supporting the use of prescribed fire. One of the key elements identified in the proclamation document was support of prescribed fire as a high priority in the SWAP. The Governor was presented with a copy of every signed proclamation in the capital during Prescribed Fire Awareness Week (PFAW) the following year. PFAW is an initiative that the council helped develop along with other partners as a platform to bring legislative recognition to the importance of prescribed fire as a natural resource management tool. The annual event also provides an opportunity to engage the media and educate the citizens of the state.

In 2007, the GPFC was presented with the “Pulaski Award” by the Fire Director from the National Association of State Foresters. This traveling award is given annually by the National Interagency Fire Center Directors to a fire organization that demonstrates excellence in fire management. The GPFC has also played a key role in improving collaboration and communication between the fire community and air quality regulators. The council was identified as the primary stakeholder to assist GA EPD and GFC in developing Georgia’s Smoke Management Plan that was formally accepted by EPA. Following the city of Atlanta being impacted from two large prescribed burns north of Macon, two members from the GPFC sat on a six person After Action Review Panel investigating the incident. As a result, GFC instituted a new policy that informs communities in the vicinity of prescribed fires over 1,000 acres the day they occur.

Today the GPFC serves as the ‘go-to’ organization for prescribed fire in the state. As a founding member of the Coalition of Prescribed Fire Councils, Inc., the GPFC has contributed significantly to the establishment of new prescribed fire councils across the United States. It is important to Georgia’s natural resources that the GPFC remain a strong, viable organization promoting the appropriate use of prescribed fire to maintain and enhance both forest and public health.

Invasive Species Efforts

Eamonn Leonard (GA WRD) and Karan Rawlins (UGA Bugwood)

(Adapted from the Georgia Invasive Species Strategy)

A tremendous amount of work has been accomplished in the past ten years addressing invasive species issues and awareness of their impacts has been greatly heightened. For the purposes of this chapter, invasive species refers to nonnative species that have been introduced, either intentionally or accidentally, into areas outside their natural ranges and that cause economic or environmental harm or impacts to human health. They are not a new phenomenon. Over the course of human history, over 50,000 nonnative species have been introduced into North America. Many of these species, such as wheat, rice, cattle, and poultry were introduced as sources of food and now provide more than 98 percent of the U.S. food system, valued at approximately \$800 billion per year (Pimentel et al. 2005). Other exotic species were introduced for landscape restoration, biological pest control, sport, or pets.

	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>

The introduction of nonnative species has a long history in Georgia. Many of these species were important for early colonists for establishing viable agricultural products. Some of these species were further spread and cultivated by Native Americans. Through the course of history new species continued to be introduced as Georgia became a state. While many significant benefits have resulted from these nonnative introductions, over time, natural, accidental or intentional dispersion of some nonnative species into new environments has resulted in negative effects to the ecological communities of infested areas, or to commercial, agricultural, aquacultural, or recreational activities dependent on these areas. These harmful nonnative species are considered to be invasive species. For a nonnative organism to be an invasive species in the policy context, the negative effects that the organism causes or is likely to cause must outweigh any benefits it may provide.

While nonnative species have historically played an important role in Georgia, two species that exemplify the environmental and economic damage invasive species can have are *Cryphonectria parasitica*, the causative agent of chestnut blight, and the boll weevil (*Anthonomus grandis*). Before 1900, the American chestnut tree (*Castanea dentata*) made up as much as one-quarter of the tree species in the Appalachian forest. In Georgia, chestnuts were particularly prominent in the Cohutta and Blue Ridge Mountains, but were also frequently found in the Ridge and Valley and the Piedmont ecoregions, and on the Cumberland Plateau. The American chestnut played a prominent ecological role in their environment, providing food and shelter to many wildlife species as well as having many economically important uses from ornamental trees to construction and tannin production for the US. leather industry. The chestnut blight fungus entered the U.S. through New York City on Japanese chestnut stock imported as orchard trees in the late 1800s. The infection spread south at the rate of 200 miles every ten years, reaching Georgia in the early 1930s. Nearly every mature chestnut tree within the species' natural range (estimated three to four billion trees) was killed by chestnut blight by the 1940s. Today, American chestnut trees survive by resprouting from surviving root systems in the soil. However, they rarely mature or produce nuts before falling victim to the fungus.

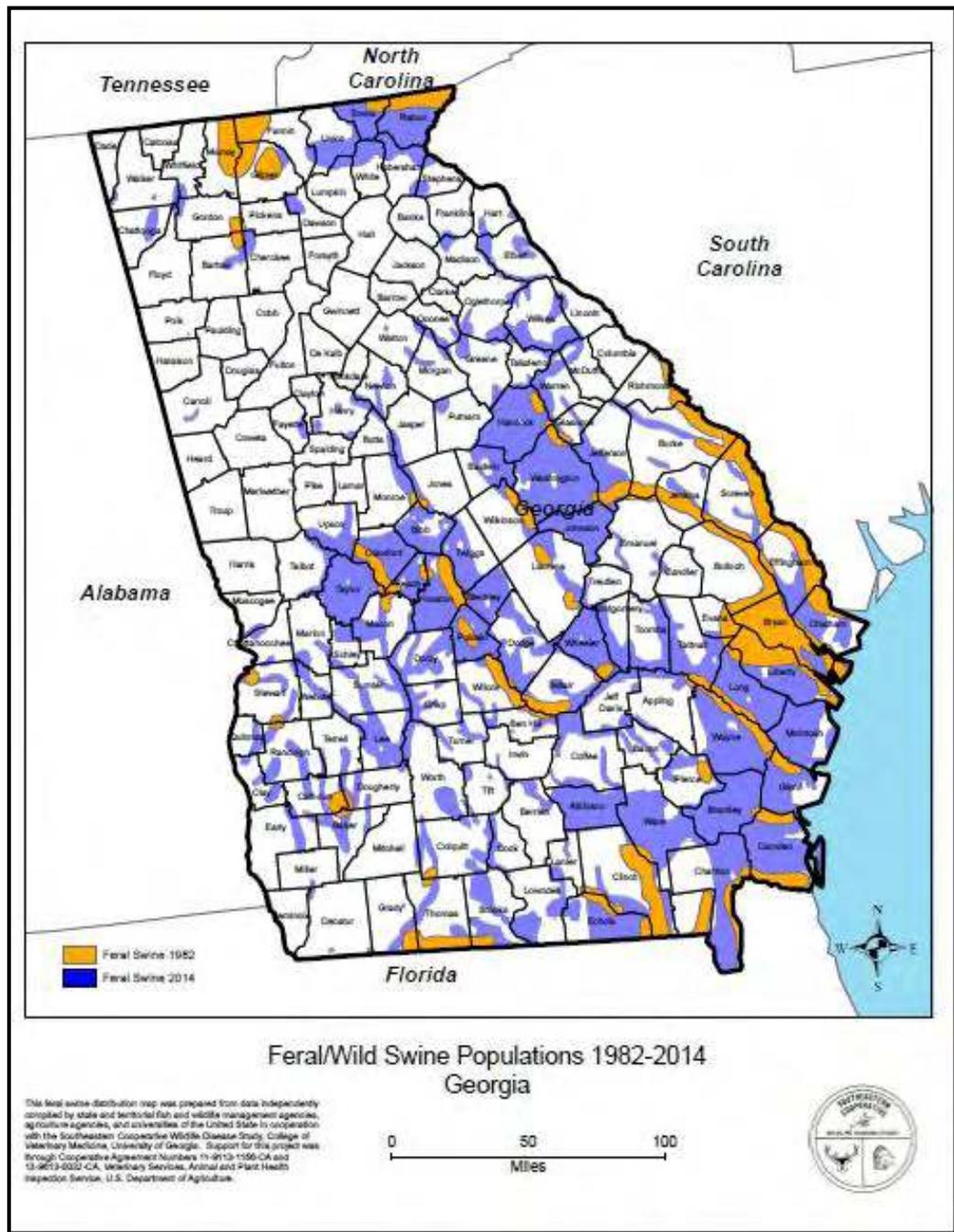
The boll weevil is another invasive species that has had enormous effects on the state. The boll weevil is an insect that feeds on cotton buds and flowers, causing extensive damage to the plant. A native of Central America, the beetle entered Texas in 1892, and reached Thomasville, Georgia in 1915. Subsequently, state cotton production plunged rapidly from a historical high of 2.8 million bales in 1914 down to 600,000 bales in 1923. Total state losses from boll weevil infestation were estimated at \$40 million by 1919. Boll weevil infestation was considered by some to be the biggest disturbance of Georgia's

economy since the end of the Civil War. In 1987, Georgia enrolled in the federal Boll Weevil Eradication Program, a cooperative effort involving USDA, state officials, and cotton growers. Consequently, the boll weevil was eradicated in the state by 1991.

Introduced nonnative species can presently be found throughout the state in each of its five major ecoregions: the Blue Ridge, Cumberland Plateau /Ridge and Valley, Piedmont, Coastal Plain, and Maritime Ecoregions. In the Cumberland Plateau /Ridge and Valley ecoregions, the red shiner (*Cyprinella lutrensis*) is suspected of having a serious effect on the native blue shiner (*C. caerulea*) through competition and hybridization. Invasive species of concern in this region include cogongrass (*Imperata cylindrical*), Japanese climbing fern (*Lygodium japonicum*), Japanese stilt grass (*Microstegium vimineum*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), oriental bittersweet (*Celastrus orbiculatus*), princess tree (*Paulownia tomentosa*), silvergrass (*Miscanthus sinensis*), and autumn olive (*Elaeagnus umbellata*). These species, along with kudzu (*Pueraria montana*), are also a concern in the Blue Ridge ecosystem. Also affecting this ecosystem is the hemlock woolly adelgid (*Adelges tsugae*), which is causing significant losses of eastern hemlock as well as loss of the few populations of Carolina hemlock in the region. Asian clams (*Corbicula fluminea*) and feral hogs (*Sus scrofa*) are examples of invasive animal species of concern in the Piedmont ecoregion. In addition, most river floodplains and valleys in the Piedmont are overrun with invasive plants such as Chinese privet and Japanese stilt grass. Hydrilla (*Hydrilla verticillata*), Japanese climbing fern, feral hogs, Chinese privet, cogongrass, and the Asian clam threaten habitats and species in the Coastal Plain. Finally, the Maritime Ecoregion is facing significant negative effects caused by flathead catfish (*Pylodictis*), feral hogs, Chinese tallowtree (*Triadica sebiferum*), Climbing Fern (*Lygodium japonicum*), water hyacinth (*Eichhornia crassipes*), common reed (*Phragmites australis*), alligatorweed (*Alternanthera philoxeroides*), parrotfeather (*Myriophyllum aquaticum*), giant reed (*Arundo donax*), and the channeled apple snail (*Pomacea insularum*). See the graph below for the significant increase in the feral hog range in the last thirty years. For an overview of the top five invasive species for the entire state in the categories of terrestrial and aquatic plants, terrestrial invertebrates, terrestrial vertebrates, freshwater fauna, and marine fauna refer to table 1 at the end of this chapter. Feral hogs have been particularly damaging and represent the top terrestrial vertebrate invasive species. See the graph below for the significant increase in the feral hog range in the last thirty years. The U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) is working on an Environmental Impact Statement (DEIS) evaluating strategies to manage increasing damages and threats associated with expanding populations. The draft document can be found at <http://www.aphis.usda.gov/wildlife-damage/fseis>.

Recently the major land managing agencies that operate within the 11 county coastal regions have organized to form the Coastal Georgia Cooperative Invasive Species Management Area (CISMA). They have gone through a process to develop a priority list of invasive species in the same five categories listed in table 1 but specific to the Coastal Counties (see table 2). A regional approach such as the one the Coastal GA CISMA has undertaken would be helpful in the other ecoregions to reprioritize planning efforts that are more appropriate at the subecoregion scale.

Unfortunately, Georgia also ranks eighth in the number of imperiled species (533 species), and fourth in While most introduced species pose little threat to the environment, invasive species do constitute a significant risk. Invasive species rank second only to habitat destruction as a threat to biodiversity. Almost half of the species in the U.S. that are at risk of extinction are negatively affected by invasive species. Invasive species threaten biodiversity in several ways. They may cause or spread diseases; or act as predators or parasites of native species. Invasive species also affect native species by out-competing them for food and natural resources and/or by altering habitat in such a way that native species can no longer flourish. Finally, invasive species may hybridize with closely related local species so that within a few generations few if any genetically pure native individuals remain. Of the 26 animal species in the



U.S. that have gone extinct since being listed under the Endangered Species Act, at least three were wholly or partly lost because of hybridization with invaders.

The introduction of nonnative species poses a profound threat to the state's biodiversity. Georgia ranks sixth in the nation for overall biological diversity (4,004 species) and twelfth for number of endemic species (58 species). Nationally, Georgia ranks second in amphibian diversity (77 species), third in freshwater fish diversity (268 species), fifth in reptile diversity (83), seventh in vascular plant diversity (2,986 species), seventeenth in bird diversity (328), and eighteenth in mammal diversity (91). number of known or suspected extinctions (24 species), due in part to the introduction and spread of nonnative species. Georgia currently has 239 native species that are in danger of immediate or foreseeable extinction in all or a significant portion

of their range. Seventy-three additional native species occur rarely enough to need protection because of their scarcity.

In addition to environmental harm, invasive species can have large negative economic effects in the areas where they have become established. The costs associated with fire ants in the U.S., for example, have been estimated at \$1 billion/year. In Texas, the agricultural economic losses caused by fire ants are an estimated \$90 million annually. Texas spent at least \$580 million in 2000 to control this insect. Nationally, invasive plant species cause a 12 percent reduction in agricultural crop yields, costing the industry \$24 billion in lost crop production annually. In addition, about \$3 billion a year in herbicides are used to protect U.S. crops from invasive plants. One recent study placed the U.S. benefit of controlling invasive aquatic plant species alone, as being in the billions of dollars. Hemlock woolly adelgid infestations in the eastern U.S. have cost \$9 million for research and suppression as of 2007. Likewise, the cities of New York and Chicago have spent \$180 million to eradicate the Asian longhorned beetle. Nationwide, infestation of this beetle could kill one third of urban trees valued at \$669 billion. Costs can be incurred through the loss of economic output, such as reductions in agriculture, aquaculture, fisheries, timber, and tourism. In addition there is the direct cost of combating and mitigating the impacts of the species, such as Hydrilla which blocks irrigation and drainage canals, enhances sedimentation in flood control reservoirs, interferes with public water supplies, impedes navigation, and generally restricts public water uses. At high densities, hydrilla also reduces productivity of recreational fisheries.

While the economic costs of invasive species in Georgia have not been adequately researched, the estimated costs are very high. The state's agriculture, forestry and tourism industries produce billions of dollars of revenue for Georgia each year. The economic value of land-based agriculture exceeded \$8.8 billion in 2002, making it Georgia's single most productive industry. One out of five jobs in Georgia is related to agribusiness. Yet boll weevil eradication cost Georgia \$111.4 million between 1987 and 1999, and continues to cost the state \$2 million annually.

Likewise, the invasive plant, tropical spiderwort, costs cotton farmers \$1.2 million for extra herbicide annually. Within the agriculture industry, timber is the state's highest-valued agricultural product. Forestry is also Georgia's third-largest manufacturing sector, employing 11 percent of the manufacturing workforce at an annual payroll of \$2.1 billion while contributing billions of dollars to Georgia's economy. However, sudden oak death threatens the state's 9.8 million acres of oak forests (15.6 percent of the state's trees) valued at \$33 billion for timber, wildlife, tourism and urban forests. In addition, Georgia spends in excess of \$200,000 a year on detection surveys and suppression for gypsy moth, hemlock woolly adelgid, *Phytophthora ramorum* (causal agent related to sudden oak death), emerald ash borer, *Sirex noctilio* woodwasp, various exotic wood borers and bark beetles and cogongrass detection and suppression. Tourism is also a major industry in the state contributing \$26 billion to the economy and generating \$1.12 billion in state and local tax revenues. Tourists include hunters, anglers, campers, and wildlife observers whose activities depend on abundant, healthy natural resources.

Another challenge facing Georgia is the potential expansion of invasive species infestations due to climate change. Although scientists differ in their predictions for what temperature changes are currently occurring and what may happen in the future, some climate change models predict an increase in July heat indexes across the Southeast U.S. from 8-15° F to as high as 20° F. Higher average temperatures may enable invasive species to take advantage of weakened ecosystems and further out-compete native species. It is estimated that global warming will allow 48 percent of currently established invasive plants and animals to expand their northern distributions if temperatures continue the warming trend. This can already be seen as warming winter temperatures permit species such as kudzu and garlic mustard to survive in areas much farther north than in the past. In addition, it is expected that global warming will contribute to more severe infestations and habitat damage from invasive insect species, including the gypsy moth (id.). Studies have

also shown that increased carbon dioxide (CO₂) levels appear to stimulate the growth of invasive plants, and may render herbicides less effective.

Invasive species are introduced to new environments in a number of different ways. Understanding the mechanisms, or pathways, by which invasive species enter Georgia is important in order to prevent or minimize additional introductions. These introductions can be natural, accidental or intentional. Many invasive plants were previously introduced as ornamentals or forage crops. Seeds and other propagules from invasive species can be spread by wildlife or natural processes such as water movement along riparian corridors. Nonnative fish have been intentionally introduced to enhance sport fisheries and for the pet trade. Accidental introductions arrive through pathways such as horticulture, aquaculture, commerce, tourism, or travel. Accidental introductions of aquatic invasive species can occur through the transportation and release of live bait by fishermen and anglers. Another prominent pathway for invasive species has been the trade in wood and wood products. In the U.S., 35 percent of all softwood consumed is imported, and up to 70 percent of all international cargo arrives supported by solid wood packing material (SWPM). The recent arrival in Georgia of the redbay ambrosia beetle (*Xyleborus glabratus*) in solid wood packing material has focused attention on this pathway. Other nonnative insects such as the emerald ash borer, Asian Longhorn Beetle, and *Sirex noctilio* woodwasp are all thought to have been introduced to North America via SWPM. The transportation of firewood from one place to another is another way invasive insect species are unintentionally moved to new environments. Ballast water transport and hull fouling transfers by commercial ships are two pathways for invasive species introductions in Georgia. Ballast water is pumped into a ship's hull to keep it stabilized and upright. This water is sometimes discharged at the receiving port when the cargo is being loaded or unloaded. Ballast water taken on in any port may include an abundance of live plants, animals, and pathogens not native to Georgia.

To address the challenges posed by both established and potential invasive species, federal, state, and nongovernmental agencies have individual roles in coordination, regulation, prevention, detection, education, and control actions. A summary of the roles federal agencies play is provided in table 3; state agencies in table 4; interagency alliances table 5; and nongovernmental organizations table 6. Although the programs and associated jurisdictions listed in these tables are essential for the management of invasive species in Georgia, they contain some gaps that reduce their effectiveness. Some of the known gaps and impediments include the following: coordination, education and outreach, early detection and rapid response, control and management, monitoring populations and habitats, research, regulations and enforcement, and funding.

Category	Plants - Terrestrial and Aquatic	Terrestrial Invertebrates	Terrestrial Vertebrates	Freshwater Fauna	Marine Fauna
1	Non-native Privets <i>Ligustrum spp.</i>	Hemlock wooly adelgid <i>Adelges tsugae</i>	Feral pig <i>Sus scrofa</i>	Flathead catfish <i>Pylodictus olivaris</i>	Red Lionfish <i>Pterois volitans</i>
2	Nepalese browntop <i>Microstegium vimineum</i>	Emerald ash borer <i>Agrilus planipennis</i>	Nine-banded armadillo <i>Dasypus novemcintus</i>	Grass carp <i>Ctenopharyngodon idella</i>	Asian Tiger Shrimp <i>Penaeus monodon</i>
3	Kudzu <i>Pueria montana</i>	Longhorn beetles <i>Anoplophorus spp.</i>	Coyote <i>Canis latrans</i>	Asian swamp eel <i>Monopterus albus</i>	Green mussel <i>Perna viridis</i>
4	Japanese honeysuckle <i>Lonicera japonica</i>	Gypsy moths <i>Lymantria spp.</i>	European starling <i>Sturnus vulgaris</i>	Tilapias <i>Oreochromis spp.</i>	Titan Acorn Barnacle <i>Megalbalanus coccopoma</i>
5	Cogongrass <i>Imperata cylindrica</i>	Red ambrosia beetle <i>Xyleborus glabratus</i>	Feral cat <i>Felis catus</i>	Red shiner <i>Cyprinella lutrensis</i>	Australian tubeworm <i>Ficopomatus enigmaticus</i>

Table 1. Top Five Invasive Species for the State of Georgia by Category

Category	Plants - Terrestrial and Aquatic	Terrestrial Invertebrates	Terrestrial Vertebrates	Freshwater Fauna	Marine Fauna
1	Cogongrass <i>Imperata cylindrica</i>	Redbay ambrosia beetle <i>Xyleborus glabratus</i>	Feral Hog <i>Sus scrofa</i>	Flathead catfish <i>Pylodictis olivaris</i>	Red Lionfish <i>Pterois volitans</i>
2	Chinese Tallow <i>Triadica sebifera</i>	Red imported fire ant <i>Solenopsis invicta</i>	Feral cat <i>Felis catus</i>	Blue catfish <i>Ictalurus furcatus</i>	Asian Tiger Shrimp <i>Penaeus monodon</i>
3	Japanese Climbing Fern <i>Lygodium japonicum</i>	Cactus moth <i>Cactoblastis cactorum</i>	Coyote <i>Canis latrans</i>	Asian clam <i>Corbicula fluminea</i>	Green mussel <i>Perna viridis</i>
4	Common Reed <i>Phragmites australis</i>	Kudzu bug <i>Megacopta cribraria</i>	Nine-banded armadillo <i>Dasypus novemcintus</i>	Red swamp crayfish <i>Procambarus clarkii</i>	Titan Acorn Barnacle <i>Megalbalanus coccopoma</i>
5	Water Hyacinth <i>Eichornia crassipes</i>	Brown widow spider <i>Latrodectus geometricus</i>	Feral horse <i>Equus ferus</i>	Red-eared slider <i>Trachemys scripta scripta</i>	Australian tubeworm <i>Ficopomatus enigmaticus</i>

Table 2. Top Five Invasive Species by Category for the 11 County Coastal Georgia CISMA

Federal Agency	Role	Public outreach	Monitoring/Control
<i>U.S. Army Corps of Engineers (Corps):</i>	Engineering Research and Development Center (ERDC) - Aquatic Nuisance Species Research Program & Aquatic Plant Control Research Program.	Information, marinas, reservoirs, pump out stations, displays, publications, workshops, websites.	reservoir surveys
<i>U.S. Department of Agriculture (USDA) – Animal and Plant Health Inspection Service - Plant Protection & Quarantine (APHIS PPQ)</i>	National Cooperative Agriculture Pest Surveys (CAPS) identifies the top foreign insects, diseases and plants that pose a high-risk to agriculture and natural communities.	Develops outreach information for the public regarding identification of exotic pests and how to report any suspects to state or USDA personnel	Sets traps, inspects materials that would provide an entry pathway. Plant Inspection Station at the Hartsfield-Jackson International Airport, cargo container port in Savannah, and Smuggling Interdiction & Trade Compliance monitoring markeplaces.
<i>U.S. Department of Agriculture - Forest Service (FS)</i>	Nationally the Forest Service manages 191 million acres of federal lands for many purposes, including protection from invasive weeds, and is the USDA's lead agency for nuisance weed control.	The Forest Service provides training in the identification, control, and biology of invasive plants.	The Service's Invasive Species Program uses experimental forests and research field stations as well as private lands, to study the reproductive biology, dispersal rates, and distribution of invasive forest species
<i>U.S. Department of Agriculture – Forest Service (FS) – National Forest System</i>	The Chattahoochee- Oconee National Forest comprises approximately 865,000 acres in portions of 26 counties in Georgia. Non-native invasive species are being addressed on the Chattahoochee-Oconee through a program of inventory and control of invasive species.	Chattahoochee-Oconee biologists are also actively working with Georgia DNR, Georgia Plant Conservation Alliance and other volunteers to restore rare communities and cultural heritage sites on the Forest through management which includes the removal of invasive species.	Environmental Assessments (EA) specifically for mechanical and chemical treatments of non-native invasive plants.

<p><i>U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS)</i></p>	<p>The NRCS considers environmental, social, cultural, and economic conditions when recommending management options for invasive species, and encourages the use of native species for a given location and conservation practice in correlation with restoration or containment goals.</p>	<p>The NRCS also uses agency programs, such as the Environmental Quality Incentives Program, the Wildlife Habitat Incentives Program, and the Wetlands Reserve Program, whenever appropriate to help private landowners recognize, inventory, and control invasive species.</p>	<p>NRCS conservationists: provide training, guidance and assistance to field personnel regarding invasive species management; ensure that all conservation plans and contracts, where relevant, contain appropriate clauses concerning the prevention, spread, and management of invasive species; participate in state (and equivalent) rapid-response teams and efforts; and stay abreast of state and local species of concern.</p>
<p><i>U.S. Department of Commerce - National Oceanic and Atmospheric Administration (NOAA):</i></p>	<p>NOAA has regulatory authority to prevent the introduction of aquatic invasive species that may affect marine sanctuaries, such as the Gray’s Reef National Marine Sanctuary, endangered or threatened species, coastal areas, and essential fish habitats.</p>	<p>NOAA funds research, education and outreach, and control activities on aquatic invasive species issues primarily through the National Sea Grant Program, with some activities funded through the National Ocean Service and National Marine Fisheries Service.</p>	<p>Research efforts include monitoring the impacts of aquatic invasive species on coastal and other ecosystems, developing control and mitigation options, and preventing new introductions by, among other things, developing new technologies for ballast water management.</p>
<p><i>U.S. Department of Homeland Security – U.S. Coast Guard:</i></p>	<p>The Coast Guard’s core roles are to protect the public, the environment, and U.S. economic and security interests in any maritime region in which those interests may be at risk, including international waters and America’s coasts, ports, and inland waterways. One of the Coast Guard’s responsibilities is the development and implementation of a ballast water management program designed to minimize the likelihood of ANS introduction into the U.S. through the ballast water of long-distance ocean vessels.</p>	<p>NA</p>	<p>Regulations promulgated under the program require mandatory ballast water management practices for all vessels that operate in U.S. waters; establish additional practices for vessels entering U.S. waters after operating beyond the Exclusive Economic Zone (waters 200 miles from shore); and require the reporting and recordkeeping of ballasting operations by all vessels.</p>

<p><i>U.S. Department of the Interior – U. S. Fish and Wildlife Service (USFWS) and USFWS Region 4</i></p>	<p>The USFWS is responsible for preventing introductions of potentially harmful, invasive species on land and in waters under the Department of Interior’s jurisdiction</p>	<p>Partners for Fish and Wildlife Program provides funds for private landowners to manage invasive species, primarily plants, on their property. USFWS’s Regional Aquatic Nuisance Species Coordinators have developed informational websites, conducted workshops, and created outreach materials for national distribution, including traveling displays, exhibits, pamphlets, aquatic invasive species identification cards, fact sheets, and videos</p>	<p>The USFWS also created grant agreements with The Nature Conservancy regarding invasive plant control in the Altamaha basin, and funded projects to remove invasive plants and research to increase understanding of how invasive species might out-compete native fish.</p>
<p><i>U.S. Department of the Interior – National Park Service (NPS)</i></p>	<p>The NPS has a program to control and eradicate invasive species in lands and waters within agency boundaries.</p>	<p>Public education and outreach varies depending on local park units. The agency also maintains a number of websites related to invasive species, particularly terrestrial plants, and works with partners to compile, manage, and distribute data on specific occurrences of invasive species</p>	<p>One of the NPS’s largest efforts is through Exotic Plant Management Teams, which are field-based teams of NPS employees and student interns that travel to various parks and apply herbicides and mechanical treatment to rid areas of invasive terrestrial plants. The NPS cooperates with partners to respond to newly detected invasive species.</p>

Table 3. Federal Agency - Invasive Species Management Efforts in Georgia

State Agency/Organization	Role	Public outreach	Monitoring/Control
<i>Georgia Department of Agriculture (GDA)</i>	The GDA is the primary state agency given statutory authority to protect the state’s agriculture resources from invasive pests. Enabling statutes include the Entomology Act of 1937 (O.C.G.A. §2-7-1), the Georgia Boll Weevil Eradication Act of 1985 (O.C.G.A §2-7-150), the Georgia Bee Law (O.C.G.A. §2-14-40), the Bird Dealers Licensing Act (O.C.G.A §4-10-1), and the Prevention of Disease in Livestock Act (O.C.G.A. §4-4-1).	The GDA provides services and regulatory functions, protects and promotes agriculture and consumer interests, and ensures an abundance of safe food and fiber for Georgia by using state-of-the-art technology and a professional workforce.	GDA employees are authorized to inspect; survey for, and treat for pests which may be injurious to livestock, agricultural, horticultural, or other interests of the state. The GDA actively inspects establishments for the presence of livestock and plant pests and cooperates with other agencies in conducting additional surveys for exotic invasive pests.
<i>Georgia Department of Agriculture - Plant Protection Division (GDA-PPD)</i>	The GDA-PPD participates in the Cooperative Agriculture Pest Survey program for detection of harmful agriculture pests	GDA-PPD personnel work with plant nurseries to keep their production premises free from federal noxious weeds.	The GDA-PPD conducts over 8,000 inspections of plant growers and plant retail centers each year with a portion of each inspection devoted to exotic pest detection.
<i>Georgia Department of Human Resources: Division of Public Health (DPH)</i>	The DPH’s Zoonotic Disease Team works with mosquito control agencies to reduce the impact of some vector-borne diseases through proper mosquito control measures	Educational efforts are focused at reducing the breeding sites of <i>Aedes albopictus</i> , an aggressive invasive mosquito species that has been implicated in arboviral disease transmission	Mosquito surveillance is performed in July-October for arboviral disease testing purposes. Because mosquitoes are identified by species, the DPH is able to document the presence of invasive mosquito species in the state. The DPH also keeps a database of mosquito species that have been tested for arboviral diseases through its West Nile Virus surveillance program

<p><i>Georgia Department of Natural Resources: Coastal Resources Division (CRD)</i></p>	<p>The CRD manages Georgia’s coastal natural resources. The CRD partners with scientists and resource managers to determine the level of potential risks and impacts that introduced aquatic invasive species could have on coastal natural resources.</p>	<p>The CRD’s Coastal Management Program funds an education and outreach campaign for aquatic invasive species found in the port areas including boater education to prevent the transportation of aquatic invasive species as well as educational brochures targeting aquatic invasive species distribution.</p>	<p>The CRD also funds mapping and distribution of aquatic invasive species in the ports. Because the impact of known aquatic invasive species has not been determined in coastal waters, the CRD is currently funding assessments of introduced aquatic invasive species along the coast.</p>
<p><i>Georgia Department of Natural Resources: Environmental Protection Division (EPD):</i></p>	<p>The Watershed Protection Branch of the EPD works indirectly with nonnative plants and invasive species. Guidance developed or policies used by EPD incorporate information regarding the use of native plant species for re-vegetating land disturbances, stream buffers, stream restorations, and general erosion prevention/treatment.</p>	<p>The EPD promotes education and outreach regarding invasive species identification and removal, and also publishes guidance documents regarding land disturbance and mitigation. The Coastal Adopt-A-Wetland program includes outreach on aquatic invasive species and has a series of posters that are distributed throughout the Georgia coastline that ask people to report occurrences of aquatic invasive species.</p>	<p>NA</p>
<p><i>Georgia Department of Natural Resources: Parks, Recreation and Historic Sites Division (PRHSD)</i></p>	<p>The PRHSD initiated an invasive species program in 2005, originally funded by federal grants. Five state priority sites were identified and a five-year management plan was developed for each site.</p>	<p>The Georgia Botanical Society, Georgia Exotic Pest Plant Council, and other groups participate as volunteers and visitor monitors who provide the PRHSD with updated information about invasive species threats</p>	<p>Focal species could include any invasive species found in Georgia, but the plans usually focused on privet, kudzu, wisteria, English ivy and microstegium. The PRHSD is also working at a number of other sites that have ongoing invasive plant species control work but do not require the intensive professional management of the five priority sites. PRHSD staff has received invasive plant species identification training and is the PRHSD’s primary source of detection</p>

<p><i>Georgia Department of Natural Resources: Wildlife Resources Division (WRD)</i></p>	<p>The WRD is charged with acting on invasive species threats and also enforces state and federal laws regulating wildlife, boating and littering on behalf of the state's wildlife and citizens. Specifically, the WRD enforces regulations concerning aquaculture and the sale of domestic fish species with exotic definitions; wild animal licensing; general protection of wildlife and wildlife habitat; the liberation of wildlife (i.e., release and escape from captivity); transportation of trout; and wild animal auctions.</p>	<p>WRD staff developed a freestanding display, brochures, and other materials highlighting aquatic invasive species. Division staff members participate in numerous outreach efforts related to invasive species, including presentations at conferences, workshops, outdoor festivals, and trade shows with the goal to educate the public about the dangers of invasive species and to prevent their release into the environment. WRD biologists also work with the Georgia Native Plant Society, the Georgia Wildlife Federation, and other groups to promote landscaping with native plants and provide information on native plant nurseries and other sources of native plant materials.</p>	<p>Control efforts for terrestrial invasives are focused primarily on state-owned lands, while those for aquatic invasives may include both public and private waters. Once an invasive species is reported or discovered, actions are taken to eliminate or control it. The following species have had focused efforts to assess and control: flathead catfish, asian swamp eels, apple snails, tilapia, feral hogs, hemlock wooly adegid, among others.</p>
<p><i>Georgia Department of Transportation: Office of Environment and Location (GDOT)</i></p>	<p>GDOT ecologists, landscape architects, maintenance crews and construction personnel survey for invasive plant species on all transportation construction projects throughout the state.</p>	<p>The survey reports are catalogued and are reviewed by the Federal Highway Administration, USFWS and WRD. GDOT is preparing to work with the UGA Bugwood Network and the Georgia Exotic Pest Plant Council by contributing GPS data on the location of invasive plant species throughout the state. GDOT reports any cogongrass and hydrilla sightings to the WRD. GDOT is treating numerous cogongrass sites on State and Federal right-of-ways in conjunction with the GFC's eradication effort.</p>	

<p><i>Georgia Forestry Commission (GFC)</i></p>	<p>GFC is the primary state agency in charge of detection and suppression of invasive species within the state's 24.7 million forested acres.</p>	<p>Cogongrass has become a priority invasive species for GFC and efforts are underway to educate the public to recognize and report species occurrences. GFC forest health staff conducts or participates in over 150 public speaking opportunities each year to various organizations including foresters and other resource managers, fire fighters, loggers, civic groups, environmental groups, school and college groups, state and county public works departments, hunting and fishing organizations and farm organizations. In all, GFC personnel expend over 50,000 hours annually on invasive forest pest issues.</p>	<p>GFC is actively involved monitoring and control of many species including taking the lead on cogongrass control, southern pine beetle, hemlock wooly adegid, and several tree diseases including Phytophthora ramorum. GFC deploys a series of early detection insect traps at multiple locations in an effort to trap a variety of nonnative insects (i.e., sirex woodwasps, gypsy moths, and emerald ash borer). GFC surveys warehouses that receive cargo with solid wood packing material from high risk regions of the world for exotic bark beetles.</p>
<p><i>UGA – Center for Invasive Species and Ecosystem Health (Center)</i></p>	<p>The Center was established at UGA in order to address issues on invasive species and ecosystem (agricultural, forested and natural system) health. The Center's goals include: becoming a preeminent national and international public service and outreach center; developing collaboration between UGA and state, university, federal and international partners; integrating and developing information and programs; serving as a clearing house for information, applied research and training; and promoting public awareness, education and applied research.</p>	<p>The Center is currently developing and administering 20 educational web systems, seeking and archiving digital images in four topic-based web systems to support educational activities as well as developing smartphone application for quick reporting of invasive species location by the public.</p>	<p>Oversees the Georgia Cooperative Agricultural Pest Survey Program, developing policy and protocols for early detection and rapid response of invasive species, developing and administrating the Early Detection and Distribution Mapping System for the Southeast Exotic Pest Plant Council and the Everglades Cooperative Invasive Species Management Area, applying herbicide research on emerging invasive plants, and facilitating and extending program development in Europe and Central America.</p>

<p><i>UGA - College of Agricultural and Environmental Sciences - Aquaculture Unit (CAES)</i></p>	<p>The CAES provides research, teaching and extension (or public service) at the undergraduate and graduate levels in a variety of specialties, including Agriculture and Environmental Sciences.</p>	<p>Through Cooperative Extension, CAES is often the first point of contact when a member of the public observes an aquatic invasive species. CAES also provides training to county extension agents, fish farmers, fish hobbyists, county governments, and others regarding invasive species issues, and has direct contact with private individuals involved in interstate transportation of fish and invertebrates through its extension programs.</p>	<p>CAES conducts pesticide testing for effective control of aquatic plants and snails.</p>
<p><i>UGA - Department of Horticulture (Department)</i></p>	<p>Members of the Department's faculty serve on the Board of the Georgia Exotic Pest Plant Council (GA-EPPC) and the Invasive Plant Task Force of the Georgia Green Industry Association.</p>	<p>The Department works to develop educational materials, including a table-top exhibit on aquatic and terrestrial nuisance plant species, a PowerPoint presentation on invasive plant species and a list of alternative plant choices, both native and nonnative. These resources are used by organizations at trade shows and other events. They are also available on-line from the GA-EPPC web site, and are used by county extension agents across the state in local programming.</p>	<p>NA</p>

<p><i>UGA - Marine Extension Service (MAREX)</i></p>	<p>MAREX conducts research programs to monitor coastal aquatic invasive species and documents their biology and ecology.</p>	<p>MAREX also conducts outreach efforts to increase public awareness and modify behaviors in order to prevent new introductions and reduce the further spread of existing problem species. MAREX’s public education and outreach activities include: the Aquatic Invaders program; public surveys to gauge understanding of aquatic invasive species issues; “Have You Seen Me?” sheets; aquatic invasive species fact sheets; Camden County 4-H officer training, development of an aquatic invasive species volunteer monitoring manual; future incorporation of aquatic invasive species prevention best practices into the Georgia Clean Marina program; development of educational rack cards, booklets, and posters on aquatic invasive species; and work on a public service announcement to highlight aquatic invasive species and prevention tips</p>	<p>In addition, MAREX conducted a volunteer monitoring program for coastal fouling communities that will operates through the existing Adopt-A-Wetland program. MAREX conducts port surveys, participates in Mytella dock sampling, and hosts the Aquatic Invaders Zoo & Aquarium program, and also compiles volunteer monitoring data and public reports from “Have You Seen Me?” flyers and publishes the data in peer-reviewed research papers. MAREX conducted a literature review for fish, mollusks, crustaceans and polychaetes in the South Atlantic Bight, and created a regional GIS database as part of port surveys. In all, the database now contains information from a total of 104 publications, representing locality information for 2,533 species.</p>
<p><i>UGA – Odum School of Ecology (Odum School)</i></p>	<p>In addition to having several faculty members who actively research invasive species, the Odum School participates in UGA’s Species Invasions Science (SIS) group and also hosts the Drake Research Group. These groups bring together individuals interested in the study of invasive species</p>	<p>While not specifically focused on public outreach, SIS is an interdisciplinary and interdepartmental group comprised of individuals from the Odum School, the Warnell School of Forestry & Natural Resources, the Department of Genetics, and the Department of Crop and Soil Sciences.</p>	<p>Applied projects have focused on invasive species to answer such questions as how many individuals of a species it takes to establish a viable population, what characteristics predispose species to being good colonizers or having strong impacts on ecosystems, and where and how fast invading species will spread.</p>

<p><i>UGA - Warnell School of Forestry and Natural Resources (Warnell School)</i></p>	<p>The Warnell School developed the Early Detection & Distribution Mapping system (EDD-Maps) for use by the eight Southeast Exotic Pest Plant Council state members</p>	<p>The Warnell School conducts extensive programming to train professional resource managers, extension agents, landowners, and the general public on invasive species issues, identification, management, control recommendations, and web resources.</p>	<p>The Warnell School is part of the Species Invasions Science group and the Center for Invasive Species and Ecosystem Health.</p>
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Table 4. State agency - invasive species management efforts in Georgia

Organization	Role	Public outreach	Monitoring/Control
<p><i>The Georgia Invasive Species Task Force</i></p>	<p>The Georgia Invasive Species Task Force is comprised of the Georgia Department of Agriculture, the Georgia Forestry Commission, the Georgia Department of Natural Resources, and the University of Georgia. For more than 20 years, members of this group have worked cooperatively together in invasive species detection, education, and control.</p>		<p>These agencies have been active participants in the Cooperative Agricultural Pest Survey program (CAPS). This program is a combined effort by state and federal agricultural or forestry agencies to conduct surveillance, detection, and monitoring of exotic plant pests of agricultural and natural plant resources and biological control agents. Survey targets include plant diseases, insects, weeds, nematodes, and other invertebrate organisms. Such survey activities foster early detection and rapid response to invasive pests that are not established or have limited range in the U.S.</p>

<p><i>Cogongrass Cooperative Weed Management Area (CWMA)</i></p>	<p>The CWMA is a cooperative alliance officially formed in 2008 with the sole purpose to address the short and long term negative effects of cogongrass within the state of Georgia. Key partnerships for the leadership within Georgia’s Cogongrass Program are: GFC – education, detection and field visits when reported, eradication treatments. UGA – education, detection, web support, printed materials and publications. USDA APHIS (PPQ) – detection and eradication treatments. USDA USFS – funding, education. Jones Ecological Center – education and outreach. Georgia Department of Agriculture – detection and plant industry regulation enforcement. Mark Atwater – Weed Control Unlimited, Inc.</p>	<p>Cogongrass educational efforts began in 2005. The Georgia Forestry Commission and University of Georgia Bugwood Network were the primary sponsors involved. The GFC Forest Health staff made numerous presentations across the state, delivering the cogongrass message. More than 900 presentations about the cogongrass threat have been made to 50,000+ attendees since 2000.</p>	<p>The Georgia Forestry Commission began herbicide treatments of cogongrass sites throughout Georgia in 2007. The GFC Forest Health staff sought the advice of experts from across the southeast, especially research and field trials conducted in Florida, Alabama and Mississippi, to develop an effective eradication treatment program. As with all invasive species, eradication would require multiple years of treatment followed by multiple years of follow-up inspections to insure total eradication has occurred.</p>
<p><i>Coastal Georgia Cooperative Invasive Species Management Area (CISMA)</i></p>	<p>Formed in 2011 the CISMA seeks to engage a broad cross section of state, federal, nonprofit and volunteer organizations to increase the awareness on invasive species issues, increase knowledge sharing, increase effectiveness, and achieve successful early detection rapid response to new invasive species threats to the coastal 11 counties of Georgia.</p>	<p>Conducts annual meetings where invasive species issues pertinent to the 11 county coastal region are discussed. Engages the public in training on how to identify and report an invasive species. Produced a prioritized list of invasive species specific to our region using expert input. Engages various groups to raise awareness of invasive species through lectures, training, or distribution of educational materials.</p>	<p>CISMA members and interns input invasive species location data to the EDDMapS database. Collaborative invasive species control work has been conducted for Chinese Tallow, Common Reed, Water Hyacinth, Salt Cedar, among others. Species and locations for control are selected based on the ability to achieve valuable management goals from raising public awareness to protection of ecosystem services, rare species, or in some cases the ability to truly eradicate as high priority invasive species.</p>

<p><i>Georgia Plant Conservation Alliance (GPCA)</i></p>	<p>Coordinate the active recovery of critically imperiled plant species and their habitats working with conservation organizations and specially trained Botanical Guardian volunteers throughout Georgia.</p>	<p>Participating museums and agencies offer classes, workshops, children’s activities, professional training, and volunteer opportunities on the impacts, alternatives, controls of invasive species.</p>	<p>GPCA collaborates on invasives removal from imperiled habitats, sharing techniques, equipment, and volunteers. Populations of rare plants monitored by professionals and volunteers for invasive species infestations.</p>
<p><i>Georgia Native Plant Initiative (GNPI)</i></p>	<p>Promote the use of Georgia native plants in all areas of the Green Industry, use push-pull marketing to share ethical sources of native plants, teach land restoration and garden design using native plants of Georgia, and particularly Georgia sourced natives for land restoration and biodiversity sustainability.</p>	<p>All growers marketed by the GNPI agree not to sell Category I or II invasive plant species. Partners share gardening techniques and restoration practices through classes, workshops, articles, websites, and volunteer opportunities.</p>	<p>Demonstration sites for land restoration promote invasives controls and repatriation of appropriate natives in prairies, floodplains, and roadsides. Demonstration gardens showcase Georgia natives incorporated into traditional garden designs but not allowing known invasives to displayed.</p>

Table 5. Interagency Alliances - Invasive Species Management Efforts in Georgia

Organization	Role	Public outreach	Monitoring/Control
<i>Georgia Aquarium</i>	As of 2008, the Aquarium's involvement in aquatic invasive species is limited to educational programs where the impact of aquatic invasive species on biodiversity is discussed with middle and high school students.	While the Aquarium exhibits flathead catfish, the exhibit does not include a discussion on aquatic invasive species. The Aquarium is considering setting up a discussion of lionfish and their introduction to Grays' Reef National Marine Sanctuary. The Aquarium also has a handout that it developed on aquatic invasive species for the general public.	NA
<i>Georgia Exotic Pest Plant Council (GA-EPPC)</i>	GA-EPPC is a nonprofit group that concentrates exclusively on existing and potential invasive exotic pest plants in Georgia. GA-EPPC is a chapter of the regional Southeast Exotic Pest Plant Council and a member of the National Association of Pest Plant Councils.	GA-EPPC developed the Invasive Nonnative Plants in Georgia list, which is currently the most comprehensive such list for the state. The organization provides an annual educational meeting, several workshops and other educational programs in a wide variety of venues throughout the state. GA	GA-EPPC has close working relationships with state and federal agencies that are involved in invasive plant management. GA-EPPC members participate in volunteer work parties to control and remove invasive plants, add to the EDDMaps database, and assist with education by distributing materials provided by the organization.
<i>GA Forestry Association (GFA)</i>	The GFA is the leading advocate for a healthy business and political climate for Georgia's forest environment, forest landowners and forest-based businesses.	GFA promotes invasive species awareness through communication, education and programs to its membership and other interested sectors. Target audiences include forest landowners, industry leaders and experts, foresters, elected officials, and the conservation community.	GFA attends the NRCS's State Technical Committee meeting where cost share programs can/could be developed to target invasive species.

<p><i>Georgia Green Industry Association (GGIA)</i></p>	<p>GGIA supports self-regulation and phasing out use of invasive species through public education about desirable alternatives.</p>	<p>GGIA working with the Georgia Exotic Pest Plant Council and the Georgia Native Plant Society to developed a list of alternative plants for cultivation, both native and nonnative. The goal of this effort is to have a single list of accepted and prohibited plants that will be agreeable to all and a unified message that can be conveyed to the gardening public.</p>	<p>GGIA has worked with the Center for Applied Nursery Research in Dearing, Georgia to solicit help from the research community with problems associated with invasive species and ways to combat invasiveness in ornamental plants.</p>
<p><i>Georgia Native Plant Society (GNPS)</i></p>	<p>The GNPS is involved with neighborhood restoration projects that encourage training in aquatic invasive species identification, removal, and replanting with natives.</p>	<p>The Society features at least one yearly lecture on invasive plants out of six general membership meetings a year. GNPS hosts a kiosk at the Southeastern Flower Show that includes an invasive species poster, and has the GA-EPPC invasive brochure prominently displayed and available to the public.</p>	<p>The GNPS also has a small research grant program that funds invasive research along with other topics.</p>
<p><i>Georgia Botanical Society (BotSoc)</i></p>	<p>The BotSoc is dedicated to the study and preservation of Georgia's wild, native, rare, and endangered wildflowers and plant life. This is accomplished by promoting the understanding and appreciation of plants and their environment, support habitat preservation, and promoting the practice of a conservation ethic.</p>	<p>The BotSoc members and other volunteers work to remove invasive species from multiple locations including the Chattahoochee National Forest. The BotSoc holds training workshops for members on invasive species. The Marie Mellinger Field Botany Research Grant program fund professional and students to conduct various types of research and restoration.</p>	<p>The BotSoc has been working with the USFS since 2012 to control and eradicate the exotic invasive <i>Ficaria verna</i> (fig buttercup) at Sosebe Cove, Chattahoochee National Forest. In addition several of our members are working on invasive species removal program (Exant) in the Chattahoochee River National Recreation Area in Atlanta and an invasive species "Weed Warrior" Project at Memorial Park in Athens Future control work will include Japanese Spirea. The BotSoc Marie Mellinger Grant Program is also supporting an <i>Arundinaria gigantea</i> resoration project in the Athens area. Panola Mountain has been the focus of grassland restoration for years.</p>

<p><i>Coastal WildScapes (CWS)</i></p>	<p>The mission of Coastal WildScapes is to actively preserve and restore the highly significant biodiversity of Southeastern coastal ecosystems by protecting existing native habitats, rebuilding the connectivity of impaired habitats and minimizing the future fragmentation of the coastal landscape. We have three overarching strategies to accomplish our mission</p>	<p>CWS holds several outreach and education events throughout the year including a full day annual symposium, lecture series, invasive species volunteer opportunities, native seed collection, restoration projects, interpretive signage projects, spring and fall native plant sale. Much of the education and outreach is focused on how to provide wildlife habitat in our landscapes through the promotion of regionally appropriate native species and discouraging the use invasive species.</p>	<p>The members and volunteers with CWS partner with many other agencies in the coastal Georgia region to work on invasive species control and native plant restoration projects including work on Cannon’s Point Preserve, SSI; Cay Creek Wetland Interpretive Center, Midway, GA; Altamaha River Delta; Little St. Simons Island; St. Catherines Island; Harris Neck NWR, McIntosh Co. to name a few.</p>
<p><i>Georgia Ports Authority (Ports Authority)</i></p>	<p>The Ports Authority monitors ships while they are at berth and reports any detected ballast water discharge to the Coast Guard.</p>		<p>The Ports Authority does not conduct ongoing monitoring for aquatic invasive species, but has worked with researchers in the past conducting a baseline survey of terminals in the ports of Savannah and Brunswick.</p>
<p><i>Georgia Power Company</i></p>	<p>Georgia Power manages aquatic invasive species in their 15 reservoirs across the state. In addition to the marina operator network, Georgia Power surveys Lakes Jackson, Juliette, Oconee, and Sinclair for aquatic nuisance plant species.</p>	<p>It also has a reservoir marina operator notification program and issues occasional notes to residents regarding aquatic invasive species. While Georgia Power personnel are trained to identify aquatic invasive species, the Company also relies on local residents for aquatic invasive species control requests, and has alerted resident marina operators to look out for aquatic invasive species, especially hydrilla.</p>	<p>Georgia Power manually removed and treated hydrilla found at its Lake Sinclair Little River Park marina during a routine aquatic plant management project at one of its operating plants. Personnel involved in water quality work are also looking for aquatic invasive species and the Company’s reservoirs are surveyed on a quarterly basis. Georgia Power does routine herbicide applications for a number of aquatic plants in its reservoirs including giant cutgrass, water hyacinth, spiny leaf naiad, Brazilian Elodea, and Eurasian water milfoil.</p>

<p><i>Georgia Wildlife Federation (GWF)</i></p>	<p>The GWF is Georgia’s oldest and largest member-supported conservation organization and the state affiliate of the National Wildlife Federation. GWF’s primary involvement with invasive species has been public outreach and education.</p>	<p>Its quarterly member newsletter, The Call, and the semi-annual Sportsman’s Connection contain information about invasive species such as hemlock woolly adelgid and flathead catfish. GWF partners with other nonprofit organizations such as the Satilla Riverkeeper and the Georgia River Network to educate the public about aquatic invasive species.</p>	<p>While the GWF monitors invasive species on its own property and through its involvement in Adopt-A-Stream, it also coordinates with the Teaming with Wildlife Coalition in Georgia, and looks for projects using volunteers to promote the control and management of invasive species. The GWF is also currently considering a Cooperative Agreement with the USFWS Partners for Wildlife program that will have a habitat restoration component at the Alcovy Conservation Center and possibly at the Wharton Conservation Center.</p>
<p><i>The Nature Conservancy</i></p>	<p>The Nature Conservancy is the world’s largest conservation organization. In Georgia, the Conservancy has worked for years to abate the threats that invasive species, both plants and animals, pose for Georgia’s natural resources through partnerships, planning, and management action.</p>	<p>The Conservancy also pursues communication strategies related to exotic invasive species. The Conservancy has sponsored invasive plant species workshops for land managers and other resource personnel in which participants are trained in the impact, identification, and control of exotic pest plants.</p>	<p>On-the-ground management activities include removals of invasive plants from Conservancy-owned preserves and priority lands and waterways by Conservancy personnel and volunteers. On the Georgia coast, the Conservancy is mapping and treating infestations of aquatic invasive plants including common reed, water hyacinth, and the wetland invasive Chinese tallow.</p>
<p><i>Trees Atlanta</i></p>	<p>Trees Atlanta is a non-profit citizens’ group dedicated to protecting and improving the urban environment by planting and conserving trees. It also educates the public about the value of trees and is involved with tree issues in the entire metropolitan Atlanta area.</p>	<p>Trees Atlanta educates volunteers about removing invasive plants such as Chinese Privet, English Ivy, and Kudzu.</p>	<p>Currently, Trees Atlanta is assisting with management plans and invasive plant removal in 20 City of Atlanta parks and more than 300 acres in Southwest Atlanta. Once invasive species are removed from these greenspaces, native trees and plants are replanted to ensure erosion control and streambank stabilization.</p>

<i>Savannah Tree Foundation</i>	Savannah Tree Foundation is a nonprofit organization dedicating to preserving, protecting and planting canopy shade trees in Chatham County.	The Savannah Tree Foundation promotes, through direct action and education, an awareness of trees as vital environmental resources and an important part of our cultural heritage. Volunteers are taught about invasive plant species at tree planting and maintenance events.	Currently, Savannah Tree Foundation monitors for invasive Chinese tallow at reforestation sites where STF has planted. Additionally STF works to control invasive English Ivy in Bacon Park Forest.
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Table 6. Nongovernmental Organizations - Invasive Species Management Efforts in Georgia

Interagency Burn Team **Jimmy Rickard (USFWS)**

Started in 2001, the Interagency Burn Team (IBT) has been burning up Georgia in the name of rare species and priority habitats. A formal Memorandum of Understanding (MOU) was signed in 2009 formalizing the partnership. By pooling the expertise of cooperators, the IBT can draw together all of the required resources to conduct prescribed burning for the benefit of fire-dependent-ecosystems and the imperiled species associated with them. Cooperators include the U.S. Fish and Wildlife Service

(Georgia Ecological Services as well as Piedmont and Okefenokee National Wildlife Refuges), the Georgia Forestry Commission, the Georgia Department of Natural Resources, The Nature Conservancy (Georgia Chapter), The Orianne Society, The Longleaf Alliance, and the U.S. Forest Service (Chattahoochee/Oconee National Forests).

Each utilizes resources from other partners and exchange in-kind services to conduct prescribed burns.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
	<i>Combatted Invasive/Alien Species</i>

Effective and efficient prescribed burning is difficult because qualified burn personnel and equipment are often unavailable in sufficient numbers to conduct prescribed burns in remote habitats across Georgia when the weather is appropriate to meet site objectives. By leveraging additional manpower and equipment from all of the cooperators, larger tracts of land may be burned at one time or may be burned when an agencies workload might otherwise preclude the burn. The IBT cooperators regularly collaborate to meet individual conservation goals. Several thousand acres are burned annually on lands managed by the cooperators as well as on privately owned lands. The IBT also helps coordinate training to keep burn team members NWCG (National Wildfire Coordinating Group) qualified, which is the national standard for fire-fighting agencies.

The IBT has conducted burns for the conservation of unique habitats from the piney flatwoods and savannas in the lower Coastal Plain to the xeric (dry) sandhills and longleaf pine woodlands along the fall-line sandhills, to mountain bogs and montane longleaf woodlands within the Ridge & Valley region. Some of the exciting places where habitat restoration has occurred include Berry College in Northwest Georgia, Piedmont National Wildlife Refuge, Chattahoochee National Forest, west Georgia areas near Fort Benning, and DNR lands state-wide. These areas may not otherwise have benefited from fire were it not for the diligent efforts of the IBT.

A few species that have benefited from IBT burns include indigo snake (*Drymarchon corais couperi*), gopher tortoise (*Gopherus polyphemus*), red-cockaded woodpecker (*Picoides borealis*), Bachmans sparrow (*Aimophila aestivalis*), Canby dropwort (*Oxypolis canbyi*), hairy rattleweed (*Baptisia arachnifera*), green pitcherplant (*Sarracenia oreophila*), Georgia plume (*Elliotia racemosa*), dissected beard tongue (*Penstemon dissectus*), pineland barbara button, (*Marshallia mohrii*), Apalachicola dusky salamander (*Desmognathus apalachicola*), bluff white oak (*Quercus austrina*), agrimony (*Agrimonia incise*), Sandhills milk-vetch (*Astragalus michauxii*), green fly orchid (*Epidendrum conopseum*), Georgia beargrass (*Nolina georgiana*), and many more.

Partners signed a new five year MOU in December 2015, ensuring that this successful partnership continues into the future. The IBT has been one of the most significant factors contributing to increased burned acres state-wide.

State Agencies

50 Year Plans in Wildlife Resources Division

Don McGowan and Matt Payne (GA WRD)

The 50-Year Plan is a document that guides management of state-owned lands that are under the purview of the Georgia Department of Natural Resources (DNR). While mostly encompassing lands within DNR's Wildlife Resources Division (WRD), 50-Year Plans have also been written for lands within the jurisdiction of DNR's Parks and Historic Sites Division. Though mainly focusing on wildlife species and habitat management goals, 50-Year plans also encompass other considerations under the scope of DNR's state legislated authority such as cultural resource protection and provisioning of public outdoor recreation opportunities.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>

The 50-Year Plan had its origin in the late 1980's when it was decided by WRD leadership that one of the best strategies of avoiding management conflicts and diversion of intentions was to initiate a comprehensive planning process, the end result of which would produce a written document – the 50-year Plan. A team of natural resource professionals from within DNR, along with input from relevant outside government agencies and non-governmental organizations, would contribute to the plan. Once written by the team and approved by appropriate Division level leadership, the 50-year Plan would serve as the fundamental guiding document for a particular piece of state-owned land, whether designated as a Wildlife Management Area (WMA), Natural Area (NA), or State Park. Indeed, shorter term work plans (5-year and annual plans) for a state-owned WMAs are based on the overarching goals of the 50-year Plan (for those areas that have a completed Plan). One of the key benefits of a completed 50-Year Plan is that while departmental staff may come and go, the 50-Year Plan remains as the basis upon which management decisions are made for a particular area – thus greatly favoring consistency of management approach, despite the possible whims of individual land managers and supervisory staff. These plans address many of the objectives outlined in the original State Wildlife Action Plan.

It is important to note, that a 50-Year Plan is not a static document, as natural stochastic events may, and do likely, occur (e.g. hurricanes, tornados, ice storms, etc.). These can significantly alter the habitat of an area in a short amount of time, mostly certainly changing current habitat conditions, and quite possibly changing the vision of 50-year habitat conditions. Significant revisions to a 50-Year Plan entail the same level of group participation and Division leadership sign-off as the original plan.

While there is no set template for a 50-year Plan, plans most commonly contain the following elements:

1. Introduction
 - a. Name of Area
 - b. Acquisition Process By State

2. Site description
 - a. Location
 - b. Soil types and Climate
 - c. Historical Ownership and Land-use
 - d. Cultural Resources

3. Purpose(s) of Area
 - a. Rare Species Protection, Watershed Protection, Public Recreation, etc.

4. Current Habitat Conditions and Proposed Conditions 50 Year Conditions
 - a. Proportion of Habitat Types
 - b. Stand-level Inventory (for forested acreage)
 - c. Maps

5. Management Prescriptions to Meet 50-Year Goals
 - a. Possible prescriptions: Prescribed Fire, Invasive Exotic Species Control (fauna, flora, or both), Timber Stand Improvements, Game Species Management, Hydrology Restoration, etc.

6. Appendices and Other Relevant Ancillary Documents

Direction and completion of a 50-Year plan for a particular area is the responsibility of the appropriate WRD Game Management Section Regional Supervisor (for WMAs) or Nongame Conservation Program Manager (for NAs). Currently, there is no set time frame for completion of 50-Year Plans, but WRD Headquarters prefers a completed 50-Year Plan within 2 years of state acquisition of a land parcel. For state owned lands in existence before the formal 50-Year Planning Process began, Game Management Regional Supervisors and Nongame Conservation Program Managers are encouraged to expedite formal 50-Year Plans as soon as possible. The current status of 50-Year Plans for lands under WRD jurisdiction is listed in Table 1.

Table 1. Current Status of 50-Year Plans for Lands Under Wildlife Resources Division Jurisdiction

WRD Region 1	
WMA or Natural Area	Completed Plan
Arrowhead	Yes
Crockford-Pigeon Mountain	Yes
J. L. Lester	No
Johns Mountain	No
McGraw Ford	No
Otting Tract	No
Paulding Forest	No
Rich Mountain	No
Sheffield Tract	Yes
Zahnd	Yes
WRD Region 2	
WMA or Natural Area	Completed Plan
Dawson Forest	Yes
Wilson Shoals	Yes
Hart County	No
WRD Region 3	
WMA or Natural Area	Completed Plan
Alexander	No
Big Dukes Pond	Yes
Dixon Bay	No
Vaughter	Yes
Hiltonia	No
Mead Farm	No
Oconee	No
Phinzy Swamp	No
Tuckahoe	No
Yuchi	Yes
WRD Region 4	
WMA or Natural Area	Completed Plan
Big Lazer Creek	Yes
Chattahoochee Fall Line	Yes
Clybel	Yes
Joe Kurz	Yes
Oaky Woods	Yes
Ocmulgee	Yes

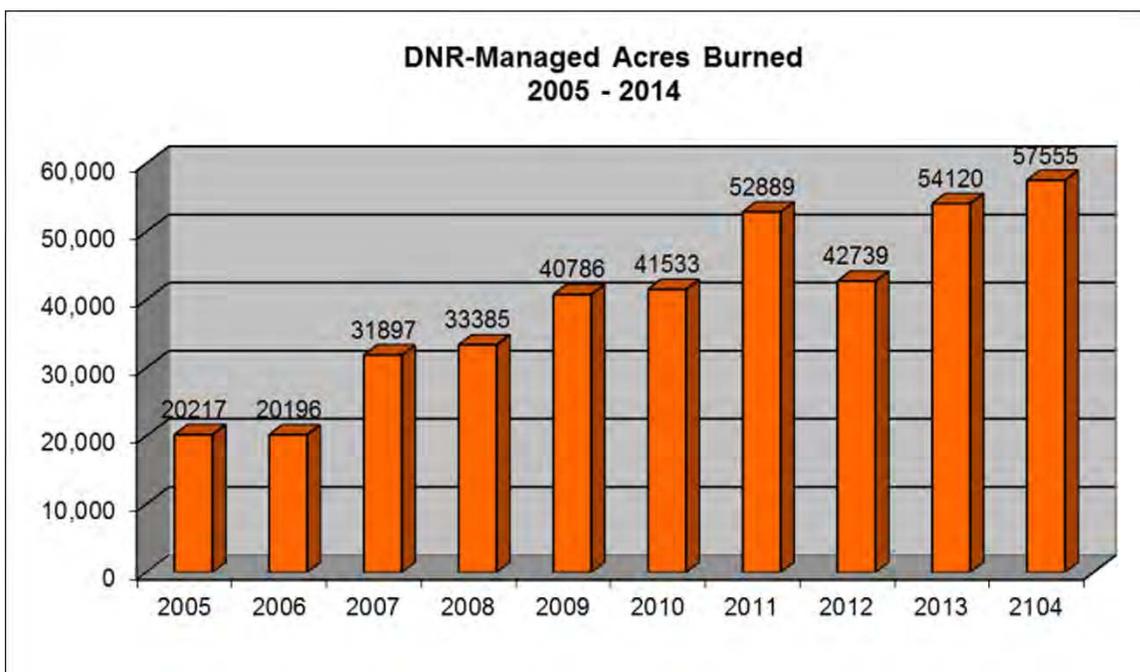
WRD Region 5	
WMA or Natural Area	Completed Plan
Elmodel	Yes
Moteczuma Bluffs	Yes
Mayhaw	Yes
Albany Nursery	Yes
Chickasawhatchee	No
Silver Lake	No
River Creek	No
Flint River	No
Doerun Pitcherplant Bog	Yes
Hannahatchee	No
WRD Region 6	
WMA or Natural Area	Completed Plan
Beaverdam	Yes
Big Hammock	Yes
Bullard Creek	Yes
Flat Tub	No
Grand Bay	Yes
Horse Creek	Yes
Moody Forest	Yes
Ohoopie Dunes	Yes
River Bend	Yes
WMA Region 7	
WMA or Natural Area	Completed Plan
Altamaha	No
Clayhole Swamp	No
Griffin Ridge	Yes
Ossabow Island	Yes
Penholoway Swamp	No
Richmond Hill	No
Sapelo Island	Yes
Townsend	No

DNR Prescribed Fire Program **Shan Cammack (GA WRD)**

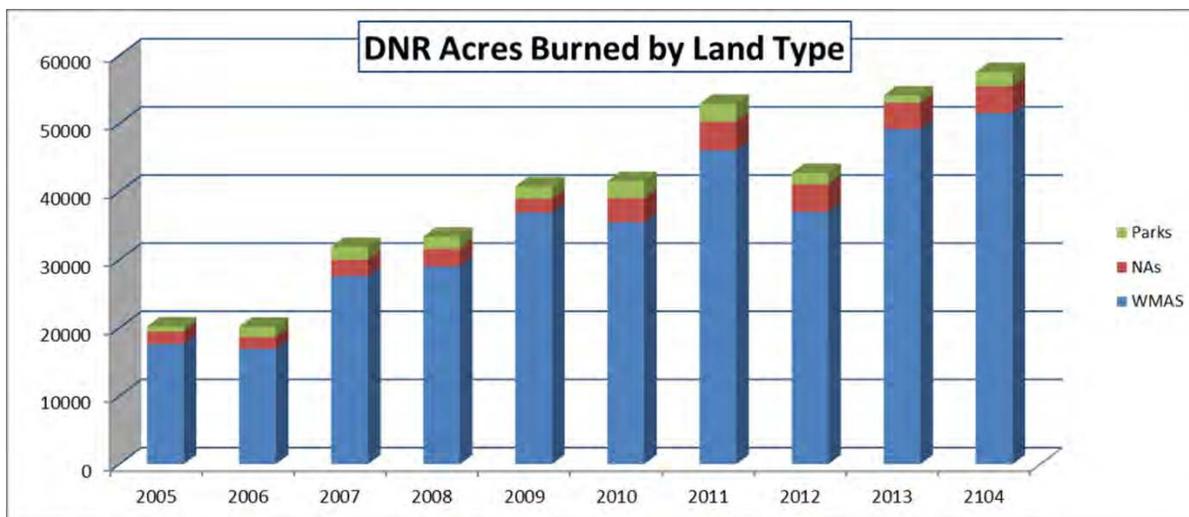
WRD has long viewed fire as one of the most important management tools available in Georgia to enhance and sustain native ecosystems. Because the need for more prescribed fire ranked so high in the State Wildlife Action Plan, a significantly greater amount of funding has been allocated to this important management tool in the last ten years. Funds for were secured by WRD from several sources, including State Wildlife grants, the National Fish and Wildlife Foundation, Georgia Ornithological Society, and Wildlife Conservation Society. These supplemented the Pittman-Robertson funds that have long been earmarked for prescribed fire.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>

In looking at the number of acres burned on state-managed lands in that past ten years, there is a definite upward trend. In 2005, a little over 20,000 acres were burned on DNR-managed land. This includes owned and leased acres. In 2014, 57,555 acres were burned, which is more than double.



Analyzing how that breaks down by land type, the following graph shows a general trend of more acres burned on each land type for the past ten years. This includes Wildlife Management Areas, areas managed as Natural Areas, and State Parks. The increase in acres burned on all three land types underscores the strong commitment to prescribed burning by all of DNR. Fluctuations exist from year to year based on days appropriate for burning and staff and resources available when burn units are in prescription. Staff shortages have been a problem for both WRD and the Parks Division. The drought of 2012 made the execution of prescribed fire operations difficult state-wide and helps explain the significantly lower number of acres burned that year.

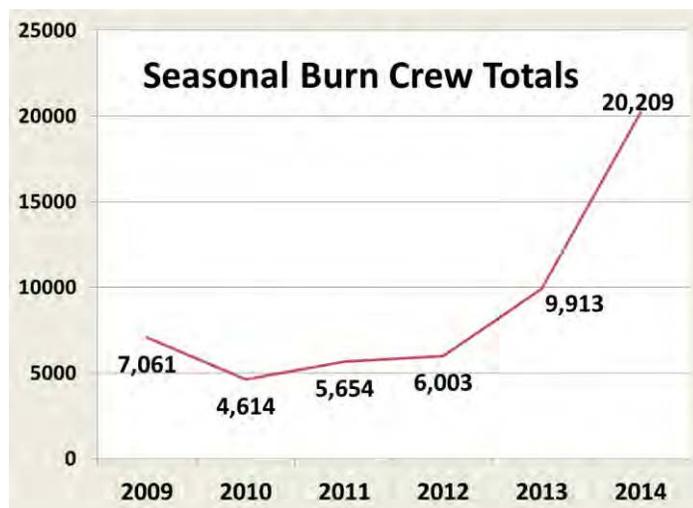


Land Types include Parks, Natural Areas (NAs), and Wildlife Management Areas (WMAs)

Several factors contribute to increased acres burned. The stronger commitment to prescribed fire since SWAP has led to increased funding, a formal prescribed fire policy, heightened training of staff and volunteers, hiring of dedicated seasonal fire crews, and an active Interagency Burn Team (IBT). The increased funding from outside sources has allowed DNR to purchase specialized wildland fire equipment and safety gear for firefighters. An important milestone for the DNR burn program was the development of a prescribed burning policy for WRD in 2007 and for Parks in 2009. This outlined standards for training, qualifications, and burn planning. The policy has produced a more consistent burn plan procedure and has brought DNR training standards up to the basic level of NWCG (National Wildfire Coordinating Group). NWCG is the recognized industry standard for fire qualifications nation-wide. Meeting these standards has allowed DNR to enter into a Memorandum of Understanding with the IBT.

Not only were more people trained, but advanced training was offered and encouraged. The IBT collaboration played a key role in increased training opportunities. The IBT also offered partners valuable experience opportunities, strengthening skills of DNR employees. Additionally, the IBT provided DNR with staff and resources on DNR burns state-wide.

Dedicated seasonal fire crews were brought on in 2009. In the first few years the crew was made up entirely of SCA (Student Conservation Association) interns. While these young passionate conservationists had to be fire trained and came with little to no fire experience, they worked tirelessly and learned quickly. Many interns have returned as seasoned wildland firefighters, providing great leadership and mentoring of incoming SCA interns. The seasonal fire crew model has been so successful--as the graph to right shows--that in 2014, the DNR expanded the program into two crews. Crews are placed regionally, based in southeast and west-central Georgia but work state-wide. The success of the fire crews is related to the 24 hour availability and flexibility to travel state-wide at a moment's notice.

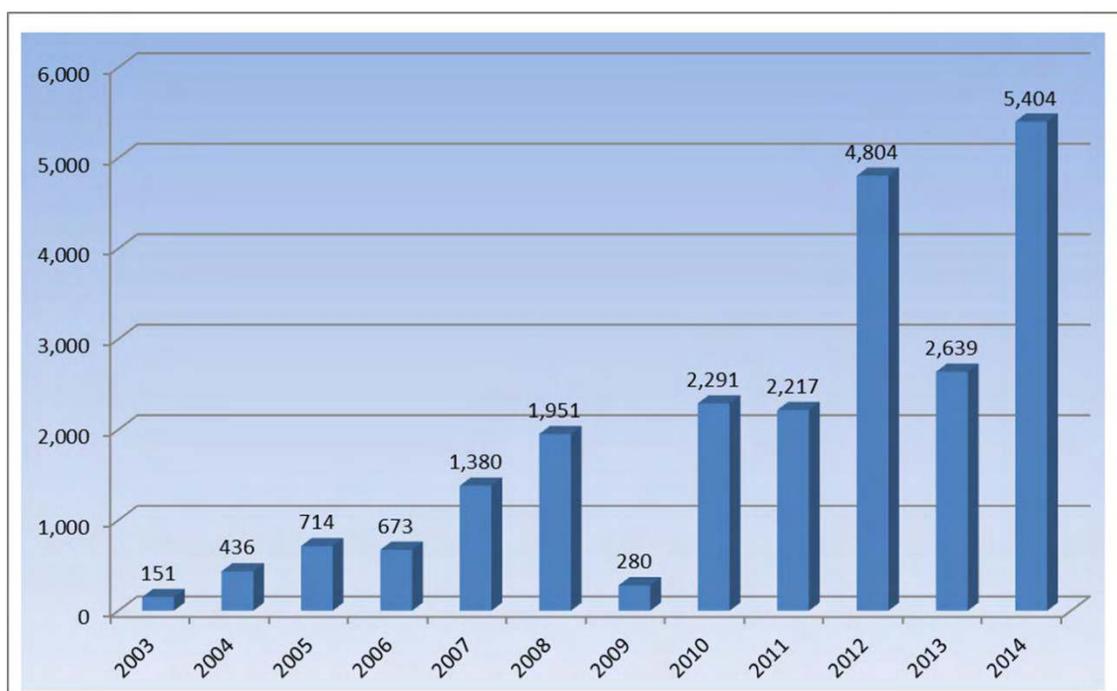


This allowed DNR fire managers to move crews to priority sites wherever weather forecasts are in prescription. The fire crews freed up DNR biologists to work on other high priority projects.

While trends are definitely moving in the right direction, managers at DNR recognize that we are not burning enough acres. If one considers that WRD manages over 363,000 acres of state-owned land, 17,760 acres of DOT mitigation lands, and the Parks, Recreation, and Historic Sites Division manages over 67,490 acres of State Parks and Historic Sites, it's a daunting task. One tool that is used is to determine how much burning is appropriate is the Fire Needs Assessment. The spreadsheet below shows a typical Fire Needs Assessment, where burnable acreage is calculated, fire frequency is determined, and acres burned are recorded. Goals for burning can be set based upon these numbers and then actual acres burned can be scrutinized each season. This can help direct resources to areas that are not hitting their target. This analysis requires a great deal of time to collate information and thought and interpretation to produce meaningful results.

Natural Area	State-owned Acreage	County	Burnable Acreage	Fire Freq	Acres Burned FY 2009	Acres Burned FY 2010	Acres Burned FY 2011	Acres Burned FY 2012	Acres Burned FY 2013	Acres Burned FY 2014	(%) FY 2014
Big Dukes Pond NA	1,692	Jenkins	1,690	Med	0	155	0	170	0	0	0%
Big Hammock NA	786	Tattnall	680	Med	0	310	0	0	340	0	0%
Black Creek NA	700	Taylor	700	High	175	295	270	450	270	450	64%
Doerun Pitcherplant Bog NA	651	Colquitt	620	High	135	281	319	350	146	105	17%
Egg Island Bar NA	226	Mcintosh	20	High	0	20	20	20	20	20	100%
Fall Line Sandhills	875	Taylor	881	High	334	0	514	335	990	380	43%
Moody Forest NA	4,425	Appling	2,850	High	984	1,495	1,050	1,155	841	1,179	41%
Ohoopsee Dunes NA	2,507	Emanuel	2,200	High	100	1,055	490	80	690	495	23%
Sprewell Bluff NA	3,150	pson/Talb	3,000	High	825	380	2136	1280	515	1745	58%
Total Acres:	15,012		12,641		2,553	3,991	4,799	3,840	3,812	4,374	35%

Another important trend in the DNR prescribed burning program is the increase in growing season fire. In 2005, a little over 700 acres of state lands were treated with growing season fire, compared to over 5,400 in 2014. Increased training and experience as well as building specialized fire equipment have all contributed to this positive trend.



Changing up the seasonality of a burn is very important ecologically. Periodic fires in the growing season can improve habitat in ways that a dormant season fire cannot. Growing season burns are incredibly effective in controlling undesirable hardwood species, promoting native species, and in restoring and maintaining the herbaceous vegetation that provides crucial habitat for brood-rearing birds as well as critical fuels for continued fire.

DNR has used the increased use of prescribed fire as an opportunity to promote the tool with landowners and the general public. Staff have developed education and outreach materials, including kiosk posters, bookmarks, and interpretive brochures. Press releases are prepared throughout the year to heighten the awareness about fire and to inform the public of current DNR activities. Staff also give presentations to schools and colleges as well as civic and conservation groups and host educational events for the public such as Fire on the Mountain. At these events, people are able to learn firsthand about prescribed burning, including seeing fire equipment, listening to speakers, and watching a prescribed burn in real time.

DNR's commitment to fire is also evident in their involvement in the Georgia Prescribed Fire Council (GPFC). Staff have been active on the steering committee since the group's inception in the early 2000's. In 2014, DNR took the helm of the group as Shan Cammack was elected Chair of the Council.

Prescribed fire is used in conjunction with other management tools, such as thinning timber, planting native tree species, restoring native groundcover, and eradicating exotic species. This is outlined in DNR's Fifty Year Plans, which are discussed earlier in this chapter. The goal of using a combination of practices is to improve altered habitats and to restore and enhance natural habitats. As outlined in the SWAP, habitats supporting rare species are made a priority for these management techniques. It is important to monitor the effects of management to ensure that the practices are achieving their objectives. DNR conducts both formal and informal monitoring to provide feedback to the adaptive management loop. One example is Fire Foto Monitoring, which is a set of protocols to take pre- and post-burn photos at specified locations. Qualitative analysis of these photos reveals if management objectives are being met. Future planning relies on the findings of the monitoring. More information can be found in the Monitoring Technical Team's chapter.

Spotlights on Conservation

Wildlife Resources Division Staff

Habitat restoration success stories can be found state-wide on WRD-managed lands. The following section highlights a state-owned property in each region and details the management for species of conservation concern.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>

Region 1: Paulding Forest /Sheffield WMA, Brent Womack

Sheffield WMA is located within the Paulding Forest, Tallapoosa/Dugdown SWAP priority area. This area is on the northern boundary of Piedmont physiographic region and contains some of the best examples of natural mountain longleaf stands in Georgia. Over the past 10 years several efforts have been made to manage for and restore the rare mountain longleaf habitat type. Starting eight years ago 260 acres of uplands were marked for selective thinning within a 900 acre project area. The objectives of the thin were to remove overstory hardwood encroachment, to release longleaf and shortleaf pine, and open up the canopy. Upon completion of this thin a prescribed burn program was initiated. The entire project area, as well as surrounding natural stands that weren't thinned, have been placed on a 3 year burn rotation. Since the thinning was completed seven years ago the entire project area has been burned twice with one block having been burned three times. The response from the ground cover has been dramatic, with the development of lush groundcover. In addition to the project area we have also prescribed burned another 900 acres of adjacent natural pine forest on Sheffield in recent years.

At the same time we have been working on Sheffield to manage natural longleaf stands we have begun a management program on adjacent Paulding Forest that will eventually result in converting the planted loblolly pine stands to longleaf. The first steps in the process have been completed with the thinning of these loblolly stands and the introduction of a controlled burn program. A 3,000 acre area of the state owned portion of Paulding Forest has been identified as a mountain longleaf priority area and will be converted first with additional stands following suit as it becomes feasible. Within the last six years over 2,100 acres of the longleaf priority area has been burned once with much of it having been burned twice. The remainder will be rolled into the prescribed burn program over the next couple of years as we complete land acquisitions from the current owners.



One exciting result of this habitat work has been the recent documentation of fox squirrels on this part of Paulding Forest. Fox squirrels have been known to be abundant on neighboring Sheffield, but had not been known to inhabit the converted stands in recent years. With the thinning operations in these loblolly stands and the prescribed burning that has taken place the ground cover on Paulding Forest has responded well and we look forward to further improvements of the wildlife habitat in the future.

Region 2: Wilson Shoals WMA, Kevin Lowrey

Wilson Shoals WMA is located in Banks County, Georgia just south of Alto. The 2,800 acre area was former farm and timberland. The habitat is primarily oak –hickory forest with some remnant loblolly, shortleaf, and Virginia pine stands.

Management focus on Wilson Shoals WMA has been to provide quality habitat for a variety of recreation activities including hunting, hiking, camping, and wildlife watching. With the area being dominated by dense oak-hickory stands, our focus has been to create more habitat diversity and enable the use of prescribed fire. With that in mind, we have begun converting several areas to shortleaf pine with the ultimate goal being diverse shortleaf pine/bluestem grass woodlands that can be maintained with prescribed fire.

The conversion is a slow process that we are accomplishing in several ways. In 2007, we planted 70 acres of shortleaf pine seedlings in areas of pine beetle kill. In 2013, we clear-cut two 25- acre stands and replanted them with containerized shortleaf pine. Also in 2013, we were able to implement our preferred conversion strategy, which would be natural shortleaf pine regeneration. We were able to thin 55-acres of ridge tops leaving shortleaf pine seed trees and fire tolerant oaks. These areas will hopefully naturally seed with short-leaf pine. We will continue to monitor and provide hardwood control as needed. Building on that success, we have identified several areas to duplicate the same treatment. Over time, we will convert as much as 1,000 of the 2,800 acres to shortleaf woodlands that will be fire maintained.



We are excited not only to create added diversity to the Wilson Shoals WMA for wildlife benefit, but we also hope to encourage a rare plant that is found on the area, Georgia Aster (*Symphyotrichum georgianum*). In the fall of 2012, Georgia Aster was discovered growing in a gas utility right of way on Wilson Shoals. This was once a candidate species and now has a conservation plan in place. A meeting on the area in the fall of 2013 resulted in a plan to burn a woodland ridge top where we had found a single Georgia aster plant. The burn went great and we hope to see the benefit this fall. With Georgia aster on the area and as more shortleaf woodlands are created, we

expect this species to flourish along with a suite of other forbs and wildflowers.

Region 3: Yuchi WMA, IB Parnell

Yuchi Wildlife Management Area (WMA) is comprised of 7,454 acres in Burke County along the Sand Hills Fall Line adjacent to the Savannah River. It is located on Georgia Highway 23 within 30 miles of Augusta, Georgia. Approximately 6,000 acres of the habitat is upland pine and pine/scrub oak mixtures. There are several creek bottoms and 3 miles of Savannah River frontage with moist to wet soils.

Yuchi WMA was purchased in 1988 from Kimberly-Clark Corporation, a forest products company. Most of the area has been cutover and replanted in loblolly and slash pines, replacing the natural longleaf-wiregrass-scrub oak community. The loblolly and slash pines are poorly suited to the dry, sandy soils found on the area and consequently are growing very poorly. The main use of the WMA is hunting for white-tailed deer, wild turkey, mourning dove, squirrel, raccoon and other game species. Fishing and boating access to the Savannah River is an additional attribute of this tract. A very popular shooting range is also present. Because of its location and soil composition, Yuchi also provides habitat for important nongame species like the gopher tortoise (*Gopherus polyphemus*).

The long-range habitat management plan for Yuchi is for the entire upland pine habitat to be converted to longleaf pine. Conversion from loblolly and slash pine to longleaf pine benefits many early successional habitat dependent species because longleaf is a fire-adapted pine species. The growth character of longleaf also allows ample amounts of sunlight to reach the forest floor, thereby stimulating many understory plant species to grow. Implementation of the long-range management plan began in 1990 and 2,279 acres have been converted to longleaf to date with an additional 1,200 acres to be planted this winter. To maintain this longleaf ecosystem, 1,000-1,500 acres are burned annually using prescribed fire. Prescribed fire prevents hardwood saplings from overtaking the longleaf understory and stimulates the growth of fire-adapted understory plant species like wiregrass, gopher apple and beargrass.

The Wildlife Resources Division's Nongame Conservation Section surveyed Yuchi for gopher tortoises in 2011 and determined that the WMA could sustain more gopher tortoises than were currently on the area. Since 2012, Yuchi WMA has become home to at least 40 translocated gopher tortoises. These tortoises appear to be acclimating well. In 2014, gopher tortoise hatchlings were released at Yuchi augmenting the growing population.

Region 4: Fall Line Sandhills WMA, Nathan Klaus

At 876 acres, Fall Line Sandhills WMA is one of the smaller WMAs in the state, however it has more rare, threatened and endangered species on it than any other WMA in Georgia. Purchased in 2007, this former timber company land seems an unlikely site to harbor such diversity. Years of agriculture followed by heavy-handed forest management have left a mark on the property. Many of the rare species found on this property had been declining for decades and many had perilously low populations at the time of state acquisition. Time was of the essence and habitat restoration was needed.



Less than ten years later most rare species are making a turn around. Gopher tortoise populations have more than doubled on the property and reproduction levels are high, almost 30 times higher than when the land was acquired. Surveys of Bachman's sparrows, a state threatened species, estimated only 8 territories in 2008. In 2014 there are an estimated 40 territories. Even game species such as northern bobwhite (another high conservation priority bird) have tripled their populations.

The following tools were used to accomplish this:

- Prescribed Fire – Since acquisition the entire property has been put on a 2-3 year fire return interval. Most fires are conducted in the growing season to better control hardwood encroachment and to encourage the recovery of native grasses
- Herbicide Application – Selective herbicides have been used over about 90% of the property to control hardwood and blackberry encroachment. Prior to their use, research was conducted on site for several years to guide decisions on which herbicides would achieve management goals while conserving groundcover

- Timber Management – Nearly all of the property (about 80%) has either been thinned or clearcut and replanted to longleaf pine. Harvest objectives put habitat restoration as a priority over timber production. Stands were thinned to low basal areas (about 50 square feet/acre) and some marginally productive loblolly pine was clearcut to make way for longleaf pine restoration
- Native Grass Restoration -- Grass seed was collected from on site and grown into grass plugs. About 110,000 native grass plugs have been planted to help develop grassy fuels for prescribed fire and to create habitat for Bachman’s sparrows, northern bobwhite and other grassland species
- Invasive Exotic Species Control – Several species of invasive exotics (Chinese privet, mimosa, and *Crotalaria spectabilis* and others) have been aggressively controlled.
- Wetland Creation – Several natural ponds, which are important breeding sites for gopher frog, striped newt and other listed species, are found on Fall Line Sandhills WMA. Climate change may be altering the hydroperiod of these ponds and limiting reproduction of rare species. Three artificial ponds were dug in 2013 with longer hydroperiods to give amphibians a wider range of breeding opportunities
- Monitoring and Research – All of these activities have been closely monitored to help us adaptively manage this site. Decisions which were made without perfect information were followed up with good monitoring, allowing corrections and adjustments as needed. Monitoring included herbicide trials, tracking longleaf pine seedling survival, photopoints to document fire effects, surveys of amphibian use in natural and artificial ponds, gopher tortoise censuses, Bachman’s sparrow surveys, monitoring of presence and reproductive success of Southeastern American kestrels and other efforts. Without strong monitoring, adaptive management would not be possible.

Region 5: Silver Lake WMA, Brent Howze

Silver Lake Wildlife Management Area (WMA) is located in the Upper Coastal Plain Physiographic Province in Decatur County, Georgia. This WMA consists of 8,430 acres of state-owned property and 1,212 acres of land leased from the U.S. Army Corps of Engineers (COE). Silver Lake WMA is located approximately 10 miles southwest of the Bainbridge city limits and was formerly part of International Paper’s Southlands Experimental Forest. The WMA consists of mixed upland vegetative cover types interspersed with numerous depressional wetlands, ponds, and 370-acre Silver Lake. Silver Lake WMA is unique among state-owned properties in Georgia in possessing extensive longleaf pine-wiregrass forest coverage (3,060 acres).

Due to its location and habitat composition, Silver Lake WMA offers a prime opportunity for restoration of fire-maintained open pine savanna and other early succession habitats and associated wildlife species. Pine savanna is one of the most diminished habitat types in the Southeast and a priority for restoration in Georgia’s State Wildlife Action Plan, America’s Longleaf Initiative, Georgia State Forestry Assessment and Strategies, and the National Bobwhite Conservation Initiative (NBCI). A major focus of Silver Lake WMA is the management and restoration activities for species inhabiting the longleaf system including



high priority species such as the endangered red-cockaded woodpecker, gopher tortoise, Bachman’s sparrow, as well as Northern bobwhite. This WMA is one of the few public land tracts in Georgia with potential for long-term sustainability of viable and harvestable bobwhite populations as well as the only state-owned land with a red-cockaded woodpecker population.

Since the acquisition of Silver Lake WMA in 2008, collaborative efforts between WRD’s Nongame Conservation Section and Game Management Section have led to habitat restoration efforts across much of the landscape. These efforts have allowed for the burning and harvesting of over 900 acres of native ground cover that is used on restoration endeavors on additional state WMAs. Prescribed burning stimulates herbaceous plants, increases the

quantity and quality of browse, controls undesirable vegetation and pests, improves access within stands, and enhances brood-rearing and nesting cover for early successional species and ground nesting birds. Growing season burns have been particularly important in this restoration.

Dormant season prescribed burning has been the predominant technique employed to manage understory vegetation on Silver Lake WMA. Prior to 2010 burn units were typically large (250-1,500 acres) contiguous blocks. Although this management was necessary for short-term fuel reduction, burning large contiguous blocks is not conducive to many wildlife species of concern as large burn units eliminate or significantly reduce the food and cover within their home ranges. In order to create a more appropriate spatial distribution of cover across the landscape, our goal is to reduce burn units to 100-acres or less burned on an alternating schedule and to move to a growing season fire regime. This would ensure a “checkerboard” pattern of burned and unburned blocks across the WMA and reduce the impact of prescribed burning on cover availability. The establishment of smaller burn blocks and varied burn seasonality allows for a greater juxtaposition of stands with different burn histories, which creates more landscape diversity and benefits multiple species.

One of the most important objectives of Silver Lake is the expansion of the current RCW population by restoring longleaf pine and associated understory vegetation. To date, there has been an increase from 18 to 25 breeding pairs of red-cockaded woodpeckers on the property. Restoring longleaf habitat will enhance biodiversity and provide additional small-game hunting opportunities, particularly for bobwhite quail as well as provide additional habitat to other grassland obligate species. The acreage of longleaf pine on Silver Lake WMA is scheduled to increase from 3,063 acres to 6,241 acres over the next 50 years. The major change will be the conversion of approximately 1,163 acres of slash and 1,944 acres of loblolly pine plantation to longleaf pine stands. The amount of acreage in open land, specifically wildlife openings, is scheduled to increase as well to approximately 600 acres of fallow openings.

Region 6: Flat Tub WMA, Greg Nelms

Flat Tub Wildlife Management Area (WMA) is located in the Coastal Plain Physiographic Region in Coffee and Jeff Davis Counties, Georgia. This WMA consists of 6,669 acres: 4,659 acres of state-owned property (DNR – 4,309 acres, GFC – 350 acres) and 1,660 acres of mitigation land owned by Plum Creek Timberlands. Flat Tub WMA is located approximately 13 miles southwest of the Hazlehurst city limits. Major vegetative cover types include pine uplands, river bottomland, and mesic hardwood drains. Flat Tub is unique among state-owned properties in Georgia in containing a significant number and distribution of “Altamaha Grit” sandstone outcrops, adjacent bogs and seeps, and associated rare plant species.

Flat Tub plays into a unique landscape scheme of high conservation value. The WMA sits immediately across the Ocmulgee River from the 8,100-acre Horse Creek WMA and the 2,500-acre Orianna Society Indigo Snake Preserve and just north of 1,500-acre Broxton Rocks Nature Conservancy Preserve and the 350-acre Georgia Forestry Commission Forest Legacy tract. On a broader scale the tract sits within the greater Fort Stewart-Altamaha Significant Geographic Area for longleaf pine. It is an extremely high priority area for the State of Georgia and collaborating conservation organizations, and has been the subject of several grant-funded projects. Future habitat developments across these properties will provide a large contiguous landscape necessary for the long-term viability of many species of concern.

Due to its location and habitat composition, Flat Tub WMA offers a prime opportunity for restoration of fire-maintained open pine savanna and other early succession habitats and associated wildlife species. Portions of the WMA’s uplands were heavily cut over by previous landowners, but possess truly outstanding groundcover of wiregrass and other herbaceous species. Pine savanna is one of the most diminished habitat types in the Southeast and a priority for restoration in Georgia’s State Wildlife Action Plan, America’s Longleaf Initiative, Georgia State Forestry Assessment and Strategies, and the National Bobwhite Conservation Initiative (NBCI). A major focus of Flat Tub WMA is the management and

restoration of high priority species inhabiting the longleaf system including the Eastern indigo snake, gopher tortoise, and northern bobwhite.

Since the acquisition of Flat Tub WMA in 2006, collaborative efforts between WRDs Nongame Conservation Section and Game Management Section have led to habitat restoration efforts and baseline wildlife and plant surveys across much of the landscape. These efforts have included burning over 1,500 acres and preparing 850 acres for replanting longleaf pine with another 318 acres identified for replanting in the near future. Conversion to longleaf will continue over several thousand acres as the current loblolly pine stands reach their rotation age. A recent large-scale gopher tortoise survey effort estimated the Flat Tub minimum population at 108 individuals (0.16/ha) and found a high-density population on the neighboring Broxton Rocks Preserve. Survey and monitoring of Eastern indigo snakes and rare plants are ongoing.



Photos from a game camera set up post growing season burn 2014 on the Rocky Hammock tract.

Region 7: Townsend WMA, David Mixon and Kara Nitschke

Townsend WMA is located on the north side of the Altamaha River in Long and McIntosh Counties. Acquisition of land now associated with Townsend WMA began in 2007. Townsend WMA now totals around 32,000 acres. Included in this acreage are thousands of acres of sandhills habitat that have been targeted for restoration to a longleaf-wiregrass ecosystem. Nearly 100% of the planted sand pine or offsite slash and loblolly has been removed from the sandhills and the majority of these clearcuts have already been planted into longleaf. The habitat change is already evident, as the sandhills are now producing many different plant species in abundance where the habitat previously was subdued by the sand pine overstory. Gopher tortoises that were primarily found on road edges and powerline right-of-ways have moved out into these newly reforested areas.

The restoration of this area to a longleaf system is still underway, but the progress is very evident and habitat response has been very encouraging. In the winter of 2013-14, 785 acres of longleaf pine were planted on Townsend WMA by DNR's Forest Management Unit. Reforestation efforts on Townsend WMA are a collaboration (years in the making) between FMU, GM, and NG sections of DNR along with multiple other stakeholder agencies in an effort to return the sites to naturally occurring forest ecosystems.

Townsend WMA is one of only two known sites in Georgia that have a naturally occurring population of Radford's mint, an endangered herb found only in McIntosh County, Georgia. DNR's Nongame section has worked to provide more suitable habitat for this rare plant by selectively hand-felling surrounding offsite sand pine in an effort to promote population growth.



Oyster Restoration and Enhancements

Jan Mackinnon, Dominic Guadagnoli, and January Murray (GADNR CRD)

The Coastal Resources Division is the state agency entrusted to manage Georgia's coastal marshes, beaches, waters, and marine fisheries resources for the benefit of present and future generations. The Division's service area extends from the inland reach of the tidal waters to three miles offshore. In 1970, the Georgia General Assembly passed the Coastal Marshlands Protection Act due, in part, to the value of the estuarine area to species of marine life and wildlife and the fact that the marshlands provide a nursery for commercially and recreationally important species of shellfish and other wildlife. Shellfish continue to be an important component to both commercial and recreational fisheries. Some species, such as the Eastern oyster (*Crassostrea virginica*) also have significant ecological value to estuarine systems by acting as a keystone species that support a host of marine fishes and other invertebrates, as well as their ability to efficiently filter water.

	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
	<i>Combatted Invasive/Alien Species</i>

CRD's Habitat Work Group is engaged in actively restoring, enhancing and monitoring oyster reefs along the coast. These projects are designed and constructed in harvest areas to enhance existing reefs to support a long standing fishery on the Georgia coast. In addition, projects are planned each year to restore reefs outside of harvest areas for fish habitat. These projects are partnership projects that deploy cultch material at suitable locations. Lastly, property owners have begun to use oyster clutch materials and native marsh plants to stabilize erosional shorelines. All of these initiatives require pre and post monitoring of sites for recruitment and stability.



CRD staff place bagged oyster shell in Plantation Creek, Glynn County.



Recruitment in Oyster Creek, Chatham County harvest area



Use of oyster shell material to stabilize eroding shoreline on Sapelo Island, GA.

Working Farms and Forestlands

Reggie Thackston (GA WRD) and James Tomberlin (GA WRD)

Georgia's landscape is 93% privately owned with the majority of its undeveloped lands being managed for agricultural and/or forestry outputs. The long-term viability for many wildlife populations depends on the successful integration of habitat practices into these working farm and forestlands. Results from more than 10 years of implementing Georgia's Bobwhite Quail Initiative, along with empirical evidence gained in the delivery of Farm Bill and other private lands programs, show that financial incentives and professional technical assistance are critical components to successfully restore and sustain priority wildlife habitats and species on private lands. Along with the Farm Bill, other state, federal and non-governmental programs have the potential to make strong contributions to wildlife management on working farm and forestlands to: 1) enhance habitat for species of conservation concern including rare, threatened, and endangered species, 2) prevent species from reaching regulatory status, and 3) keep common species common.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
	<i>Combated Invasive/Alien Species</i>

Conservation programs authorized and funded through the Farm Bill impact wildlife habitat at the landscape scale. For example, across Georgia during 1998-2009, the Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), Wildlife Habitat Incentives Program (WHIP) and Wetlands Reserve Program (WRP) collectively resulted in over 210,000 acres of longleaf pine planting (Figure 2), 31,000 acres of pine thinning, and 300,000 acres of prescribed burning. In fact, funding for Farm Bill conservation programs and practices potentially exceeds revenue from all other wildlife conservation funding sources.

Somewhat consistent with Georgia SWAP, in 2011 the Georgia Natural Resources Conservation Service (GA NRCS) worked with conservation partners to develop a State Natural Resources Assessment (SRA). The SRA is a prioritization process across five land use categories for nine identified resource concerns including fish and wildlife habitat. The SRA purpose is to guide and focus Farm Bill program delivery during 2012 - 2014 to optimize natural resource returns on taxpayer investments. Georgia NRCS engaged conservation partners to rank the resource concerns in order of importance and estimate the acres needing treatment. Table 1 shows the results for the NRCS Inadequate Habitat for Fish and Wildlife concern within the four applicable land uses. Forestland ranked highest in both priority and estimated treatment acres for fish and wildlife habitat. Forest habitat management needs vary with landscape context from riparian forest buffers, to forested wetlands, to fire-maintained woodland savanna. Agriculture and pasture lands were also prioritized for wildlife enhancement and offer the opportunity for integration of naturally vegetated fallow habitats to benefit wildlife species dependent on early stages of plant succession, such as grass-forb-shrub.

Table 1. Georgia NRCS 2012-2014 State Resource Assessment (SRA) for the Inadequate Habitat for Fish and Wildlife Resource Concerns.

Land Use	Potential at-risk acres	Acres Needing Treatment	Priority Rank 1 = Highest	Priority Treatment Acres
Crop	30,114	27,176	9	2,000
Pasture	110,550	90,410	8	10,000
Forest	12,937,704	12,455,643	4	500,000
Other Assoc. Ag Land	132,636	128,922	5	30,000

Woodland savanna, early succession habitats, and associated wildlife are identified as a priority for conservation in various national, regional, and state conservation plans. Examples include America's Longleaf Initiative, North American Landbird Plan, and the National Bobwhite Conservation Initiative. More specifically, Georgia WRD identifies the northern bobwhite, Georgia's state gamebird as a species of specific conservation focus. Additionally, bobwhites serve as an indicator for a much larger association of non-game and game species of conservation concern.

Widespread changes in land use, which have reduced the abundance and distribution of woodland savanna and early succession habitat, have caused bobwhite populations to decline by more than 90% since 1966. Collectively, these landscape changes have fragmented what was once a "sea" of early succession habitat into "habitat islands" that are becoming increasingly smaller in size and further apart. The overall result of this habitat loss and fragmentation is severely reduced bobwhite survival and population sustainability.

Bobwhites are not the only species suffering from this landscape scale habitat change. Georgia SWAP identifies 45 animal and 132 plant species that are associated with native grass-forb-shrub habitats and are of priority conservation concern. Additionally, quality early succession benefits wildlife species that are more abundant and adaptable than bobwhites (e.g., eastern wild turkey, white-tailed deer, and cottontail rabbit) and are important to Georgia's hunters and other citizens. In short, the bobwhite decline is indicative of a dramatic ecological change with widespread ecological, economic, and recreational impacts.

Similarly, bobwhites and other grassland obligates have experienced longterm population declines across the Southeast. In response to this decline the National Bobwhite Conservation Initiative 2.0 (NBCI 2.0) was developed by over 600 wildlife biologists and managers from 25 states and released in 2011 as a collaborative plan to restore woodland savanna and native grassland habitats (www.bringbackbobwhites.org).

In Georgia, as part of the NBCI 2.0 process, Tall Timbers Research Station and Land Conservancy staff, with input from biologists and managers from WRD and 11 other conservation organizations conducted a statewide habitat analysis to identify, rank and prioritize portions of counties for habitat restoration. Through this collaborative process geographic areas were prioritized as high, medium or low based on their bobwhite restoration potential and management constraints (Figure 1 and Table 2).

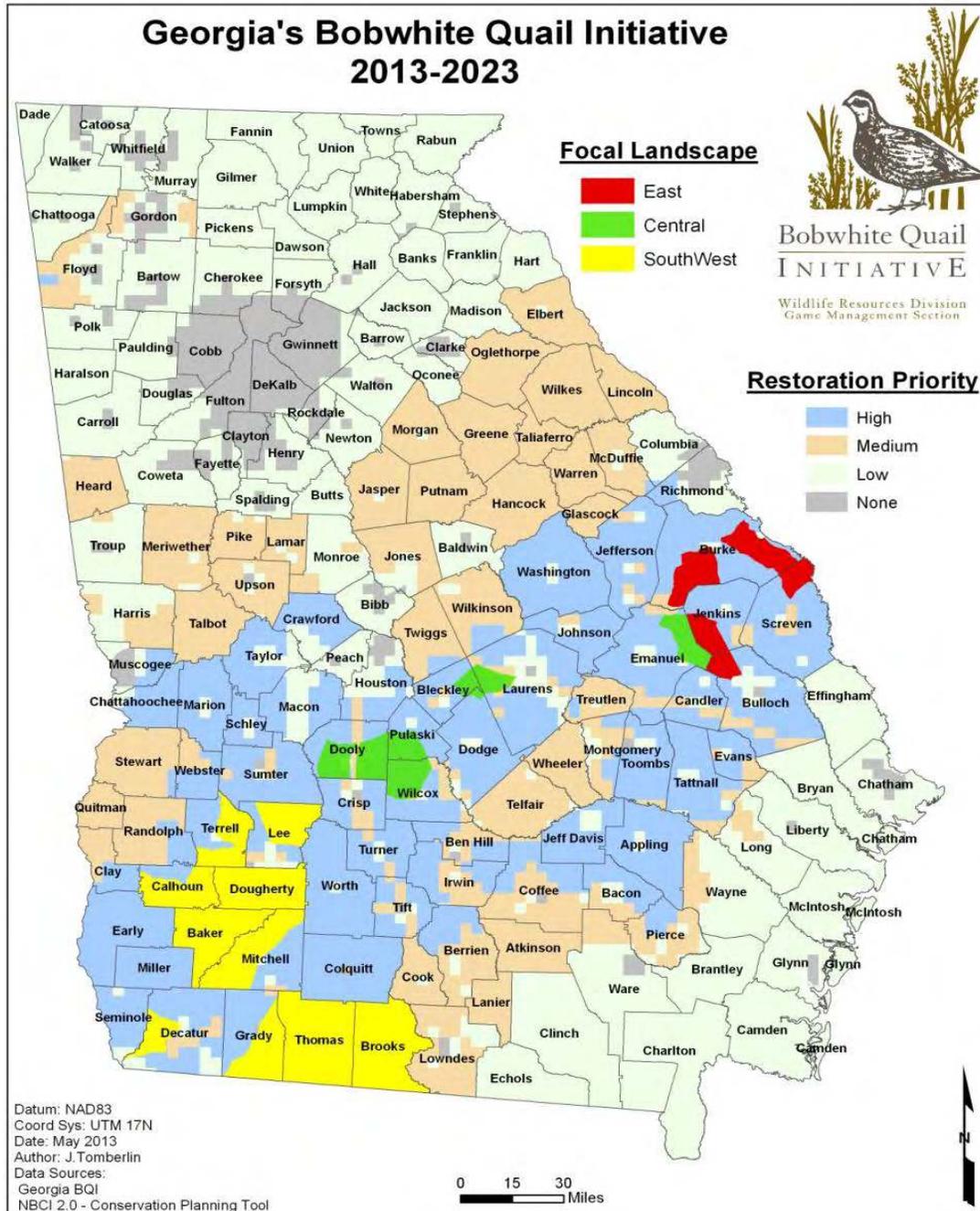


Figure 1. Habitat restoration priority delineated by Georgia’s Bobwhite Technical Team (GBTT) as part of the National Bobwhite Conservation Initiative Revision (NBCI 2.0). Areas in red, green and yellow represent 22 Focal Landscapes targeted for pine savanna and early succession habitat restoration in Georgia’s Bobwhite Quail Initiative Implementation Plan 2013-2023.

Table 2. Acres ranked as medium or high priority during the biologist ranking information workshop of the National Bobwhite Conservation Initiative 2.0.

Focal Region	Area*	Forest*	Crop*
Southwest	6,429,308	3,319,124	1,361,834
Central	4,964,576	2,842,830	655,162
East	2,454,314	1,290,371	418,073
Total	13,848,198	7,452,327	2,435,070

These high and medium priority areas were then further analyzed and filtered using the criteria of overall context, proximity to existing core bobwhite populations and WRD infrastructure. That analysis resulted in the delineation of 22 BQI Focal Landscapes into which funding and technical assistance will be prioritized for pine savanna and early succession habitat restoration (Figure 1). Habitat implementation strategies were then developed to achieve bobwhite population objectives. Analysis of habitat conditions within these Focal Landscapes revealed the potential and need for 58,360 acres of heavy pine thinning, 209,844 acres of additional prescribed burning and 63,205 acres of fallow cropland margins (Table 3).

As per the NBCI 2.0 protocol monitoring will occur for bobwhites, selected songbirds and habitat occurrence on at least one treatment and control focal area within each of the targeted landscapes. Spatially explicit delineation of landscapes and targeted acres for management are provided in the Georgia WRD Bobwhite Quail Implementation Plan 2013 – 2023 <http://www.georgiawildlife.com/conservation/quail>.

Table 3. Georgia Bobwhite Quail Initiative habitat restoration needs identified within 22 Focal Landscapes to achieve bobwhite population goals.

Focal Region	Soil & Water Conservation District	Focal Landscape (County)	Acres	Habitat Restoration Needs ^a		
				Pine		
				Thinning ^b	Rx Burning ^c	Cropland ^d
Southwest	Flint River	Baker (Baker)	118,564	3,464	0	5,041
		Calhoun (Calhoun)	103,326	1,743	0	3,743
		Dougherty (Dougherty)	31,521	1,353	0	509
		Grady (Grady)	97,623	3,533	0	2,117
		Mitchell (Mitchell)	190,000	3,100	0	6,135
		Silver Lake (Decatur)	46,542	2,694	0	2,389
	Lower Chattahoochee	Lee (Lee)	97,326	2,277	9,166	3,435
		Terrell (Terrell)	100,842	2,465	9,924	3,864
	Middle South Georgia	Brooks (Brooks)	301,088	5,315	0	5,741
		Thomas (Thomas)	213,397	7,730	0	4,094
Worth (Worth)		116,923	4,454	0	4,024	
Central	Central Georgia	Buckhorn (Bleckley, Dodge, Laurens)	67,013	2,918	29,175	1,627
	Ocmulgee	Dooly (Dooly)	71,148	1,501	14,616	4,162
		Pennahatchee (Dooly)	60,561	1,010	9,837	3,263
		Pulaski (Pulaski)	53,346	863	8,404	2,479
		Wilcox (Wilcox)	82,226	2,822	27,478	2,151
	Ohoopsee River	Emanuel (Emanuel)	72,254	2,216	22,439	1,421
East	Brier Creek	Di-Lane (Burke)	97,502	2,238	20,720	2,876
		Jenkins (Jenkins)	55,376	1,872	17,337	1,496
		Yuchi (Burke)	88,257	2,730	25,281	1,656
	Ogeechee River	Bulloch (Bulloch)	36,527	946	7,098	290
		Screven (Screven)	44,377	1,116	8,371	693
Totals		22	2,145,739	58,360	209,846	63,205

^a Habitat Restoration Needs are acres established through direct habitat management.

^b 10% estimated from 2009 USDA Cropland Data Layer and percentage of pine needing thinning based on analysis of stand composition using 2008 Forest Inventory Analysis data.

^c Additional acres needing prescribed fire based on acres of pine burnable from 2008 Forest Inventory Analysis data, burn acres permitted by Georgia Forestry Commission and assuming a 2-yr burn interval.

^d 10% of

Private Lands Program Summary

Eric Darracq (GA WRD)

The following programs supported by the Georgia DNR Wildlife Resources Division have played a role in supporting SWAP objectives.

Bobwhite Quail Initiative

BQI provides technical assistance for private landowners who are interested in increasing quail and populations through habitat restoration. Georgia's quail population has declined by approximately 90% since the early 1960s primarily due to loss of quality early succession habitat. Restoring this habitat type within row crop agriculture & forest landscapes also benefits many songbirds & other wildlife, improves water quality, reduces soil erosion, and can economically enhance local communities by stimulating quail hunting and wildlife viewing. Landowners will be advised about available financial incentives. BQI is supported solely through proceeds of "Support Wildlife" vehicle license plate sales, grants, & direct donations.

In 2014, BQI biologists held 13 field days, prepared over 100 management plans, interacted with the media with newspaper articles and TV/radio interviews, and conducted research and surveys. Almost 6,000 people participated and over 285,000 acres were impacted.

Any private non-industrial landowner is eligible for a management plan. For service, visit <http://gohuntgeorgia.com/conservation/quail> & call a professional wildlife biologist within your GA BQI Focal Region: East- 706-554-3745, Central- 478-296-6176, or Southwest- 229-420-1212.

Forest Stewardship Program (FSP)

FSP helps private landowners manage their natural resources with a written management plan that integrates and focuses their objectives of sustaining quality native timber, wildlife populations, soil and water resources, aesthetics, and recreation. Plans prescribe select conservation practices for specific areas of land. A team of professional soil/water experts, foresters and wildlife biologists will provide you with a free tour of your land to monitor forest health, discuss your objectives, planning options for the next 10 years, available conservation incentive programs, & point out specific areas needing immediate attention. After they complete follow-up fieldwork you will receive a carefully tailored plan. WRD has helped the Georgia Forestry Commission with their program by reviewing/writing 546 FSP plans representing 118,016 acres & visiting 161 different properties with landowners.

Any private non-industrial forest landowner of 100-1000 acres is encouraged to apply. Applicants must have 10+ forest acres & 25+ total acres. To apply visit www.gfc.state.ga.us and select Forest Management then Forest Stewardship. If wildlife is your focus objective, you can also inquire by calling a professional wildlife biologist at 706-557-3263.

Conservation Program & Practice Guidance

PLP biologists help private landowners find other technical and financial assistance programs that are most applicable for their objectives and land conditions. Many of these programs are offered through what is known as the "Farm Bill" and are summarized in the Landowner's Guide to Conservation Incentives at www.georgiawildlife.com/node/807. Landowners can call their local conservation agency office using its directory. Services include written technical guidance, financial incentives to install conservation practices prescribed, and financial assistance to conserve land. Conservation practices are management actions that improve forest and other natural resources while helping you meet your objectives. Visit www.gatrees.org

for Forestry Best Management Practices and www.ga.nrcs.usda.gov/technical for practices in agricultural & forest lands.

Forestry for Wildlife Partnership (FWP)

FWP provides corporate forest landowners with technical guidance to enhance wildlife conservation through a strong proactive partnership. The program is voluntary, flexible, non-competitive and participant-driven. Participating companies are evaluated based on their involvement and forethought regarding wildlife conservation planning, education and outreach, management practices, sensitive sites/special concerns, recreation, and partnerships. Companies that achieve a certain level of wildlife stewardship on their lands are publicly recognized by the state. WRD's corporate forestry partners are CatchMark Timber Trust, Plum Creek (since 2004), and Georgia Power (since 1999). They own & manage a total of 1,054,299 acres in Georgia.

FWP had five partners from 2004-2006, when forest industry owned more land in Georgia. Any corporate forest landowner of 20,000+ acres in Georgia is eligible to receive technical guidance. To apply visit <http://www.georgiawildlife.com/node/1283> or call our FWP nongame conservation biologist (229-227-5422), game management biologist (706-557-3263), or public affairs representative (770-918-6787).

Resource Management in State Parks Division **Sim Davidson and Brian Nichols (GA SPS)**

The mission of Georgia State Parks is to “protect our state's natural beauty and historic integrity while providing opportunities for public enjoyment and education.” The first core value of state parks and historic sites is “stewardship of our state’s natural, cultural, and historical resources is fundamental to the understanding of our past and the well-being of our future.”

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>

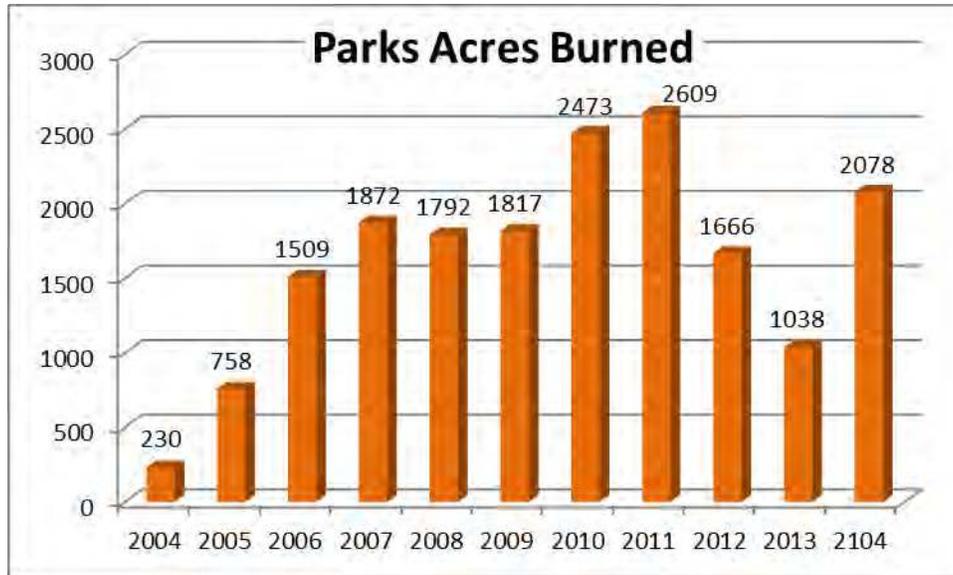
The management of the state parks natural resources falls under the responsibility of the Resource Management Unit (RMU), which was formed in 2011. A Resource Manager is assigned to each one of the two geographic regions (North and South). Primary responsibilities of the resource managers include prescribed fire, timber management, deer management, invasive/exotic species management, nuisance animal management, and natural resource management planning. Other components of the RMU include recreation, interpretation, and volunteer services.

Prescribed Fire

Georgia State Parks is a part of the statewide Interagency Burn Team (IBT). Parks began training firefighters in 2005, and currently has a force of 68 members. The RMU helps manage the fire team by providing seasonal training and burning opportunities. They are slowly building their equipment cache and fire leadership.

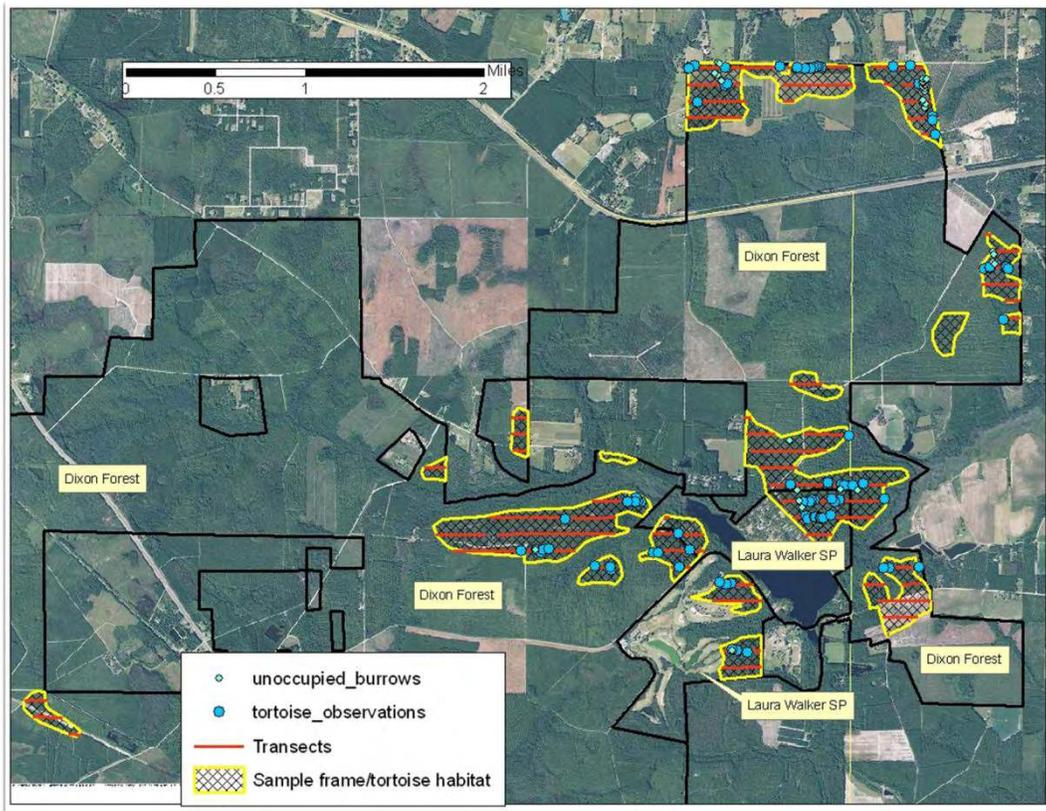
With the help of the Nongame Conservation Section, active fire management has been in place for almost a decade on high priority parks harboring rare species, including Crooked River, George L Smith, General Coffee, Laura Walker, Little Ocmulgee, Reed Bingham, and Seminole. Acres burned on state parks have increased dramatically over the past ten years, from about 200 in 2004 to over 2,000 in 2014. Parks resource managers have also been putting together plans for several new burn units at Fort Morris, Suwanee River Eco Lodge at S.C. Foster, George L. Smith, Kolomoki Mounds, Hard Labor Creek, and Sloppy Floyd.

Fire



photo

monitoring points have been established at parks across the state. Monitoring points have been set up at all parks that are actively burning for rare species. Most recently, points were established at Little Ocmulgee, George L. Smith, Georgia Veterans, General Coffee, Elijah Clark, and Mistletoe State Parks. These photo monitoring points enable practitioners to monitor the effects of fire on ecosystems and initiate adaptive management strategies for the future.



Gopher tortoise surveys have been conducted state-wide. The map above shows the high density of tortoises documented in 2014 at Laura Walker State Park is directly correlated with the prescribed burning program there.

Collaborating with Georgia Forestry Commission on fire management continues to increase. This past year, with significant assistance from GFC, Fort Mountain and Indian Springs were designated as Firewise Communities. The intention of the Firewise Communities Program is to reduce the loss of lives, properties, and resources to wildland fire by building and maintaining fire resistant communities in a way that is compatible with their natural surroundings.

Timber Management

The RMU assists with managing forests and timber on 60+ parks and historic sites. The RMU coordinates with the Forest Management Unit (FMU) for assistance with timber harvests, re-forestation, etc. Recent highlights include:

- Reforestation projects have been initiated at Magnolia Springs, Hard Labor Creek, and FDR in tornado-damaged areas. Longleaf pine will be planted on appropriate sites.
- The RMU was awarded a Southern Pine Beetle Suppression grant which will be used for non-commercial thinning at Fort Yargo State Park. This twenty-two acre plot is part of a sixty-six acre tract that was clearcut a number of years ago in order to combat an intensive infestation of kudzu. Thinning this dense, naturally-regenerated pine stand will improve tree health and reduce the risk of pine beetle infestation.
- RMU continues to work with FMU to put into practice harvest plans for parks statewide. Timber thins are utilized to improve overall forest health, wildlife habitat, and recreational opportunities.

Nongame Species Management

In addition to prescribed burning to restore and enhance habitat for rare species and other nongame species, Parks staff have used other management techniques. Some of these include planting of native trees and groundcover.

Chattahoochee Bend State Park will benefit from a project to enhance the population of a threatened and increasingly rare native wildflower, the monkey-face orchid. Funded through a grant received by the Atlanta Botanical Garden, and with assistance from the DNR Nongame Conservation Section, this project focuses on 3 of 11 known populations of the monkey-face orchid in Georgia. Seeds from these locations will be propagated by the Atlanta Botanical Garden and then introduced to a new location close by. Chattahoochee Bend is located very close to the Moore Creek population and offers similar wetland habitat for this orchid, making the park an ideal location to expand the population. In the coming year, the selected area at park will be prepared by removing overgrowth and opening the canopy for sunlight to reach the forest floor. The goal is to introduce the new orchids to the park during the winter of 2014-15.

This year, Panola Mountain State Park's Power of Flight area was officially recognized as an "Important Bird Area" (IBA). The goal of the IBA Program is to identify and conserve key breeding and feeding sites for birds. These areas provide essential habitats for one or more species of bird for breeding, wintering, or

migration. One of the primary reasons is the grassland restoration program that provides habitat for species such as swamp sparrows, woodcock, indigo buntings and blue grosbeak. This area represents a step toward restoring an area to quality native grassland on public land. Partners include GA DNR Nongame Conservation Section, Atlanta Audubon Society, GA Ornithological Society, GA Native Plant Society, The Nature Conservancy, etc.

Deer Management

Areas where deer are overpopulated have suffered habitat degradation. The RMU takes the lead and assists designated sites with managed quota hunts. Quota hunts on the state parks began in the late 1990's and have continued ever since. In 2013, quota hunts occurred on six sites including Panola Mountain, Hard Labor Creek, Tugaloo, Richard Russell, Red Top Mountain, and Chattahoochee Bend. RMU staff attends the annual deer management meeting at WRD headquarters to determine which sites will be selected for hunts on a two year rotation. Managed hunts help improve both deer health and the habitat that supports them.

Invasive Exotic Species

The RMU is tasked with the never-ending challenge of eradicating vegetative and aquatic invasive species from state park properties. Recent highlights include:

- The RMU oversaw numerous invasive species projects, both on land and water. Projects included treatment of kudzu at George L. Smith, treating the springs at Magnolia Springs, and privet resprouts at Chattahoochee Bend. Resource Managers also distributed chemical and backpack sprayers, as well as provided technical guidance to various sites for ongoing maintenance treatment of existing invasive species. Projects included treating Chinese privet at Gordonia-Alatamaha, Kolomoki Mounds, New Echota and Panola, bittersweet at Indian Springs, and Japanese Climbing Fern at Seminole and Mistletoe, as well as Autumn Olive at various locations.
- The RMU has partnered with the University of Georgia to provide training on treating aquatic invasives. RMU also hosted an invasive workshop at Panola with GA Power Land Mgt. Services for DNR staff to provide a hands-on field day to identify species and practice treatment options. Resource Managers were also able to assist with the ongoing treatment of aquatic invasives at Reed Bingham using an airboat to distribute chemical. Likewise, partners were engaged, like DNR Fisheries in their assessment and recommendations to treat duckweed at Victoria Bryant.
- The Hemlock Woolly Adelgid (HWA) continues to ravage the hemlocks of north Georgia. At current writing, all Georgia State Parks with natural stands of Eastern Hemlocks have been impacted by HWA. Initial soil injection treatments began in 2004 and followed the western progression of the adelgid. To date, staff and volunteers have protected over 3,500 individual trees on state parks, many re-treated after 5 years. Partners in this undertaking include the Georgia Forestry Commission, University of Georgia, Save GA Hemlocks- a non-profit organization, etc. The following parks have trees that have been treated: Black Rock Mountain, Unicoi, Hardman Farm, Smithgall Woods, Moccasin Creek, Fort Mountain, Amicalola Falls, Vogel, and Cloudland Canyon.
- In the early 1900's, an exotic fungus, *Chryphonectria parasitica*, was introduced and nearly eliminated the American chestnut from the landscape. Understanding the historical prevalence and

cultural significance American chestnuts played in the early 1900's, State Parks have recently partnered with The American Chestnut Foundation (TACF). Coordinated efforts include collecting pollen from established chestnut trees, installing demonstration plots and providing educational materials to visitors, with the collective goal of introducing blight-resistant chestnuts back into the environment.

- The RMU spent considerable time in the field mapping and assessing invasive species that were treated in recent years by contractors paid through the American Recovery & Reinvestment Act (ARRA). Also, professional training continued by staff attending the GA Exotic Pest Plant Council Meeting in Macon, GA.

The key to long term management of these species is proactively investing time and resources to following up on initial treatments.

Nuisance Animals

The RMU also worked with USDA APHIS wildlife services (WS) on nuisance animal issues. These impact not only park visitors, but also species of conservation concern. WS provided technical assistance for predator control in the gopher tortoise management areas at Reed Bingham State Park. Raccoons, fox, cats, armadillos, and other predators present a threat to the gopher tortoise population because they prey on the tortoise eggs that are deposited near the opening of the burrows. RMU and park personnel set cage traps in an effort to catch these predators before they do any harm.

Feral hogs also caused problems at Laura Walker, Hard Labor Creek, and Hofwyl-Broadfield Plantation. Management recommendations were made by WS and will be monitored to prevent future damage to state park lands.

Natural Resource Management Planning

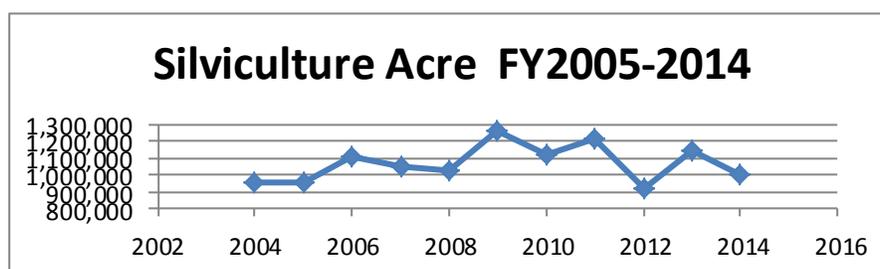
The RMU has been tasked with putting together natural resource management plans for state parks. In the past decade, several plans have been completed, including Little Ocmulgee, General Coffee, FDR, and Kolomoki Mounds. The plans include historical data, maps, rare/threatened plants and animals, vegetative communities, and desired future conditions.

Georgia Forestry Commission **Prescribed Burning in Georgia, Neal Edmonson (GFC)**

Prescribed fire is described as a safe way to apply a natural process, ensure ecosystem health, and reduce wildfire risk.

Over the last 10 years prescribed fire (Rx fire) has been on the increase in Georgia. The attached graph shows the increase. The average number of acres burned between 2004 and 2008 was 1,287,852 acres while the average between 2009 and 2013 was 1,544,084 acres. In the years that numbers are down (such as 2012) weather was the contributing factor. Extreme drought or very wet years prevent maximum achievable acres.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>



Acres burned under the silviculture permit system in Georgia.

Prescribed fire continues to be the favored tool for most land management objectives, especially for fuel reduction, wildlife management, as well as native plant and grass restoration. Longleaf pine ecosystems would cease to exist if not for the regular use of prescribed fire.

In 2008 Georgia and Florida realized that the two states faced similar challenges for prescribed fire, both currently and in the future. The two states decided to build a team of professionals from private landowners, non-government groups, plantation owners, and government agencies to identify the challenges facing prescribed fire for the next 10 years. Out of this Summit a Strategic Plan was written for each state. The number one obstacle noted to overcome was a common message from the prescribed fire community to the public promoting the benefits of prescribed fire.

From this the “One Message Many Voices Campaign” was launched. Georgia and Florida used a professional marketing company to develop a professional campaign to get the positive word out on prescribed fire. After developing the message and a plan for the campaign the two states shared it with the other thirteen southeastern states and all agreed to use the same message.

Prescribed fire has more publicity and an understanding of its use than in any other time in history. The growth of Prescribed Fire Councils has grown from the Southeast to all across the nation as well as British Columbia, and it has become the best recognized management tool for managing our nation’s forest than any other. The Prescribed Fire Council in Georgia is one of the strongest in the nation and has an attendance of over 150 practitioners each year at its annual meeting.

Private Lands Programs

Scott Griffin (GFC)

The Georgia Statewide Forest Resources Assessment and Georgia Statewide Forest Resources Strategy documents, also known as the Forest Action Plan, were produced in accordance with the 2008 Farm Bill in order to position Georgia to receive funds under the Cooperative Forestry Assistance Act. The Assessment provides a science-based foundation that analyzes forest conditions and trends in the state and delineates priority rural and urban forest landscape areas, in an approach consistent with the 2008 Farm Bill national priorities. Those priorities are to conserve working forest landscapes, protect forests from harm and enhance public benefits from trees and forests. The Strategy addresses top priority issues identified by the Assessment and will serve as the basis for formulating the GFC's five-year strategic plan.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>

Pressing forest issues and threats (ranked by stakeholders):

- 1) Water quality and quantity
- 2) Urbanization
- 3) Forest health
- 4) Biodiversity
- 5) Air quality
- 6) Fire management
- 7) Fragmentation and parcelization
- 8) Economics and changing markets

There is a lot of overlap in the Forest Action Plan (FAP) and the State Wildlife Action Plan (SWAP). Key common ground includes the restoration of native vegetation (longleaf pine ecosystem), the reintroduction of prescribed fire, battling the introduction and spread of invasive plants, and minimizing the impacts of development on forestland habitat. All of the priority issues above are directly tied to this common ground.

GFC Services - Private Lands

GFC services are making great strides in achieving the goals set forth by the FAP and SWAP. The vast majority of the GFC management services are directed towards private lands. With 91% of Georgia's 24.4 million acres of commercial forest land in private ownership, this program is vital to sustainability of forest resources in the state. The GFC currently has around 30 field foresters and 30 forest technicians whose primary goal is to serve this private landowner base. Overall this group serves as an advocate for the sound management of forests, with a focus on multi-resource management. Every county in Georgia has a forester dedicated to it. The following is an overview of the different services and how they are helping to achieve the goals of the action plans.

General Advice

This is a field visit to private property to give advice on a specific issue(s). This would include things such as prescribed burning, forest health issues, harvesting, reforestation, etc. In this case the forester or technician would visit the tract and provide written recommendations regarding the management of the issue. In FY 2014, GFC made 2,141 general advice contacts covering 250,190 acres.

Cost share

GFC is heavily involved with incentive programs that have a great impact on private lands in Georgia. These programs include the Emergency Forest Restoration Program, Conservation Reserve Program, Southern Pine Beetle PRS Program, Environmental Quality Incentives Program, Wildlife Habitat Incentive

Program, Partners for Fish and Wildlife, Invasive Plant Species Control Program, and the Conservation Stewardship Program. GFC foresters and technicians serve as technical service providers developing practice plans and certifying the performance of practices. Many of these programs have practices that focus on the goals of both action plans, including longleaf ecosystem establishment, prescribed burning and invasive plant control. In FY 2014, GFC made 3,798 cost share related visits touching 255,705 acres.

Forest Stewardship

A Forest Stewardship management plan is provided to landowners interested in managing their forestland for multiple use purposes such as timber, wildlife habitat, recreational opportunities, aesthetics, and soil and water conservation. The plan covers a ten year period. GFC foresters and technicians produced 189 new plans during FY14 covering 45,327 acres. This group also renewed/updated 37 plans covering 8,875 acres that were 10+ years old.

Cogongrass Eradication Program

Cogongrass (*Imperata cylindrica*) is considered the seventh worst weed in the world and listed as a federal noxious weed by USDA Animal and Plant Health Inspection Service - Plant Protection and Quarantine. The GFC, using funds provided by the USFS, began treating cogongrass in 2007. An online reporting system is currently available and much effort has been expended educating the general public regarding cogongrass and the threat it poses to Georgia's forests. The eradication program has addressed 839 cogongrass spots covering 204 acres. Of these 839 spots about 80% are considered controlled or eradicated and the other 20% are being treated with herbicides. The spots are monitored and treated yearly until considered eradicated.

Water Quality

In an effort to minimize erosion and stream sedimentation from forestry practices, the GFC has an agreement with the Georgia Department of Natural Resources Environmental Protection Division (EPD) to educate the forest community and promote the use of forestry Best Management Practices (BMPs). Under the same agreement with EPD and through an understanding with the U.S. Environmental Protection Agency (EPA) and the Army Corps of Engineers, the GFC also investigates and mediates forestry water quality and wetland complaints. The agreement also requires the GFC to monitor BMP implementation.

Prescribed Burning

GFC personnel encourage burning on private lands wherever it is needed and feasible. The services offered include firebreak plowing, burn map development and prescribed burning assistance. GFC rangers and foresters assisted with 135,365 acres of silvicultural burning during FY 2013.

Federal Entities

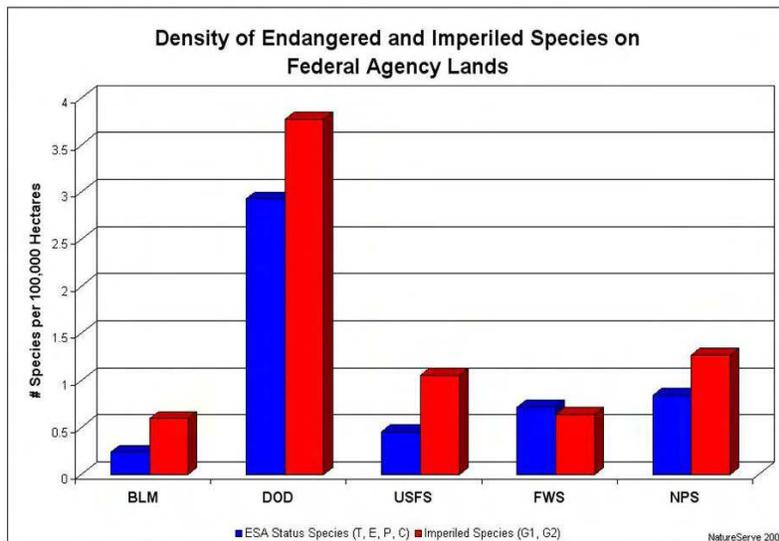
Department of Defense
Update on DOD Installations
Tim Beaty and Contributors (DOD)

Management of the natural resources on Department of Defense (DOD) installations in Georgia is guided by each installation’s Integrated Natural Resource Management Plan (INRMP). In accordance with the Sikes Act, each INRMP is reviewed by GADNR WRD, as well as the U.S. Fish and Wildlife Service and, at some installations, the National Marine Fisheries Service. The Goals and Objectives of the INRMPs are therefore well aligned with many of the Conservation Actions in the State Wildlife Action Plan. In cooperation with our State partners in Georgia DNR, as well as other Federal and private partners, significant progress has been made in achieving many of the High Priority Conservation Actions over the last 10 years.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>

In general, INRMPs focus on sustaining healthy, functional ecosystems and ensuring that the land will be able to support DOD’s current and future military mission requirements in harmony with traditional conservation goals. DOD lands have been increasingly recognized for their biodiversity, and they contain some of the state’s largest populations of many rare species. DOD installations have been largely protected from land use pressures that have affected private lands and many public lands over the last century. As shown in the table below, DOD lands support more rare species per acre than other federal lands. This is a result of several factors, including protection from urbanization and over-utilization of forest resources. In Georgia, fire-maintained communities on DOD lands have also benefitted from frequent wildfires caused by military training activities involving the use of explosives, tracers, and pyrotechnics, as well as the use of prescribed fire as a management tool to reduce fuel loads and lessen wildfire risks. Although DOD lands are not always thought of as “conservation lands”, there appears to be an inherent, enigmatic compatibility between the management needs of many natural communities and the manner in which DOD Services use those lands to meet their missions.

Most of Georgia’s DOD installations were established in the early to mid-twentieth century, in sparsely



populated rural areas. Over time, however, the populations around these installations have exploded, fueled in large part by the economic stimulus from the presence of the installations and the Soldiers, Airmen, Marines, Sailors, federal employees, and contractors stationed or employed there. This change in land use patterns (i.e., increased human population density) has the potential to lead to conflict (noise complaints,

safety concerns, etc.). Consequently, in 2003 DOD initiated the Readiness and Environmental Protection Integration (REPI) program to encourage landowners around DOD installations to keep their farm and forest land in conservation use. These types of land uses generally minimize potential conflicts between adjacent DOD and civilian land owners. These REPI buffers have significant value as wildlife habitat, and GADNR WRD has been an active partner in promoting REPI programs at several installations.

The following is a summary of specific wildlife conservation accomplishments at Georgia's DOD installations over the last 10 years.

Kings Bay Naval Base

Size: 16,000Acres

Date of acquisition: late 70's – early 80's

Public access allowed (yes, no, limited): Limited

REPI Buffer acres – N/A_ protected; N/A__ additional acres planned N/A

Species of Conservation Concern

<p><u>Federally Protected Species</u></p> <p>Wood Stork Eastern Indigo Snake North Atlantic Right Whale West Indian Manatee Green Sea Turtle Hawksbill Sea Turtle Kemp's Ridley Sea Turtle Leatherback Sea Turtle Loggerhead Sea Turtle Atlantic Sturgeon Shortnose Sturgeon</p>	<p><u>State protected species</u></p> <p>American Oystercatcher Swallow-tailed Kite Bald Eagle Gull-billed Tern Least Tern Black Skimmer Gopher Tortoise Striped Newt</p>
<p><u>Other Species of conservation concern</u></p> <p>Fox Squirrel American Eel Smalltooth Sawfish Canvasback Redhead American Coot Common Ground-Dove Loggerhead Shrike Saltmarsh Sharp-tailed Sparrow Painted Bunting Black-crowned Night-Heron Yellow-crowned Night Heron White Ibis Glossy Ibis Northern Harrier American Kestrel Northern Bobwhite Common Moorhen American Oystercatcher Lesser Yellowlegs Solitary Sandpiper Willet Dunlin</p>	<p><u>Other Species of conservation concern</u></p> <p>Semipalmated Sandpiper Western Sandpiper Least Sandpiper Wilson's Snipe Yellow-billed Cuckoo Pied-billed Grebe Horned Grebe White Pelican Brown Pelican Least Bittern Snowy Egret Tricolor Heron Little Blue Heron Least Bittern Tricolor Heron Grasshopper Sparrow Eastern Diamondback Rattlesnake Ball Moss Bartram's Air Plant Green-fly Orchid Hooded Pitcher Plant Pond Spice Tiny-leaf Buckthorn</p>

Significant conservation actions during last 10 years:

- INRMP Implementation
- Manatee Population Monitoring (Annual Recurring)
- Rare, Threatened, and Endangered Species (RTE) Monitoring (Annual Recurring)
 - Wood Stork nesting and satellite tracking/wading bird survey - includes 5 yr. update
 - Comprehensive Avian Survey (focusing on RTE spp.)
 - Comprehensive Gopher Tortoise/Eastern Indigo Snake Survey - includes 5 yr. update
 - Sturgeon Population Monitoring (Annual Recurring; now a regional project)
- Forest thinning via timber sales
- Forest group selection cuts for conversion to longleaf, ~200 acres converted to longleaf
- Longleaf restoration/release
- Accelerated Prescribe Burn Regime
- ~3000 acres burned since Feb 2010

Significant conservation actions planned for next 10 years:

- Continue above mentioned actions
- Tailor INRMP implementation for continued support of State/Regional Initiatives, e.g.:
 - State Wildlife Action Plan
 - Longleaf Pine Initiative
 - Bobwhite Quail Initiative
 - South Atlantic Migratory Bird Initiative
- Continue Partnership with GA DNR, UGA, GFC, and USFWS
- Advance Prescribe Burn Regime towards Growing Season Burns
- Implement Loggerhead Shrike Population Monitoring (Non-annual Recurring) - to include 3 – 5 year updates; TBD

Marine Corps Logistics Base Albany

Size: 3,326 acres (1,400 acres forested)

Date of acquisition: 1951

Public access allowed (yes, no, limited): Limited___

REPI Buffer acres - 0 protected; 0 additional acres planned
(meeting in May to discuss opportunities)

Species of Conservation Concern

<p><u>Federally Protected Species</u> Wood Stork (no known nests, forages in wetlands)</p> <p><u>State protected species:</u> Gopher Tortoise – small population (< 15 individuals)</p>	<p><u>Other Species of conservation concern</u> Eastern Tiger Salamander Eastern Diamond-backed Rattlesnake – no population estimate available but thought to be viable based on reproduction and adult snake sightings Yellow-Crowned Night-Heron Northern Bobwhite Quail Loggerhead Shrike Bachman’s Sparrow (< 10 individuals) Bald Eagle (no known nests, forages in wetlands) Incised grove-bur Woodland poppy-mallow Crestless Plume Orchid</p>
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3 Natural Communities – Clayhill Longleaf Woodland; South Atlantic Willow Oak Flatwoods Forest, Limesink Pond

Significant conservation actions during last 10 years:

- Planted 40 acres of longleaf pine in 2009
- Developed 4-acre native groundcover restoration demonstration area (FY13)
- Mechanical treatment (brown-tree mowing/chopping) approximately 100 acres of upland pine to improve pine savannah habitat
- Herbicide treatment of 390 acres to control hardwood, kudzu (20 acres), and bicolor lespedeza (40 acres)
- Implementation of prescribed burning program with 1-3 year return interval, prescribed burned 450 acres in FY13, followed by 700 acres in FY14
- Conducted rare species survey through Alabama Natural Heritage Program

Significant conservation actions planned for next 10 years:

- Continued treatment to control invasive species, targeting hardwood, kudzu, Japanese climbing fern, bicolor lespedeza, Chinese privet, wisteria, and others in upland pine and wetland habitats
- Partnership with USDA Wildlife Services to implement gopher tortoise restoration project focusing initially on surveying population, reducing predation and mortality factors, and habitat improvements
- Incorporation of growing season burns into prescribe burning program
- Development of longleaf pine restoration plan and planting approximately 40 acres of longleaf pine (projected FY16) with additional acreage following
- Development of management program for rights-of-way and other areas to reduce maintenance costs (mowing contract) and to improve habitat for early successional species
- In-depth survey of habitat requirements of rare plant species and development of guidelines to protect and promote these species
- Forest thinning to promote early successional habitat/pine savannah on approximately 200 acres (FY15)

Moody Air Force Base/Grand Bay Weapons Range/Grassy Pond Recreational Annex

Size: 11,881 acres (5518 acres/5874 acres/489 acres)

Date of acquisition: 1941

Public access allowed (yes, no, limited): Limited

REPI Buffer acres - 0 protected; 0 additional acres planned

Species of Conservation Concern

<u>Federally Protected Species</u>	<u>State Protected Species</u>
Eastern Indigo Snake -- Last confirmed sighting in 1996	Gopher tortoise – In 2013 there were 319 marked burrows; Population estimated at 198 individuals
Wood stork – No rookeries, but forages in installation wetlands	Greenfly orchid – Known only from Dudley’s Hammock
Bald eagle – 1 nest at Grassy Pond Recreational Annex	on Grand Bay Range
	Round-tailed Muskrat -- Periodically observed in wetlands on Grand Bay Range

Significant conservation actions during last 10 years:

- Intensive gopher tortoise monitoring projects underway, including URTD surveillance, telemetry studies, and RFID study to determine utilization, social behaviors, disturbance factors, and competition with other species within colonies

- Management for eastern indigo snake/gopher tortoises has included longleaf pine/wiregrass restoration projects on about 500 acres, midstory hardwood removal (mechanical and chemical), timber stand improvements, prescribed burning (approximately 500 acres/yr)

Significant conservation actions planned for next 10 years:

- Continuation of above conservation actions
- Invasive species surveys, control, and monitoring (aquatic and upland species)
- Shift to growing season burns instead of dormant season burns

Robins Air Force Base

Size: 6,733 acres

Date of acquisition: 1941

Public access allowed (yes, no, limited): Limited

REPI Buffer acres - 663 protected; 800 additional acres planned

Species of Conservation Concern

<u>Federally Protected Species</u> None	<u>State Protected Species</u> Ocmulgee Skullcap (threatened)
<u>Animal Species Listed as High Priority by the State</u> Bald Eagle (incidental occurrence) Swainson's Warbler Wood Stork (incidental occurrence) Southeastern Pocket Gopher	<u>Plant Species Listed as High Priority by the State</u> Spikerush Harper's Wild Ginger Boykin's Lobelia Awned Meadowbeauty Ocmulgee Skullcap

Significant conservation actions during last 10 years:

- Intensive surveys of flora and fauna to establish baselines in order to tailor specific management goals for natural resources categories (e.g., T&E Species, game and non-game species, urban forests, native ecosystems, etc.).
- Jurisdictional delineation, in-the-field demarcation, and GIS mapping of 2,230 acres of wetlands.
- Basewide survey to locate and map invasive plant species, which led to a management plan (2008) that prioritized the eradication or control of 20 species. Plan focuses on controlling species within management zones and treatment areas.
- Continued restoration of a former 23-acre longleaf pine ecosystem, including prescribed burning every 3 years, seedling establishment, and control of aggressive hardwood saplings via spot herbicide treatments.
- Development of a wildfire and prescribed burn management plan with the aid of the Georgia Forestry Commission.
- Authored a rare plant management plan with special emphasis on the propagation of the two populations of Ocmulgee skullcap. Includes the control of competing invasive species, hydroperiod management in the Grady meadow, and annual surveys.
- Established a bear scent station survey in partnership with GADNR WRD.
- Utilized a volunteer trapper program and a 9-10-month-long hunting season to remove 175-250 feral hogs per year.
- Thinned 75 acres of loblolly pine plantations to improve sunlight penetration, improving understory diversity of grasses, forbs, shrubs, and hardwoods for wildlife.
- Utilized fertilization, artificial reefs, renovation, and stocking to improve fishery health in three lakes (38 acres).

- Authored a wetland protection plan that emphasizes re-establishment of native vegetation on highly erodible sites, implementation of best management practice standards on construction sites to prevent sedimentation of storm water systems, headwall and road repairs, and establishment on “no mow” zones.
- Instituted basewide landscaping standards featuring the use of native, low-maintenance vegetation, especially species preferred by urban wildlife. Standards are incorporated into all construction projects.
- Utilized volunteers to perform a diverse array of urban wildlife projects including the planting of hundreds of native trees in urban areas, the erection of over 300 nest boxes for birds and 30 bat boxes, the construction of basking platforms for aquatic turtles and nesting houses for purple martins, the installment of Christmas trees and tires and cinder blocks as fish attractors in base lakes, modifications of trash receptacles to reduce their attractiveness to wildlife, quarterly team efforts to remove trash from lakes and fields, and the continued maintenance of two interpretive nature trails.
- Converted a former housing area into a natural habitat restoration area.
- Managed hunting program for base employees and their guests on 1,300 acres, and a fishing program on three lakes.
- Continued management practices designed to reduce Bird/Wildlife Strike Hazards, which helps to keep pilots safe, but also reduces wildlife mortality resulting from strikes. Effort includes improvements to the airfield’s wildlife exclusion fence, placing grating over culverts to prevent wildlife from using them to gain access to the airfield, diminishing plant diversity on the airfield, and using knowledge of bird movements during migration and winter to convince flight crews to alter their flying schedules in order to reduce the risk.
- Frequent public education efforts are employed, including birding and botanical walks, leading tours for students from UGA and local colleges, monthly newspaper and Facebook stories, and the use of summer interns from area colleges to do field work.

Significant conservation actions planned for next 10 years:

- Convert remaining loblolly pine stands into mixed hardwood/pine forests.
- Continue to improve the longleaf pine forest via prescribed burning and hack & squirt herbicide applications to eliminate persistent competing tree species.
- Continued emphasis on many of the above actions including invasive plant and animal control, vegetation establishment on erodible sites, fish stocking and further renovations, urban tree planting projects (and retention of snags where possible), management of hunting and fishing programs, and continued conversion of base landscaping to native plants.
- Partnership with researchers at Ft. Valley State University and with GADNR to re-establish populations of Ocmulgee skullcap.
- Further improvements in natural habitat establishment on the golf course, as well as further reductions in pesticide use. (Note: Robins AFB has maintained a continued 70-80% reduction in pesticide usage over the 1995 baseline, as measured in pounds of active ingredients used.)

Fort Benning

Size: 182,433 acres

Date of acquisition: 1919 and 1942

Public access allowed (yes, no, limited): limited

REPI Buffer acres - 23,444 protected; up to 12,000 additional acres planned

Species of Conservation Concern

<p><u>Federally protected species</u> <i>Red-cockaded woodpecker</i> – 332 potential breeding groups in 2013 <i>Wood stork</i> – No rookeries, but forages in installation wetlands <i>Relict Trillium</i> – 5 stable population <i>Bald eagle</i> – 2 nests</p>
<p><u>State protected species</u> <i>Gopher frog</i> – Numerous individuals, known in two ponds on northeast portion of the installation <i>Barbour's map turtle</i> – known to exist on the Alabama side near Chattahoochee backwaters <i>Alligator snapping turtle</i> – stable population in the Chattahoochee river <i>Gopher tortoise</i> – an estimated 2000 tortoises on 15,000 acres of habitat. <i>Southern hognose snake</i> – Status not well known (1 recorded observation) <i>Florida pine snake</i> – uncommon but present throughout installation <i>Bluestripe shiner</i> – Known to occur in the Chattahoochee River and Upatoi Creek <i>Bachman's sparrow</i> – Common breeder and winter resident <i>Southeastern American kestrel</i> – Nests regularly throughout installation, have 30 nesting boxes under management <i>Ground dove</i> – recorded in low numbers installation wide <i>Southeastern pocket gopher</i> – found in northeastern sand hills <i>Georgia rockcress</i> – 2 populations <i>Croonia</i> – 2 known populations on the installation <i>Lax water-milfoil</i> – found in several impoundments on the installation <i>Georgia oak</i> – exists in low numbers on the southeast corner of the installation <i>Sweet pitcher plant</i> – 4 known populations <i>Pickering's morning-glory</i> – exists in low densities on Lakeland sands</p>

Significant conservation actions during last 10 years:

- The RCW population grew at an average rate of over 1.8% annually, reaching 332 potential breeding groups in 2013.
- Started ACUB program in 2006.
- Started periodic population estimates for gopher tortoise populations on 4 habitat management units.
- Planted 25,000 acres of LLF to date.
- Burn 30,000-40,000 acres per year.

Significant conservation actions planned for next 10 years:

- Recover the RCW - reach goal of 351 PBGs.
- Assist in recovery efforts for relict trillium.
- Complete revision of INRMP and RCW ESMC – implement 2007 guidelines.
- Add 12-15,000 acres of ACUB lands towards Ft. Benning baseline RCW acreage.
- Continue periodic population estimates for the eastern gopher tortoise.
- Continue Longleaf pine forest restoration with burning and LLF planting.

- Develop 11,000 acre wildlife management area from ACUB lands jointly managed by Ga DNR and The Nature Conservancy with public access.

Fort Gordon

Size: 55,600 acres

Date of acquisition: 1941

Public access allowed (yes, no, limited): Yes

REPI Buffer acres – 0 acres currently protected; 1594 acres planned in FY2014 (Phase I focus) and 11,963 planned long-term (desired end state)

Species of Conservation Concern

<p><u>Federally Protected Species</u></p> <p><i>Red Cockaded Woodpecker</i> –as of 2013 -25,643 acre Habitat Management Unit, 5,083 acres in foraging partitions, 50 managed clusters, 21 active clusters, 14 potential breeding groups</p> <p><i>Wood Stork</i> –observed foraging occasionally, but no known rookery site</p> <p><i>Bald Eagle</i> –observed occasionally, but no known nest sites</p>
<p><u>State Endangered or Threatened Species</u></p> <p><i>Gopher Tortoise</i> –estimated population of 280 tortoises, 28,481 acre HMU, with 7,321 acres considered currently suitable</p> <p><i>Southern Hognose Snake</i> –common and widespread on the installation</p> <p><i>Bluebarred Pygmy Sunfish</i> -found to be abundant in several localized areas in a 1997-1998 survey, but not found in a similar survey conducted in 2010</p> <p><i>Sandhills Rosemary</i> –located on 12 different sites scattered across the installation</p> <p><i>Sweet Pitcher Plant</i> –small population of a few plants located at two sites</p> <p><i>Pickering's Morning Glory</i> - located on 9 different sites scattered across the installation</p>
<p><u>Species Listed on State or Federal Lists as Rare or Species of Concern</u></p> <p><i>Bachman's Sparrow</i> –present, detected infrequently in surveys as part of a 2010-2011avian biodiversity project</p> <p><i>Southeastern American Kestrel</i> – common near open areas (cantonment, ranges, open forests, early successional areas); band approximately 75 – 100 nestlings each year</p> <p><i>Migrant Loggerhead Shrike</i> -occasionally observed, but unknown whether resident or migrant subspecies</p> <p><i>Southeastern Bat</i> –presence unknown, not found in 2013 survey</p> <p><i>Rafinesque's Big Eared Bat</i> – present but uncommon, recorded by acoustic monitoring in 2013 survey</p> <p><i>Florida Pine Snake</i> – thought to be common although this subspecies may intergrade with the northern subspecies in this area</p> <p><i>Sandbar Shiner</i> – presence unknown, not observed in a fish survey conducted in 2010</p> <p><i>Atlantic White Cedar</i> –present and abundant at three sites along the Sandy Run Drainage</p> <p><i>Carolina Bogmint</i>– present at three sites along Brier and Headstall Creeks</p> <p><i>Indian Olive</i> –present at three sites</p> <p><i>Silky Camellia</i> – present at three sites along Brier and Headstall Creeks</p>

Significant conservation actions during last 10 years:

- Increased the population of RCWs from 8 active clusters to 21, an average growth of 14% annually
- Established a Gopher Tortoise HMU, conducted a 100% population survey, monitored activity status of 750+ burrows
- Restored 2,586 acres of longleaf pine (most of which was conversion from off-site pine species)
- Planted 207 acres of wiregrass

- Conducted prescribed burning on 182,000 acres (approximately 18,000 acres annually)
- Conducted hardwood midstory control on 6,650 acres (mechanical and chemical)

Significant conservation actions planned for next 10 years:

- Continue to grow the population of RCWs at a rate of at least 5% per year by bringing the number of active clusters up to 34
- Continue to monitor gopher tortoise population by conducting a full population survey every 2-5 years and by monitoring activity status of all burrows
- Continue to restore and maintain the longleaf-wiregrass ecosystem with the use of prescribed fire, mechanical and chemical treatment, and longleaf and wiregrass restoration plantings

Fort Stewart/Hunter Army Airfield

Size: Ft. Stewart – 279,449 ac. HAAF – 5,457 ac.

Date of acquisition: 1941

Public access allowed (yes, no, limited): Yes

REPI Buffer acres – 70,795 ac. protected; 104,537 additional acres planned

Species of Conservation Concern

<p><u>Federally protected species</u></p> <p>Red-cockaded woodpecker – 363 potential breeding groups in 2013 Wood stork – No rookeries, but forages in installation wetlands Bald eagle – 2 nests Eastern indigo snake – Large, stable population (over 300 adults/sub-adults) Frosted flatwoods salamander – Only extant population in Georgia Atlantic sturgeon – Ogeechee and Canoochee Rivers Shortnose sturgeon - Ogeechee and Canoochee Rivers Smooth coneflower – 1 known population (.01 acre patch)</p>
<p><u>State protected species:</u></p> <p>2011 Striped newt – At least 14 breeding ponds; stressed by persistent drought from 2001-2011</p> <p>Gopher frog – Numerous individuals, widely distributed Bachman's sparrow – Common breeder and winter resident Henslow's sparrow – Uncommon in winter Cerulean warbler – Potential migrant Swallow-tailed kite – Regularly sited during breeding site. Large flocks stage near Ft. Stewart prior to fall migration Peregrine falcon – Rare visitor Southeastern American kestrel – Nests regularly at Camp Oliver Least tern – Nests on gravel rooftops and forages in canals and ponds in cantonment area.</p> <p>Golden-winged warbler – Potential migrant.</p> <p>Rafinesque's big-eared bat – Known to occur on Fort Stewart, but status not well known.</p> <p>Spotted turtle – Status not well known (7 recorded observations) Gopher tortoise – Population estimated at 2,862 individuals in 2012 (LCL = 2,092; UCL = 3,917), stable or increasing Southern hognose snake – Status not well known (4 recorded observations) Diamondback terrapin – Status not well known</p>

Mimic glass lizard – Status not well known (3 recorded observations)

Say's spiketail

Black-banded sunfish – Widely distributed on Fort Stewart.

Purple honeycomb head – 17 populations

Georgia Plume – 9 populations

Greenfly orchid – Widely distributed in tupelo swamps

Dwarf witch-alder – 1 very small (.01 acre) population

Michaux's spider orchid - 1 very small (.01 acre) population

Corkwood – 1 individual known

Pond spice – Known from 9 ephemeral wetlands

Boykin's lobelia – Known from 3 ephemeral wetlands

White fringed orchid – Widely distributed

Crestless plume orchid – 1 known population, probably more

Hooded pitcherplant - Common

Swamp buckthorn – 12 known populations, widely distributed

Silky camellia – Not infrequent along the Canoochee Creek and Canoochee River bluffs.

Significant conservation actions during last 10 years:

- The RCW population grew at an average rate of over 5% annually, reaching 366 potential breeding groups in 2013.
- Planted wiregrass on 1,451 acres. Of those 1,451 acres, 1,127 acres have been planted to longleaf.
- Started annual population estimates for eastern indigo snake and gopher tortoise.
- Improved 250-500 acres annually for the gopher tortoise/eastern indigo snake.
- Conducted eDNA sampling for the frosted flatwoods salamander, striped newt, and gopher frog.

Significant conservation actions planned for next 10 years:

- Continue annual population estimates for the eastern indigo snake and gopher tortoise
- Improve 250-500 acres annually for the gopher tortoise/eastern indigo snake
- Conduct eDNA sampling for the frosted flatwoods salamander, striped newt, and gopher frog.
- Work in cooperation with the Atlanta Botanical Gardens to start a captive breeding population for the frosted flatwoods salamander and possibly release head-start salamanders onto Fort Stewart or surrounding ACUB lands.
- Plant 200 acres of longleaf/year and 200 acres of wiregrass/year.

Townsend Bombing Range

Size: 5,183 acres

Date of acquisition: 1981

Public access allowed (yes, no, limited): Limited

REPI Buffer acres - 30,921 ac. protected; Unknown additional acres planned

Species of Conservation Concern

Federally protected species

American Alligator (*Alligator mississippiensis*) – Likely resident; may occur on TBR but is not abundant. Threatened due to similarity of appearance.

Eastern Indigo Snake (*Drymarchon couperi*) – Unlikely resident; threatened

Frosted Flatwoods Salamander (*Ambystoma cingulatum*) – Only confirmed resident federally protected species known to occur on TBR. Listed as threatened.

Discovered on TBR during an endangered species survey in 1994. One larva was collected in a dip-net at a small cypress pond on the edge of the cleared target area. Annual surveys of TBR for presence of the species were initiated in 1998 and continue to the present. However, no larvae were observed at the breeding pond in 1998-2000. These were generally poor breeding years for the species, with inadequate rainfall in October-December of each year.

No other specimens were observed at the site until another single larva was collected in a bomb crater located at the edge of the breeding pond in April 2001. A second larval flatwoods salamander was found in April 2003 in a small borrow pit located about 200 feet east of the April 2001 site.

Fire suppression and conversion of longleaf pine flatwoods into slash and loblolly pine plantations is the major threat to the flatwoods salamander. Fire suppression has led to an increase in slash and loblolly pine species, an increase in hardwood species, and a decrease in herbaceous groundcover. The combination of these factors has reduced the availability of suitable breeding ponds for the salamander (74 FR 6700).

Bald Eagle (*Haliaeetus leucocephalus*) – Possible migrant or occasional visitor. Has not been located on TBR despite efforts to locate them during surveys in 1993-94 and 1998-2001.

Wood Stork (*Mycteria americana*) – Endangered. Confirmed migrant or occasional visitor. Has been seen flying over TBR at least once, but has not been observed nesting or feeding there (not a resident). Known rookery located approximately 9 miles northwest of proposed expansion areas (USFWS 2009c). Wetlands within proposed expansion areas may be utilized as foraging habitat for wood storks.

Red-Cockaded Woodpecker (*Picoides borealis*) – Possible resident; endangered. Has not been located on TBR despite efforts to locate them during surveys in 1993-94 and 1998-2001.

Bachman's Warbler (*Vermivora bachmanii*) – Unlikely migrant or occasional visitor; endangered

Kirtland's Warbler (*Dendroica kirtlandii*) – Unlikely migrant or occasional visitor; endangered

Striped Newt (*Notophthalmus perstriatus*) – Listed as candidate species in 2011; possible resident. Primary threat is habitat loss due to fire suppression and hardwood invasion (76 FR 32911-32923).

State protected species

American Alligator (*Alligator mississippiensis*) – Likely resident; may occur on TBR but is not abundant. Threatened due to similarity of appearance

Eastern Indigo Snake (*Drymarchon couperi*) – Unlikely resident; threatened. Has not been located on TBR despite efforts to locate them during surveys in 1993-94 and 1998-2001.

Southern Hognose Snake (*Heterodon simus*) – Unlikely resident; threatened

Mimic Glass Lizard (*Ophisaurus mimicus*) – Likely resident; rare

Gopher Tortoise (*Gopherus Polyphemus*) – Unlikely resident; threatened

Spotted Turtle (*Clemmys guttata*) – Possible resident; unusual

Frosted Flatwoods Salamander (*Ambystoma cingulatum*) – Confirmed resident; threatened. (See “Federally protected species” above for further information)

Striped Newt (*Notophthalmus perstriatus*) – Possible resident; primary threat to newts is habitat loss due to fire suppression and hardwood invasion (76 FR 32911-32923).

Gopher Frog (*Rana capito*) – Possible resident

Swallow-tailed Kite (*Elanoides forficatus*) – Possible migrant or occasional visitor

Peregrine Falcon (*Falco peregrinus*) – Possible migrant or occasional visitor

Bald Eagle (*Haliaeetus leucocephalus*) – Possible migrant or occasional visitor; threatened. Has not been located on TBR despite efforts to locate them during surveys in 1993-94 and 1998-2001.

Wood Stork (*Mycteria americana*) – Confirmed migrant or occasional visitor; endangered

Red-Cockaded Woodpecker (*Picoides borealis*) – Possible resident; endangered

Southeastern Kestrel (*Falco sparverius paulus*) – Possible resident; rare

Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*) – Possible resident/Possible migrant or occasional visitor; rare

Blackbanded Sunfish (*Enneacanthus chaetodon*) – Possible resident; endangered

Bluefin Killifish (*Lucania goodie*) – Possible resident; rare

Pondspice (*Litsea aestivalis*) – Possible resident; rare

Greenfly Orchid (*Epidendrium conopseum*) – Confirmed resident; unusual

Dwarf Witch-alder (*Fothergilla gardenia*) – Possible resident; threatened

Hooded Pitcherplant (*Sarracenia minor*) – Confirmed resident; unusual

Significant conservation actions during last 10 years:

- Management of the flatwoods salamander.
Managed the flatwoods salamander in cooperation with U.S. Fish and Wildlife Service (USFWS) to maintain the existing population and periodically search for new or undiscovered populations on TBR. Management consists of (1) monitoring the population at yearly to evaluate reproduction and habitat use; (2) searches for new populations; (3) assessing hydrological systems to determine the area where drainage or other development would impact the species, and (4) continuing prescribed burning both at the breeding pond and in the adjacent areas.

Wildlife management activities on TBR property in the vicinity of the flatwoods salamander breeding site and upland buffer zones would include prescribed fire, hunting, and various wildlife surveys.

Land management activities in the vicinity of the flatwoods salamander breeding site and upland buffer zones would include surveys for and control of various exotic plants and erosion control.

- Range-wide surveys for rare, threatened, and endangered species and suitable habitat
- Range-wide monitoring for rare, threatened, and endangered species and suitable habitat
- Prescribed burning as appropriate for best compromise of mission sustainability and management of T&E species' suitable habitat

Significant conservation actions planned for next 10 years:

- Continue management actions for the flatwoods salamander
- Continue range-wide surveys for rare, threatened, and endangered species and suitable habitat
- Continue range-wide monitoring for rare, threatened, and endangered species and suitable habitat
- Continue prescribed burning as appropriate for best compromise of mission sustainability and management of T&E species' habitat

National Park Service
Cumberland Island National Seashore
Doug Hoffman (NPS)

Cumberland Island National Seashore is the largest and southernmost barrier island in Georgia. It encompasses 36,000 acres, with roughly half of this acreage in upland habitat and the other half in salt marsh and freshwater wetland habitats. The island's 18 miles of undeveloped beach is arguably one of the most important areas in the state for sea turtle nesting, consistently producing 25% of the statewide total of nests each year. It is also an important winter stopover location for shorebirds, wading birds, and neotropical migrants. Habitat diversity is considerable on Cumberland, with 22 plant communities, 34 vegetative classifications, and 500 species of plants identified. The island was designated a National Seashore in 1972 and is owned and managed by the National Park Service.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combated Invasive/Alien Species</i>

While the park is not guided directly by the Statewide Wildlife Action Plan, it does work closely with the Georgia Department of Natural Resources Coastal Resources Division, Nongame Division, and Wildlife Resources Division in numerous capacities. Interagency coordination includes habitat enhancement or restoration projects, surveys, consultations and decision making, and direct management actions for species of both state and Federal importance. With increased human use of coastal areas and specific proposed development for the Camden and Glynn county areas, it will be important to continue the relationship with GADNR and other state, Federal, and local agencies to ensure wise management and conservation of coastal resources.

Fire Management

Cumberland hired a fire management officer in 2011 and is currently in the final phases of approval for a newly-developed fire management plan with the goal of restoring fire to a more natural regime throughout the island. The plan will incorporate prescribed fire and management of natural ignitions to reduce fuel loads and benefit the numerous vegetative communities found on Cumberland Island. In addition to resource management, the plan addresses protection of the numerous historic structures and residential buildings scattered throughout. The fire management program is currently working with island residents to implement the Firewise program to reduce fuel near structures. Cumberland's fire management and response team is an interagency effort including the National Park Service, U. S. Fish & Wildlife Service, U. S. Forest Service, Georgia Forestry Commission, and Camden County.

Feral Hog Management

The park began intensive feral hog management activities in 2001 to reduce losses of sea turtle nests and minimize general destruction of resources from rooting. This effort has been successful in reducing the population to minimal numbers. During the last 10 years, hog-related losses to turtle nests have been almost non-existent with only 6 nests being impacted out of a total of 3,760 nests recorded during this time period on Cumberland. Damage to other natural resources is localized and minimal. Competition with native wildlife species is also significantly reduced. Hog management activities are conducted year-round by the park's biologist and include hunting during daylight hours, use of night vision equipment to remove specific animals at night, and trapping when conditions warrant. While the park conducts 6 managed public

hunts each fall/winter, hunter harvest is normally minimal. Public hunts alone are not capable of reducing or maintaining the hog population at a level that would achieve the desired results.

Invasive Plant Management

The park has documented approximately 70 species of non-native plants on Cumberland, most of which can be attributed to earlier inhabitants introducing plants for ornamentals and/or production of seeds, oils, wood, etc. While most species are not considered invasive, there are several species of concern including tung oil, tamarisk, Chinese tallow, and tree of heaven. Cumberland has a certified pesticide applicator on site who conducts annual control with chemical and mechanical means. NPS also has a regional team that assists annually with specific treatments. Recently NPS partnered with GADNR and Georgia Forestry Commission to monitor and treat a small, newly-established stand of cogongrass discovered in innerdune meadow habitat.

Oyster Reef Restoration

Two oyster reef habitat restoration projects have been initiated around Cumberland Island. One reef was established in the spring of 2014 covering 530 feet of shoreline. A second reef site is planned for the near future. Objectives of the project include buffering shoreline erosion and establishing a viable living reef to benefit estuarine species. Oyster reef habitats were overharvested during the mid-1800's during a boom in the oyster canning industry. Restoration of this reef habitat has been shown to attract many estuarine species including commercially important fish species, bait species, and many crustaceans. These species can utilize the reef for part or all of their life cycle as shelter or foraging habitat. Some of the species documented to increase in these restoration areas include commercial species (spotted sea trout, red drum, black and rock bass, gag grouper, summer and southern flounder, bluefish, ladyfish, inshore shark species, and all local bleny and goby species) and bait species (pinfish, pig fish, mummichogs, blue crab, all whelk species, stone crabs, and penaeid shrimp to name a few). NPS has worked closely with GADNR for guidance and permitting during the habitat restoration process. NPS personnel and members of the Camden County Future Farmers of America Chapter bagged over 3,000 oyster shell bags in 2014 for the two reef projects.

Natural Resources Conservation Service (NRCS)
Georgia Accomplishments from 2005-2013
Sharon Holbrooks (NRCS)

NRCS-Georgia uses the State Wildlife Action Plan (SWAP) in several ways. For Financial Assistance programs, the SWAP has been/is used in ranking higher priority properties, helping to set priority landscapes, and as a keystone document to guide program implementation. For Conservation Planning, the SWAP GIS layer indicating locations/occurrences of threatened and endangered (T&E) species has been used in our Environmental Evaluation process, and as a keystone document to guide conservation planning.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
	<i>Combatted Invasive/Alien Species</i>

For program specifics and potential impacts that NRCS may have had on T&E/rare species habitat, the following financial assistance program numbers are provided:

Environmental Quality Incentives Program (EQIP) – General:

The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program from the USDA Natural Resources Conservation Service for farmers, ranchers and owners of private, non-industrial forest land. Through EQIP, farmers may receive financial and technical assistance with structural and management conservation practices on agricultural land to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner.

- 2009-2012: \$71,758,000 total
- 20% (\$13,652,061) in forestry/wildlife related practices

EQIP/WHIP – Longleaf Pine Initiative:

Georgia NRCS under the Longleaf Pine Initiative (LLPI) helped private landowners improve the sustainability and profitability of longleaf pine forest ecosystems. The longleaf pine ecosystem provides critical habitat for 29 threatened and endangered species. Environmental outcomes included improving herbaceous understory conditions in longleaf pine forests, improving habitat conditions in existing longleaf pine forests, as well as establishing new longleaf pine forests.

State	Contracts Obligated	Contracted Acres	Obligation Amount
Georgia	715	40,509.34	\$10,951,646.79
EQIP 2008	315	16,797.10	\$4,845,048.77
2012	95	5,163.20	\$1,383,541.85
2013	220	11,633.90	\$3,461,506.92
WHIP 2008	400	23,712.24	\$6,106,598.02
2010	36	1,739.90	\$653,378.67
2011	364	21,972.34	\$5,453,219.35
Total:	715	40,509.34	\$10,951,646.79

Wildlife Habitat Incentive Program, Working Lands for Wildlife:

The Wildlife Habitat Incentive Program (WHIP) is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land. In 2013, NRCS is only offering financial assistance in the Working Lands for Wildlife partnership.

Working Lands for Wildlife is a partnership between NRCS and the U.S. Fish and Wildlife Service (FWS) to combat the decline of seven specific wildlife species whose decline can be reversed and will benefit other species with similar habitat needs. In Georgia, the focus was on the gopher tortoise, in order to prevent listing of this species under the Endangered Species Act.

In 2011-2013, NRCS Georgia awarded 422 contracts on 75,000 acres for \$3.7 million to enhance gopher tortoise habitat.

In both EQIP, and WHIP, Fish and Wildlife Habitat has been listed as a conservation concern in all of the 2008 Farm Bill financial assistance programs. As a summary, below shows the amount and acres that were selected to address Fish and Wildlife Habitat as a conservation concern.

State	Contracts Obligated	Obligation Amount	Contracted Acres
Georgia	5,773	\$86,065,164.80	493,190.11
EQIP 2008	4,223	\$63,073,595.05	301,392.30
2009	1,010	\$16,195,995.64	77,167.39
2010	1,919	\$31,055,092.60	141,565.67
2011	490	\$7,232,442.59	34,813.69
2012	475	\$3,898,536.07	26,914.65
2013	329	\$4,691,528.15	20,930.90
WHIP 2008	1,550	\$22,991,569.75	191,797.81
2009	462	\$3,878,763.27	31,163.20
2010	532	\$6,235,857.26	52,182.90
2011	62	\$517,391.71	17,587.70
2012	287	\$7,645,145.46	66,745.21
2013	207	\$4,714,412.05	24,118.80
Total:	5,773	\$86,065,164.80	493,190.11

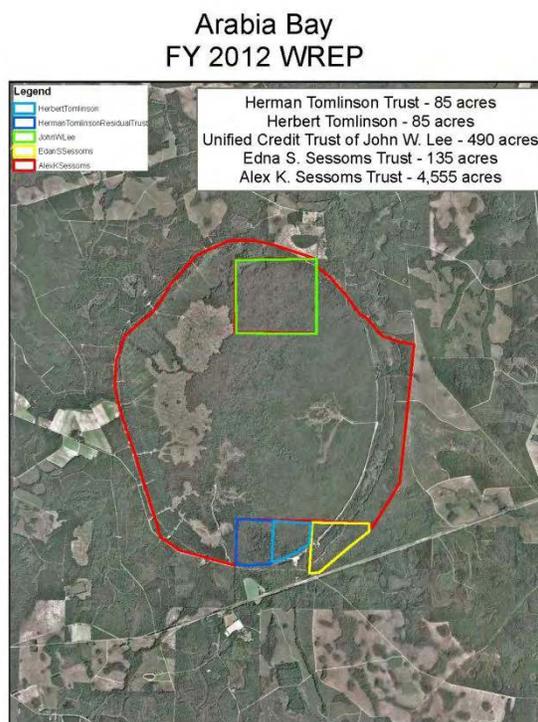
Out of those contracts, below is a summary of which T&E habitat was selected as the expressed conservation concern:

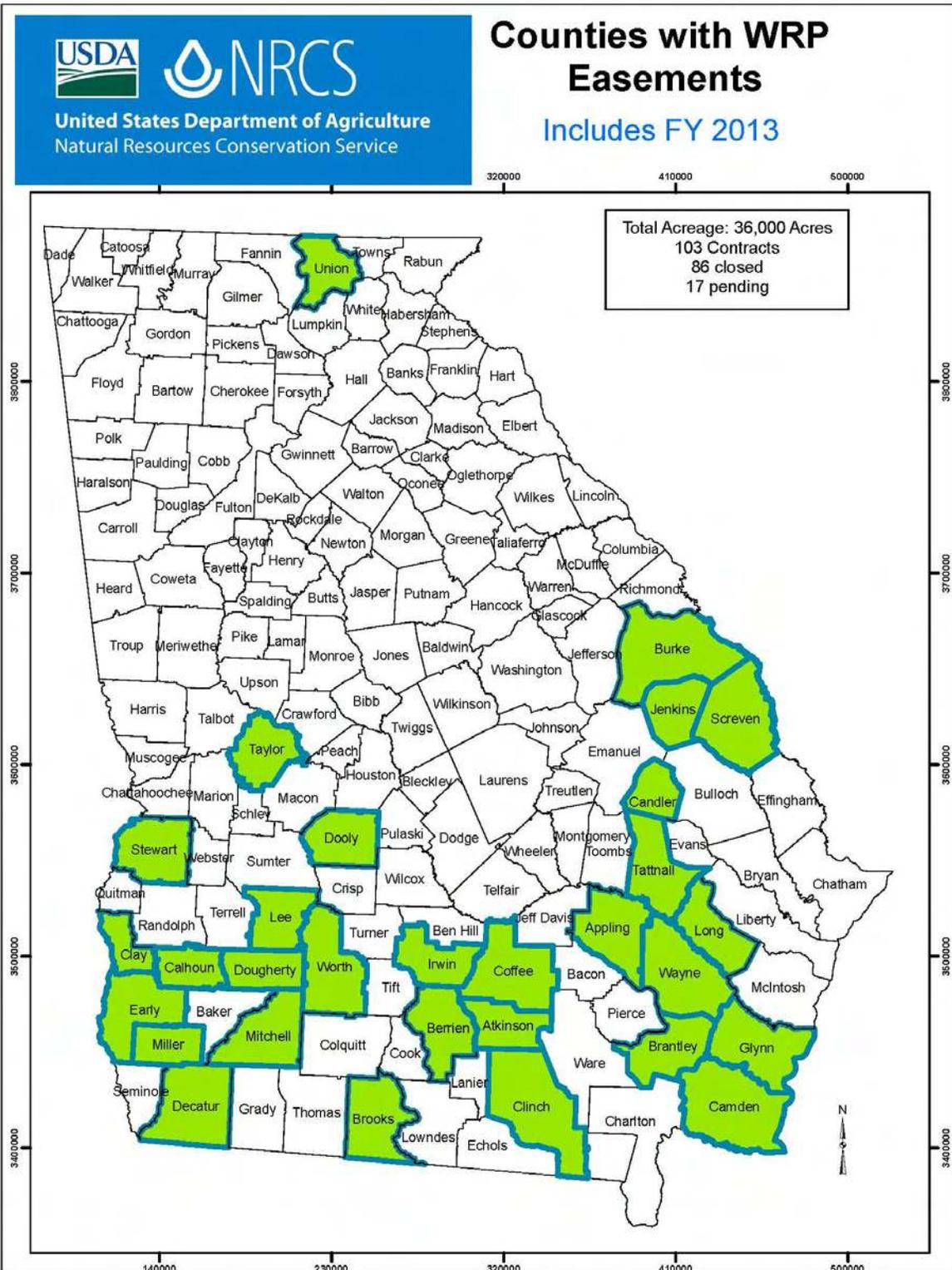
State	Applications Received	Application Acres	Contracts Obligated	Obligation Amount	Contracted Acres
Georgia	857	86,806.54	601	\$9,766,384.63	73,834.70
EQIP 2008	444	29,442.54	303	\$4,259,263.80	24,781.00
2010	341	20,412.60	234	\$3,317,116.77	18,062.40
2011	37	5,462.74	25	\$289,689.94	4,036.40
2012	10	1,040.00	9	\$60,191.63	1,040.00
2013	56	2,527.20	35	\$592,265.46	1,642.20
WHIP 2008	413	57,364.00	298	\$5,507,120.83	49,053.70
2010	119	13,649.00	86	\$813,489.14	11,958.00
2011	22	4,668.00	13	\$100,586.29	4,126.00
2012	191	29,582.30	126	\$2,965,080.03	25,168.40
2013	81	9,464.70	73	\$1,627,965.37	7,801.30
Total:	857	86,806.54	601	\$9,766,384.63	73,834.70

Wetlands Reserve Program (WRP)

Another area where NRCS Georgia made great strides toward Fish and Wildlife Habitat is in the Wetlands Reserve Program (WRP.) WRP is a voluntary conservation easement program that assists landowners in restoring, protecting, and enhancing wetlands on eligible private or tribal lands while maximizing wildlife habitat benefits. The emphasis of WRP is to protect, restore, and enhance functions and values of wetland ecosystems on privately owned lands to attain habitat for migratory birds and other wetland-dependent wildlife and protection and improvement of water quality. Agricultural production ceases from lands enrolled in WRP, but WRP lands are usually marginal agricultural lands poorly suited for efficient agricultural productions. NRCS Georgia has 106 easements for 37,580 acres protected from a period of 30-years to perpetuity (87% permanent easements.) See state map below. Most of this acreage is known habitat for rare and declining, including T&E species. The wood stork, bald eagle, gopher tortoise, indigo snake, and game animals directly benefit from protection and restoration accomplished through WRP. Another major area where WRP affects wildlife habitat is through the upland acres included in most easements. NRCS Georgia strives for a ratio of 50% upland to 5-% wetland. In these upland acres, NRCS Georgia restores habitat through longleaf planting, native warm season grass planting, thinning, burning, and maintenance of early successional habitat in wildlife openings.

Here is a highlighted WRP project where SWAP was used to get funding through the Wetland Reserve Enhancement Program (WREP) in 2012. Through this funding, NRCS Georgia was able to permanently protect 5,458 acres in Clinch County. Known locally as Arabia Bay, this cypress/hardwood wetland depression is the largest intact Carolina Bay formation in the state of Georgia. Arabia Bay contains a Pond Cypress/Pine Savanna that is a major rookery for the federally endangered wood stork and other wading birds, and provides significant habitat for the federally threatened flatwoods salamander. As well as protecting the habitat, wildfire prevention and protection was also a major goal of this project. Restoring hydrology, as well as getting prescribed fire back into the upland habitat surrounding the bay, is a critical component of the restoration of Arabia Bay.





The following is information on the funding and number of forested acres impacted by Farm Bill programs along with the types of habitat management that were funded.

NRCS GEORGIA

2008 Farm Bill Forestry Impacts

2011 - 2013

Year	Program	Contracts	Acres	Funding Total	LLP Initiative	General EQIP
2013	EQIP	370	22,360	\$4,424,724	\$3,874,176	\$550,549
2012	EQIP	354	19,265	\$3,790,126	\$1,385,976	\$2,404,150
2011	WHIP	331	20,698	\$5,437,211		
Three year total		1,055	62,323	\$13,652,061		

Three year practice total

Practice	Acres Contracted	Practice Frequency
Early Successional Habitat	6,025	44
Forest Stand Improvement	6,872	45
Forest Trails and Landings	6,545	50
Firebreak	8,524	98
Prescribed Burning	39,938	415
Silvopasture Establishment	1,401	18
Tree and Shrub Establishment	55,067	956
Tree and Shrub Site Preparation	50,714	919
Upland Wildlife Habitat Management	165	5

US Army Corps Engineers (USACE)
Update on USACE Projects in the Savannah District
Ellie Covington

The U.S. Army Corps of Engineers Savannah District oversees a multi-million dollar military construction program at 11 Army and Air Force installations in Georgia and North Carolina and manages water resources across the Coastal Georgia region, including maintenance dredging of the Savannah and Brunswick harbors; operation of three hydroelectric dams and reservoirs along the upper Savannah River; and administration of the Regulatory stream and wetland permitting program within the state of Georgia. The District's operations produce ecological impacts to fish and wildlife resources, including temporary impacts during construction and permanent habitat loss if not mitigated.

	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>

Brunswick Harbor Deepening (includes Andrews Island and Beneficial Use Island)

Brunswick Harbor is a deep-water port located in Brunswick, Glynn County, Georgia through St. Simon's Sound, Brunswick River and East River. The Corps completed deepening the navigation channel by 6 feet in August of 2007. Other major components of the project included enlarging the turning basin in the upper South Brunswick River; widening the inner harbor channel to 400 feet; and creating a 1,300 foot bend widener for safe ship handling. Other improvements completed in FY08 included enlarging the East River Turning Basin and the associated mitigation for that feature.

This project included the creation of a beneficial use dredged material island in St. Simon's Sound. This island is dedicated to providing nesting habitat for shorebirds, with human visitation restricted to only maintenance activities. In addition to providing rare bare ground bird nesting acreage, the island also provides essential fish habitat (EFH) through the oysters and mudflats that occur along its perimeter. Other essential fish habitats provided by the island include two acres of salt marsh and both rock and sandy bottom intertidal habitat. In order to ensure the mitigation features are providing the habitats intended, annual monitoring is conducted and corrective actions are taken if needed.

Post-construction began after the mitigation features were constructed. Wetland mitigation sites were altered in 2011 and a 5-year monitoring period began on the performance of those features in October 2011. Invasive species have presented an issue in several of the wetland mitigation sites. The District worked with the Coastal Georgia Cooperative Invasive Species Management Area to obtain an Americorps NCCC (National Civilian Community Corps) team to treat salt cedar in 2013 in marsh mitigation sites on Andrews Island.

The creation of the Island in the St. Simons Sound has benefited threatened, endangered, and candidate bird species. Specifically, nesting and activity of the following species was documented during 2014: 6,573 royal tern pairs nested (only nesting site in Georgia for this species) and thousands fledged, 50 sandwich tern pairs nested (only nesting site in Georgia for this species) and many fledged, 250 Least Terns nests (many fledged), 4 gull-billed tern nests (all failed), 90 black skimmer nests (many fledged), 5 brown pelicans, and 152 laughing gulls. Because laughing gulls are considered a pest species and can reduce the nesting success of the desired threatened, endangered, and candidate bird species, control of this species was initiated.

Savannah Harbor Navigation Project

The Savannah Harbor Navigation Project is a deep water port located in Savannah, GA. In the 1990's, the project impacted 311 acres of salt marsh in South Carolina when it created a new diked dredged material containment area. To mitigate for those impacts, the Corps developed and implemented a Long Term Management Strategy for the harbor. The plan commits the Navigation Project to provide 1,769 habitat units of bird habitat each year, generally as follows: 74 habitat units of bare ground nesting, 450 habitat units of wetland nesting, 505 habitat units of waterfowl feeding, and 740 habitat units of shorebird feeding. The plan included constructing bare ground nesting islands within the diked sediment disposal areas and managing water levels appropriately on a rotating program. Providing bare ground nesting habitat involves clearing invasive vegetation, herbicide treatment, and control of predators such as fire ants, coyotes, and feral hogs. As part of these efforts, the Corps established a rookery within one of the dredged material containment areas. The 350-acre site provides wetland nesting habitat for a number of waterbirds, with egrets, herons, and anhingas successfully fledging young. Other species have benefited from roosting/feeding in the rookery, including woodstorks, roseate spoonbills, and white ibis.

In 2011, the Corps rehabilitated a previously abandoned dredged material containment area (Area 1N on Onslow Island). This rehabilitation allowed the Corps to reuse the site for sediment placement and production of wildlife habitats.

The EIS requires the District to monitor and report on the mitigation status. Most of the construction work for this mitigation occurred between 2009 and 2014. The Corps monitors these sites on a regular basis to ensure the features continue to provide the intended amount of bird habitats. When new issues arise, such as erosion of a site, the District investigates ways to stabilize the site and ensure continued mitigation compliance.

Savannah District staff partner with many other federal and state agencies, including the US Fish and Wildlife Service and the GA DNR Nongame Conservation Section to protect the nation's environment and provide valuable and productive wildlife habitats.

United States Fish & Wildlife Service
Update on USFWS
Robin Goodloe and Carl Schmidt (USFWS)

FWS-Georgia Ecological Services uses the SWAP to assist in ranking proposed Partners for Fish and Wildlife projects in the state. We worked with the Savannah District to incorporate consideration of the goals of the State Wildlife Action Plan into District requirements for selection of mitigation properties; each mitigation bank prospectus must clearly identify how the bank furthers the goals of the SWAP. The SWAP, in addition, serves as a source document for GAES biologists for information on non-listed priority species in different areas of the State.

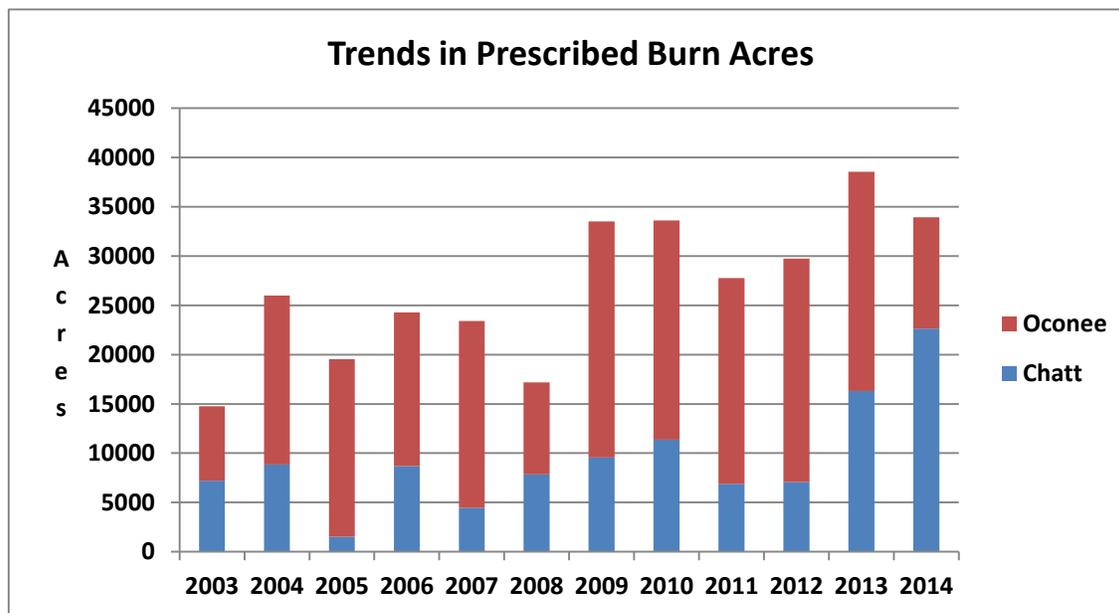
The State Wildlife Action Plan affects National Wildlife Refuges in several ways. For example, the Georgia Land Conservation Partnership Plan, Identification of Conservation Opportunity Areas in Georgia, and High Priority Conservation Actions appendices may affect proposed projects, proposed land acquisitions, etc. A primary way SWAP affects a refuge's management activities is through the plan's influence on determining what the USFWS calls Resources of Concern. These are "plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), system mission, or international, national, regional, state, or ecosystem conservation plans or acts." For instance, Piedmont National Wildlife Refuge's resources of concern and priority habitats were determined, in part, by the High Priority Species and High Priority Habitats appendices of the state plan. Determining these species and habitats sets the management direction and potential management strategies for the next fifteen years.

US Forest Service
Update on Chattahoochee-Oconee National Forests
Jim Wentworth (USFS)

Management of the Chattahoochee-Oconee National Forests is guided by the 2004 Land and Resource Management Plan (Forest Plan). The Goals and Objectives of the Forest Plan are well aligned with many of the Conservation Actions in the State Wildlife Action Plan. In cooperation with our State partners in Georgia DNR, as well as other Federal and private partners, significant progress has been made in achieving many of the High Priority Conservation Actions over the last 10 years.

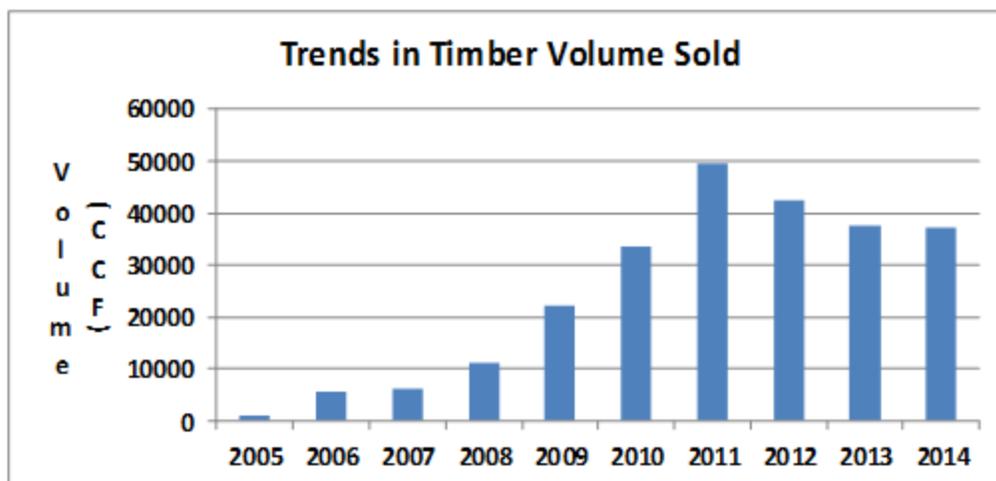
X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combated Invasive/Alien Species</i>

The Forest Plan places emphasis on the restoration of native forest communities as well as a number of rare communities. An expanded program of prescribed fire and timber harvest is being utilized to restore native communities including open southern yellow pine forests (shortleaf, pitch, table mountain, and longleaf pine), as well as oak and oak-pine woodland. These measures are also being used to create suitable



conditions for species that require early successional habitats including high elevation early

successional habitat. An example is the Brawley Mountain project in Fannin County that involves the restoration of woodland habitat for the golden-winged warbler (*Vermivora chryoptera*). A combination of canopy thinning, prescribed burning, selective herbicide use, and the establishment of native warm season grasses are being used to enhance habitat conditions for the last remaining golden-winged warbler population in Georgia. On the Oconee National Forest, prescribed burning, timber harvest, midstory control and the installation of cavity inserts are being used to improve conditions for the endangered red-cockaded woodpecker (*Picoides borealis*).

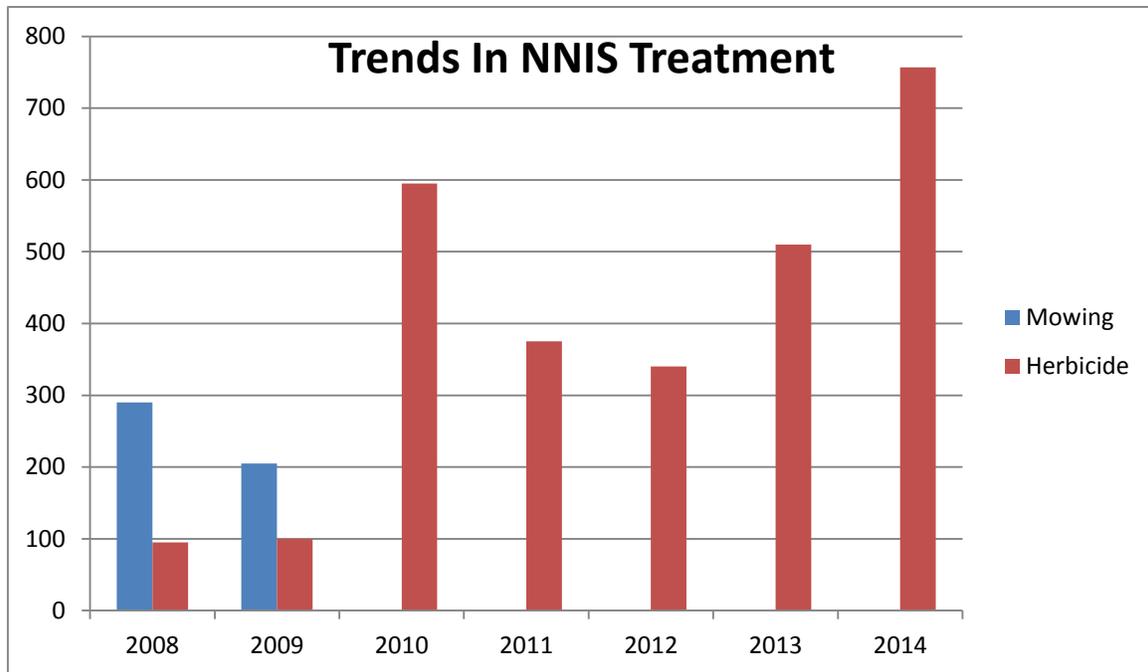


In

cooperation with the Georgia Plant Conservation Alliance (GPCA), the Forest is involved in the establishment and management of safeguarding sites for rare bog flora including mountain purple pitcher plant (*Sarracenia purpurea* ssp. *purpurea* var. *montana*), swamp pink (*Helonias bullata*), and Carolina laurel (*Kalmia caroliniana*). Hand tools and prescribed fire are being used to restore mountain bog habitat in 7 bog complexes, several of which also contain the federally listed bog turtle (*Glyptemys muhlenbergii*). Habitat for woodland plants such as smooth purple coneflower (*Echinacea laevigata*), Georgia aster (*Symphyotrichum georgianum*), and eastern turkeybeard (*Xerophyllum asphodeloides*) also is being managed with prescribed fire and vegetation management. Additionally, safeguarding sites for federally listed smooth purple coneflower and large-flowered skullcap (*Scutellaria montana*) have also been established. The Forest is also working with the Atlanta Botanical Gardens and the University of Georgia to complete a habitat assessment, assess the monitoring program, develop a spatial model, and conduct germination trials for the federally threatened small whorled pogonia (*Isotria medeoloides*). In addition to establishing safeguarding sites, the Forest is working with other GPCA partners such as Georgia DNR and Atlanta Botanical Garden, to improve data sharing through development of the safeguarding database. The database tracks the safeguarding program from source material, to outplanting, to monitoring. Increased efforts for survey and monitoring continue to focus on rare bog plants, small whorled pogonia, smooth purple coneflower, and Georgia aster.

As a result of the increased concern due to the effects of white-nosed syndrome as well as recent discovery of an Indiana Bat (*Myotis sodalis*) maternity colony in north Georgia, the Forest has placed additional emphasis on forest bats. In conjunction with Georgia DNR and US Fish and Wildlife Service personnel, the Forest has undertaken acoustical and mist net surveys to establish baseline bat populations. The Forest is also implementing measures to control human access to caves and mines and is developing a Forest Plan Amendment to incorporate additional measures to protect and enhance habitat conditions for forest bats.

The Forest also has a growing program of inventory and treatment of non-native invasive species (NNIS). The early detection and rapid response program continues to identify new invasive plant risks including fig buttercup (*Ficaria verna*) on the Chattahoochee National Forest and Japanese climbing fern (*Lygodium japonicum*) on the Oconee National Forest. The Forest also has an extensive program to reduce the threat of the exotic insect hemlock woolly adelgid (*Adelges tsugae*) on our native hemlocks. This includes the chemical treatment of individual groups of hemlocks and the release of several species of predator beetles produced at labs at Young Harris College, the University of Georgia, the University of North Georgia in Dahlonega, and Clemson University. The invasive species program also includes an effort on the Chattooga River Ranger District to control feral hogs in high priority bog habitats. The Forest has also increased use of native herbaceous species for erosion control and restoration.



For aquatic species, the Forest has installed bottomless arch culverts on several streams to enhance passage for brook trout (*Salvelinus fontinalis*), Eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*), and other species. To increase the availability of spawning for the blue shiner (*Cyprinella caerulea*), log spawning structures were installed in portion of the Conasauga River where large woody debris was limited. On the Oconee National Forest, we are working with Federal, State, and private partners in the Robust Redhorse (*Moxostoma robustum*) Conservation Committee to help in the recovery of this species. The Forest has an ongoing effort with Conservation Fisheries Inc. to monitor rare aquatic species. Finally, in the last decade, the Forest's land acquisition program has focused on high priority watersheds including the acquisition of nearly 800 and 400 acres in the Conasauga and Etowah River watersheds, respectively.

Non-Governmental Organizations

Georgia Plant Conservation Alliance

Lisa Kruse (GA WRD) and Contributors

Georgia Plant Conservation Alliance

Jennifer Ceska, Jim Affolter, Heather Alley (State Botanical Garden of Georgia)

The Georgia Plant Conservation Alliance (GPCA) is a professional network of botanical gardens, state and federal agencies, non-profit organizations, universities, and large land-owning companies working together on statewide plant conservation projects. GPCA began its work in 1995 with the goal of preventing plant extinctions in Georgia. There has been real success over the last two decades, expanding to include 36 active organizations, with 80 endangered species in active recovery, and 31 species in safeguarding in wild protected sites. Habitat restoration on these sites is essential for the longterm success of these high priority species.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combatted Invasive/Alien Species</i>

GPCA was launched by the State Botanical Garden, Callaway Gardens, the Atlanta Botanical Garden, the Georgia Department of Natural Resources Nongame Conservation Section, the U.S. Forest Service, and The Nature Conservancy of Georgia, expanding slowly to create a network for statewide conservation projects. The mission of GPCA is to facilitate partnerships among private and government agencies that have the knowledge, the critical habitat, and the resources to implement high-priority, science-based plant conservation and education projects statewide.

The GPCA goal is to protect all populations of imperiled plant species in Georgia. Horticulture experts store plant material collected from the wild at botanical gardens. While collecting, growing, and storing rare species is an important conservation strategy, safeguarding plant species *ex situ* (outside of their natural populations) is only part of a recovery strategy for the GPCA. Our priority for endangered plant species conservation is to restore original populations or introduce new populations *in situ* (at appropriate wild sites) on protected land. The critical work of locating those plants on the land, finding secure sites appropriate to the species' range and habitat, makes our land-holding and land-managing partners essential to the formula of conserving rare plant species' populations in Georgia. Our partners in The Nature Conservancy of Georgia, the US Forest Service Chattahoochee and Oconee National Forest, and the Georgia Department of Natural Resources, particularly the Nongame Conservation Section, help locate and provide sites for safeguarding rare plant populations on protected lands.

Safeguarding Sites State-Wide

Of the 80 species that GPCA has prioritized for conservation safeguarding work, 65 species have material in safeguarding *ex situ* either as plants, seeds, or tissue. Of those 65 species in safeguarding, 49 species have made the horticulture conservation loop and have been returned to the wild to safeguarding sites. A majority of these species have been returned to wild sites that are on lands owned or managed by GA DNR. These 38 species are planted state-wide and include 21 Wildlife Management Areas (WMAs), 7 areas managed as Natural Areas (NAs), and 10 State Parks/Historical Sites.

Several of GPCA's most successful safeguarding projects occur on these state lands. The sites are protected and are under active restoration and management. GPCA has returned a number of critically imperiled plant species to the wild on areas such as Broad River WMA, Ohoopce Dunes WMA, Rock and Shoals Outcrop WMA, and Cooper's Creek WMA. The projects require long term commitments for protection as well as dedicated resources for the land restoration, management, and monitoring until a species begins to take hold in its new safeguarding home.

Because the WMAs are under active restoration and management, they provide GPCA not only with a protected site, but also a team of professionals working to remove invasive species, apply prescribed fire to the land, and to restore hydrological systems to their natural flows. Working with lands already in active management saves the GPCA years of time, enabling us to return plants to wild sites faster than we would if we were working with other lands that are at the beginning of their restoration phase.

Reciprocal work between the Interagency Burn Team and GPCA partners has enabled us to return imperiled plant species and protect Georgia rare plant populations on land held by different parent agencies, including private, state, and federal. This collaboration has allowed working together as a team, leveraging the work, volunteers, and equipment to get land restored and plants back on the ground. GPCA has been proud to support networking on all of these lands and with significant successes.

Safeguarding Highlight on State Land Dwarf Sumac at Lower Broad River WMA, Mincy Moffett (GA WRD)

Aggressive habitat-level management, coupled with careful “surgically” applied micro-site management has saved one of Georgia’s only two natural populations of the federally endangered dwarf sumac (*Rhus michauxii*) from extirpation. Dwarf Sumac is a small deciduous shrub preferring open woodland habitat.

The male population of dwarf sumac in Elbert County occupies a 1-acre knoll within the larger Lower Broad River WMA (LBRWMA). It began a precipitous decline in the late 1990’s, and by 2005, the number of visible male stems at the Elbert County site had dwindled to just two. The site had become incredibly overgrown with a nearly closed canopy and rapidly encroaching mid-story. It was at that time that the Georgia Plant Conservation Alliance (GPCA) added the dwarf sumac to its safeguarding work list and began designing the concept of a 40-acre LBRWMA safeguarding area. The GPCA safeguarding model combines landscape-level management/restoration with more intensive micro-site management to achieve amazing results. Landscape-level management includes such things as prescribed fire, as well as chemical and mechanical removal of woody competition with a focus on large acreage. Micro-site management occurs on a scale of square feet and is essentially *in situ* conservation horticulture.

During the last 8 years, the LBRWMA safeguarding area has received three prescribed burns and one mechanical thinning. In addition, the knoll area received a more thorough manual thinning using chainsaws, and benefits from an annual hand-pruning of woody growth where needed. The plants have responded vigorously to this management scheme, producing 750 stems in 2014. A genetics study by a GPCA member institution indicated the presence of at least 10 different genotypes in the male population, meaning that most of the genotypes were just lying dormant beneath the burden of woody competition and shade during those “lean” years. They were rescued from their slowly-senescent dormancy by the intervention of habitat management.

The GPCA undertook another dwarf sumac initiative designed to encourage sexual reproduction. Fifty stems from the female population in Newton County were transplanted into the male population at LBRWMA. The micro-sites for outplanting were carefully selected and prepped, and young plants received stewardship visits on a regular basis during their first year. In 2013, the mixed population produced viable seed that later germinated in conservation greenhouses. This was the first successful sexual reproduction event ever witnessed for this species in Georgia.

The GPCA also maintains numerous *in situ* and *ex situ* safeguarding collections of both populations of this species as a hedge against extinction.

Safeguarding Highlight on Private Land Coastal Plain Pitcher Plant Bog, Lisa Kruse (GA WRD)

Another GPCA success story lies in southeast Georgia. The GPCA and its partners have restored endangered herbaceous seepage bog habitat in Georgia's Atlantic Coastal Plain in a long-term public-private partnership for monitoring and management. Intact seepage bogs are extremely rare in Georgia, with less than a dozen high quality bog habitats identified in the entire state. This habitat was identified as a high priority habitat in the original SWAP. One of these bogs near Claxton was chosen by the nascent GPCA around 1999 as one of its five top priority initial conservation projects. It is a complex of seepage bogs in 8 discrete swales along a rolling 5-mile stretch of powerline right of way, within a matrix of intact longleaf /turkey oak sandhill and pine plantation. It is important as the only known Georgia location for the Coastal plain purple pitcher plant (*Sarracenia purpurea* var. *venosa*), for having eight other Georgia protected plant species, and for overall high floristic species diversity that includes at least five orchid and seven carnivorous plant species.

Conservation of these bogs is challenging because they are in multiple private ownership, each with differing land management objectives. Further complications arise from management activities by two utility companies in their right-of-ways across the bogs. Significant threats include fire suppression, herbicide and fertilizer use, off-road vehicle intrusion, invasive plant species, and industrial forestry practices.

GPCA's involvement was initiated when a miscommunication within a utility company resulted in herbicide application that destroyed the herbaceous component of one of the bogs. From that low point GPCA took on the role of 1) centralizing communication among land managers, land owners, and conservationist biologists, 2) formalizing a shared management agreement with utility companies, and 3) monitoring the rare habitats through the Botanical Guardians program.

When regular monitoring from 2002-2006 indicated that the bogs were in rapid decline due to off-road vehicle trespass and fire suppression, GPCA coordinated a multi-pronged management effort to counter these threats. Utilizing the Interagency Burn Team (IBT), prescribed fire was conducted at one property in 2006. In 2007, new fences and educational signs were installed at five of the bogs to deter off-road vehicle use. As GPCA had been in contact with landowners and utility companies for years, permission was not difficult to obtain. The management was mutually beneficial to all parties. Subsequently, Coastal Plain purple pitcher plant and one orchid species have been planted at one bog, grown from seed collected at the site. Four additional prescribed burns, including a second landowner, have been conducted by the IBT. The latest, in 2014, was a growing season burn where nearly 35 acres of wiregrass groundcover flowered and set seed. Fences and signs have remained intact and no further damage has been done by off-road vehicles. Pitcher plants, orchids, and incredible herbaceous diversity are flourishing, particularly where prescribed fire has been implemented. The benefits extend to animal species as well, as evidenced by the numerous gopher tortoise burrows on the site. These great successes have provided inspiration to continue maintaining good landowner relations, expand to additional properties in the restoration management activities, and possibly create long-term legal agreements for conservation of this special habitat.

The Longleaf Alliance

Randy Tate (LLA)

The Longleaf Alliance (LLA) was established in 1995 at Auburn University when it became apparent that the interest in the longleaf ecosystem and the tree itself was growing rapidly, but there wasn't an outlet available for ecologists, foresters, wildlife biologists, land owners and land managers seeking information nor was there a means to distribute information they did know.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
	<i>Combatted Invasive/Alien Species</i>

A growing body of anecdotal information, personal experience, and scientific data was being passed on fitfully, and many groups were not being reached. The LLA was therefore created with the express purpose of coordinating partnerships between private landowners, forest industries, state and federal agencies, conservation groups, researchers, and other enthusiasts interested in managing and restoring longleaf pine forests for their ecological and economic benefits.

The structure of the LLA is simple, with a direct goal, the establishment of a functional longleaf forest ecosystem to the extent feasible in today's Southern forest environment. We understand that the restoration of a fully functioning longleaf ecosystem appeals to landowners in varying degrees. Recognizing that an intact longleaf forest ecosystem is not likely ever again to dominate the southern landscape, we have adopted the philosophy that "better is better." We believe that longleaf in any form is better than a cotton field; that longleaf and native ground cover (like wiregrass) is better than longleaf alone; that longleaf, wiregrass, and gopher tortoises are better than longleaf and wiregrass alone, etc.

The LLA serves as a clearinghouse for information on regenerating, restoring and managing longleaf pine; provide networking opportunities for supporters to connect with other landowners, managers and researchers with similar interests and problems; and coordinate technical meetings and education seminars.

The vast majority of forest acreage in the Southeast is privately owned. For example, of the approximate 24 million acres of forest land in GA, 92% of that is privately owned (*Sustainable Forest Management in Georgia, GFC, 2008*). Consequently, the LLA feels that the greatest opportunity to significantly re-establish longleaf pine forests is on private lands. A primary focus is to provide economically viable and voluntary options for recovery of longleaf on private lands where most of the losses are occurring.

In 2009, the LLA joined several other agencies, organizations and private individuals in creating a range wide plan for the restoration of longleaf pine. That plan became *America's Longleaf Restoration Initiative*. (<http://www.americaslongleaf.org/>) America's Longleaf Restoration Initiative (ALRI) is a collaborative effort of multiple public and private sector partners that actively supports range-wide efforts to restore and conserve longleaf pine ecosystems. The vision of the partners involved in ALRI is to have functional, viable longleaf pine ecosystems with the full

spectrum of ecological, economic and social values inspired through the voluntary involvement of motivated organizations and individuals.

ALRI has recognized 17 Significant Geographic Areas (SGA) for longleaf throughout its range. Five of these are wholly or partly in Georgia. No other state within the range has as many as Georgia. Each of these SGAs has established a Local Implementation Team (LIT) to coordinate and guide restoration and conservation activities within the boundary they have drawn. These are the *Talladega-Mountain Longleaf Pine Conservation Partnership*, the *Chattahoochee Fall Line Conservation Partnership*, the *Fort Stewart/Altamaha Longleaf Restoration Partnership*, the *Okefenokee and Osceola Local Implementation Team* and the *Apalachicola Regional Stewardship Alliance*.

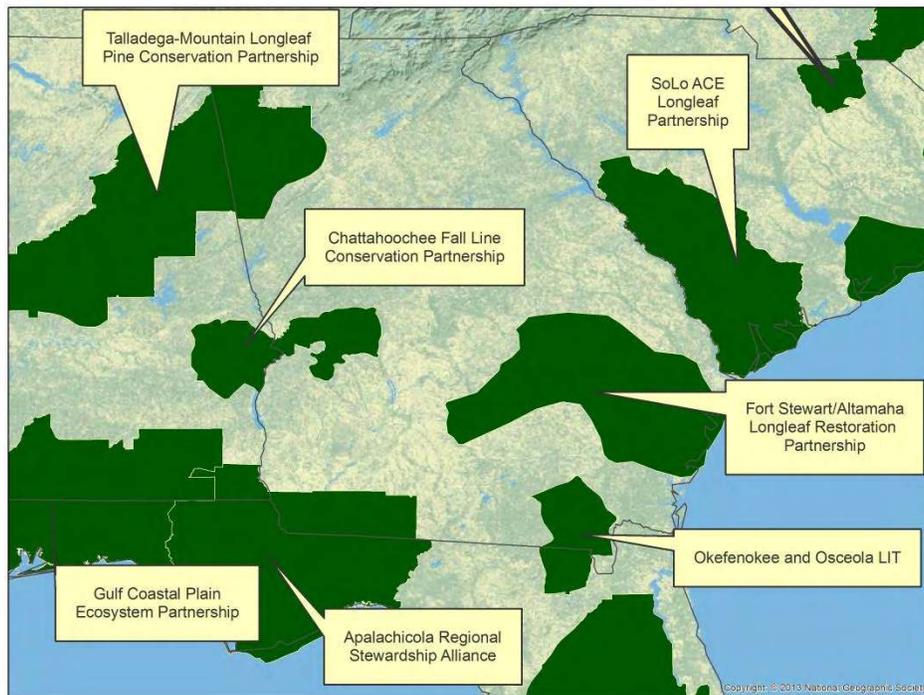
The National Fish and Wildlife Foundation established the Longleaf Stewardship Fund (LSF) in 2012. It is a landmark public-private partnership supported with federal funding from the Department of Defense, the U.S. Forest Service, the Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, and private funding from Southern Company and International Paper's Forestland Stewards Initiative. It is the LSF that has largely funded the establishment and operations of the LITs.

In order to disseminate the best information possible on longleaf establishment and management, the Longleaf Alliance initiated Longleaf Academies in 2008. Longleaf 101 provides the basics of longleaf ecology, establishment and management. They have proved enormously successful and now include Longleaf 201 courses on understory establishment and management and prescribed fire. Several Academies have been held in GA and more are planned in the future.

There has been much work on groundcover restoration in GA. In 2012 the LLA initiated the *Longleaf Understory Common Garden Project*. The project evaluates differences in germination, establishment, phenological characteristics and growth rates among proposed seed transfer zones for six common understory plant species that provide functionality in the longleaf ecosystem. One of the four sites is located in GA at the Joseph Jones Ecological Research Center in Newton, GA. Also, a groundcover seed production plot has been established at K&L Forest Nursery in Buena Vista, GA. Six different common longleaf understory species are being grown for the purpose of seed production. And, in conjunction with the Chattahoochee Fall Line Ecosystem Partnership, 21 acres of native grasses were established on The Nature Conservancy owned Ingram Tract that borders the Ft. Benning Military Installation. Over the next two years (2015-2016), a five acre groundcover restoration demonstration site will be established at Moody Forest Natural Area in Appling County.

Additionally, in collaboration with Trees Atlanta, the LLA established a demonstration planting of longleaf and understory species along the Eastside Trail on the BeltLine in Atlanta, GA, in 2012.

Each LIT within Georgia currently has funding for two more years and anticipates continued work given future funding. These LITs form an infrastructure for longleaf pine restoration and management into the future. Dozens of species of conservation concern will benefit.



America's Longleaf Restoration Initiative recognized 17 Significant Geographic Areas

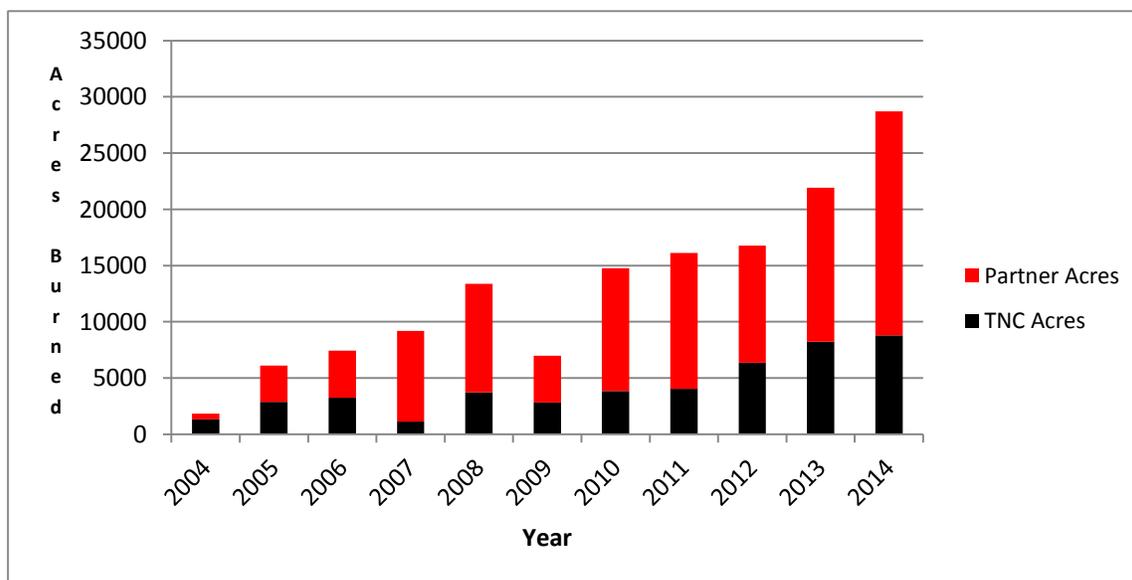
The Nature Conservancy (TNC)

Habitat Restoration Over the Past Decade, Malcolm Hodges and Erick Brown (TNC)

Over the past decade (2004-2014), The Nature Conservancy has increased both its need for habitat restoration and its capacity in Georgia. In general, our conservation staff has declined, but we have gone from three to four full-time land stewards, two site-based and two statewide. Most of the latter half-decade we went without a state-dedicated fire manager, but that was rectified in 2013. TNC-owned lands in Georgia have more than doubled in the past decade, and the conservation easement acres managed by our land stewards have also increased significantly (see Figure 1). To fill the capacity gap, we rely heavily on volunteers, interns, and short-term fire crews, as well as assistance from partners such as GA DNR.

X	<i>Addressed Altered Fire Regimes</i>
X	<i>Improved Management Practices</i>
X	<i>Combated Invasive/Alien Species</i>

Our habitat restoration strategy places high priority on prescribed fire. In addition, we remove pine plantations and native invasive hardwoods (e.g., water oak, sweetgum) and replant uplands with site-appropriate pine species. We also harvest native plant seed and replant in areas where necessary. Finally, we remove non-native plants and animals negatively impacting natural systems. Over the last decade, we have continued with all these practices, with varying degrees of success. Emphasis on fire, which we believe is the most important single action we can take, has increased outside TNC lands, with our participation in fire on partner lands growing tenfold over the last decade. We began the decade relying on staffing prescribed burns with full time employees and short term Americorps NCCC teams, then moved to a seasonal crew based out of Baxley, and now routinely hire two crews each spring. We believe that we achieve the greatest success at efficiently conserving biodiversity by ensuring our fire program, and the fire programs of our partners, continues to grow and achieve programmatic objectives.



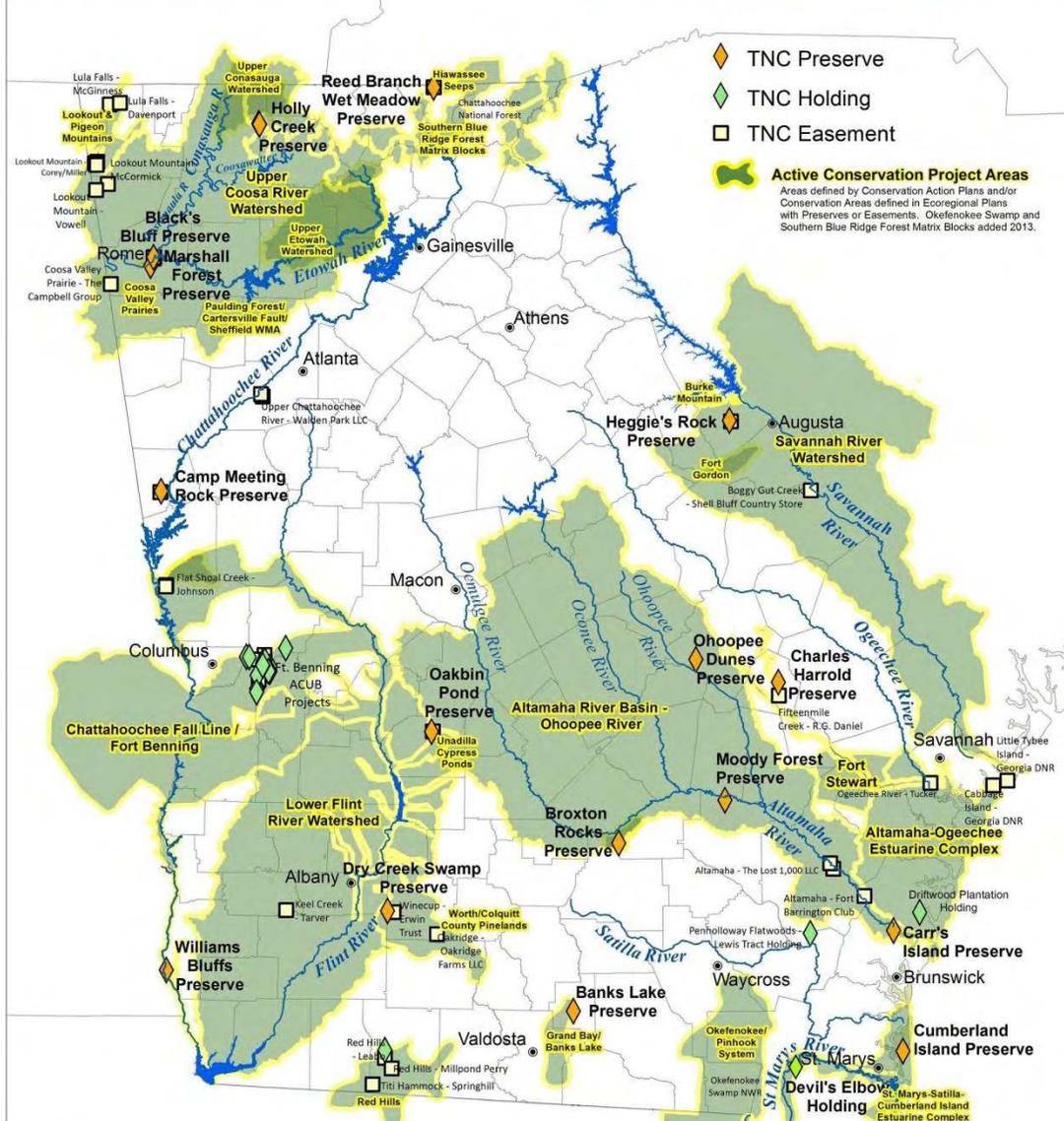
TNC attempts to use its preserves as a testing ground for best habitat restoration practices, and then use that knowledge to assist in restoration efforts and land management undertaken by partner agencies and organizations statewide. Over the past decade, we have experimented with tree and herb planting methodology, fire frequency in xeric habitats, restoration of fire-suppressed mature pinelands with organic soils, and methods for restoring exotic grasslands. Many of these attempts at “adaptive management” are ongoing, and engaging partners has often involved a slow, osmotic transfer of information.

Conservation of biodiversity in conjunction with habitat restoration can sometimes result in surprises, some good and some bad. For instance, over the past decade fire management in remnant prairies in the Coosa Basin has resulted in significant increases in populations of two federally protected plants, Mohr's Barbutton (*Marshallia mohrii*) and whorled sunflower (*Helianthus verticillatus*). However, two key habitat-indicator plants, prairie dock (*Silphium terebinthinaceum*) and prairie purple coneflower (*Echinacea purpurea*), have declined. Increased fire at sites with populations of Georgia plume has invigorated some populations, while others have suffered setbacks from excessive deer browse on root sprouts. Habitats are complex systems and pushing on one part can cause unanticipated effects in other areas.

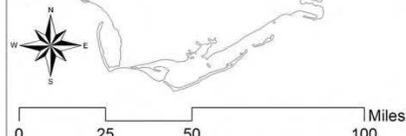
Habitat restoration of increasingly isolated tracts begins to look like zoo-keeping in a state with less than 10% of its land area in protected lands. Our manipulation of populations of rare plants and animals has grown, with reintroductions, ex-situ propagation and safeguarding of rare organisms all increasing greatly over the last decade. Examples include the introduction of gopher frog to Williams Bluffs Preserve (Early County), augmentation of green pitcherplants (*Sarracenia oreophylla*) at Reed Branch Wet Meadow Preserve (Townsend County), reintroduction of Georgia rockcress (*Arabis georgiana*) from ex-situ cultivation at Black's Bluff Preserve (Floyd County), and safeguarding of Cooley meadowrue (*Thalictrum cooleyi*) from Dry Creek Swamp Preserve (Worth County) at a nearby conservation easement. Such creative methodology will only increase as we make full use of a weak conservation portfolio to conserve the state's existing biodiversity.

As large-scale land protection wanes in the face of an increasing human population, careful restoration and management of existing conservation lands becomes more important. Collaboration among conservation-lands managers has increased and will no doubt continue to do so, as we seek best practices for habitat restoration and develop multi-site cooperative projects.

Rapid changes in land tenure, intensification of anthropogenic extraction processes, climate change, declines in government funding, and the shifting structure and mission of non-profit environmental groups create a mercurial environment for long-term land-management practitioners. In particular, the uncertain future of fire management in the face of increasing concern over smoke management and atmospheric carbon inputs places our most important restoration strategy at risk. Prioritization of management practices on those lands most resilient to change is one way to minimize risk. Belief in the ecologically redemptive power of fire can reach an almost evangelical zeal amongst land stewards, but careful evaluation of and experimentation with alternatives to fire would be wise in the coming decades. Examples include close-mowing and rotational grazing schemes.



Legend Notes:
 Easements directly adjacent to Preserves are indicated, but not labeled
 TNC Holding = Conservation Buyer Transaction planned for property (TNC currently owns, but will not hold as a preserve)



Map by Sara Gottlieb
 The Nature Conservancy in Georgia
 TNC_in_GA_Arc10.mxd



Habitat Restoration and SWAP

Looking Ahead

Shan Cammack and Eamonn Leonard (GA WRD)

The State Wildlife Action Plan was developed by a comprehensive planning team as a conservation strategy to protect and maintain the full complement of species native to a Georgia, especially species of greatest conservation need. The strategy assessed the extent and condition of habitats required by these species, as well as existing and potential problems and conservation opportunities for these habitats. The plan remains as strong and relevant to habitat restoration today as it was when it was published ten years ago.

Recommended Actions and Strategies that were outlined in the original SWAP were addressed in the past ten years.

<p><i>Address Altered Fire Regimes</i></p> <ul style="list-style-type: none"> • Partnerships continue to grow and increase capacity to conduct prescribed burning and to identify priority areas in need of better fire management. More emphasis is being placed on appropriate timing and frequency. • The Interagency Burn Team (IBT) continues to be successful and will continue with the recent re-signing of the Memorandum of Understanding. • Several programs focused on working with private landowners owning high priority habitat. Technical assistance and incentive programs encouraged prescribed burns in fire-adapted habitats. • NWCG (National Wildfire Coordinating Group) certification standards were adopted by all state and federal practitioners in the IBT.
<p><i>Encourage Improved Management Practices</i></p> <ul style="list-style-type: none"> • As outlined in this chapter, USFS, NPS, USFWS, and other public land managers worked together at multiple levels to improve habitat management on public lands. Restoration and maintenance of natural habitats was emphasized as well as addressing regional conservation. • IBT partners work to couple habitat management and educational outreach programs to help provide the public with information to inspire sound stewardship for wildlife resources on private lands. • NRCS used SWAP widely to promote the planting of native species through Farm Bill programs. • State agencies worked to improve public familiarity with and use of BMPs for agriculture, forestry, and land development practices.
<p><i>Combat Invasive/Alien Species</i></p> <ul style="list-style-type: none"> • A strong interagency push was made to work collaboratively on invasive species issues. This included promoting education about exotic species that covered identification, effects, and eradication measures. Efforts were also made to reduce the importation of invasive exotic species. • State, federal and NGOs worked tirelessly to eradicate invasive species on their properties. • Land management agencies worked to initiate integrated control measures that focus on early detection and eradication of alien species.

Thanks to the Georgia State Wildlife Action Plan, land management agencies across the state have been working hard to improve habitats for species of special concern. Perhaps the most useful benefit of the SWAP is heightened importance of habitat restoration and the increased availability of funds. Federal funding entities as well as non-profit organizations relied on the SWAP to set priorities and rank projects. This has funded a lot of on-the-ground management activities that have benefitted a myriad of species.

These priorities remain in place. This, coupled with the momentum that has been generated in the last ten years, suggests that the vision of habitat restoration will continue into the future. Part of this success has been due to the high level of collaboration and cooperation between the various state, federal, and non-profit agencies and groups. The unique landscape of Georgia and the high level of private landownership has forged these alliances and led to creative ways to implement effective land management. Species of special concern in Georgia will experience new challenges in the future in the form of economic, demographic, environmental, and political change that will force land managers to be adaptive. The SWAP will continue to be used as a blueprint to guide the prioritizing of habitat restoration activities for years to come.