

Appendix B. Birds Technical Team Report

Prepared by Todd Schneider and Tim Keyes, Team Leaders

Technical Team Members

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Team Members participating at Bird Technical Committee Meetings

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Invited but unable to participate:

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Approach

On January 8, 2014 a one-day meeting was convened at Charlie Elliott Wildlife Education Center near Mansfield to update and revise the SWAP bird species list. Those invited to attend represented a broad range of expertise both geographically and taxonomically. Many of these people had participated in development of the original SWAP bird list (2005), although a significant number of people new to the process also attended. Prior to the meeting participants were provided with the 2005 SWAP bird list for review, as well as a summary of the revision process and expectations for the meeting. During the meeting participants discussed individual species on the list at length and determined whether information for a particular species needed to be revised or added. They also discussed whether a species should remain on the list or be removed, as well as possible new species that should be added. While this process was relatively efficient, we were only able to get through a portion of the species on the list and decided that another meeting would be necessary to complete the task. A second one-day meeting was convened on July 8, 2014 at the Nongame Conservation Section Office in Forsyth. At this meeting species not previously discussed were reviewed and new species proposed for the list were discussed and approved or rejected by the group. While working on the bird list we also discussed updates and changes to the status of species on the Georgia Protected Species List and the Georgia Special Concern Species Tracking List. These suggested changes were documented in the bird list spreadsheet. Later we sent out the updated bird list from this meeting to everyone on our mailing list to seek any additional input and to allow everyone to vote on the species suggested for addition or deletion.

Decisions on all species discussed at these two meetings were made based on expert opinion that was supported by peer reviewed scientific literature, technical reports, ornithological records, other databases, and conservation plans including, but not limited to, the Partners in Flight North American Landbird Conservation Plan, the North American Waterbird Conservation Plan, United States Shorebird Conservation Plan, the North American Waterfowl Management Plan, and the North American Bird Conservation Initiative. Determination of species to include on the list was based primarily on the species' population status, trends, habitat status and threats, rarity, vulnerability, and ability to serve as an indicator of ecological integrity of specific habitats or habitat conditions. Species included on the list are those species known, or thought to be, most critically in need of immediate conservation action. In a few cases the species included on this list serve as umbrella species that represent a guild of species, habitat type(s), or habitat condition(s) that is significantly declining (e.g., Northern Bobwhite, Prothonotary Warbler). While this list is fairly comprehensive it should be considered a work in progress and modified as needed to best address conservation concerns in the future.

Assessment Results

The SWAP bird committee reviewed the original 33 species on the 2005 SWAP list, and proposed the removal of one species and the addition of 8 species. In addition, 2 species were recommended for addition to the Georgia Special Concern Species Tracking List.

Removal: Bicknell's Thrush was recommended for removal based upon the fact that it is a transient through the state, virtually impossible to distinguish from the ubiquitous Gray-cheeked Thrush (even in the hand), and the consensus that there is no meaningful management activity

that we could undertake that would have any direct impact on the species. The only other species on the SWAP list that is strictly a transient is Kirtland's Warbler, which was maintained on the list due to its federal endangered species status and other considerations.

Additions: The group agreed that the following species should be added to the list; Seaside Sparrow, Saltmarsh Sparrow, Nelson's Sparrow, Rusty Blackbird, Whooping Crane, Little Blue Heron, Prothonotary Warbler, and Yellow Rail. Seaside, Saltmarsh, and Nelson's Sparrows use coastal saltmarshes for all or part of their life cycle and are threatened by sea level rise, development, and possibly excessive predation. The Rusty Blackbird has declined by 90% or more over the last few decades, the causes for this decline are not well understood. Georgia bottomland forests provide potentially important habitat for overwintering birds. Whooping Cranes now regularly migrate through the state led by ultralight aircraft, or on their own, as they travel between their wintering site in Florida and breeding site in Wisconsin. Some also overwinter in Georgia, and there have even been cases of Whooping Cranes being illegally shot in the state in recent years. Little Blue Heron remains a species of concern and appears to be undergoing a range-wide decline. The Prothonotary Warbler was suggested as another species that should be included on the list based upon both a declining population trend (BBS data) and its suitability as an umbrella species for birds of bottomland and swamp forest habitats. One other species on our SWAP list, the Northern Bobwhite, is similarly used as an umbrella species for grassland and pine savanna habitats. Yellow Rail was added to the list despite very little knowledge of its status in the state. It is considered a high conservation priority throughout its range and clearly winters here in unknown numbers. The broader concern for the species warrants additional survey effort in Georgia.

Discussed: The committee discussed whether several high priority pelagic species (e.g., Bermuda Petrel, Black-capped Petrel) should be added to the list. While there was no disagreement regarding the status of these imperiled pelagic species, it was determined that since these birds virtually never come into state waters (within 3 miles of shore), there would be no direct management actions we could take that would meaningfully affect these species.

Tracked List: The group discussed the possible addition of the Roseate Spoonbill, which has been documented nesting in the state since the 2005 SWAP list was completed, and the Reddish Egret. It was determined that both species warrant tracking at a state level (Georgia Special Concern Species Tracking List) but do not rise to the level of concern needed for inclusion on the SWAP list.

The status of Loggerhead Shrike was expanded to include both breeding and wintering subspecies.

High Priority Bird Species in Georgia

Common Name	Species
Saltmarsh Sparrow	<i>Ammodramus caudacutus</i>
Henslow's Sparrow	<i>Ammodramus henslowii</i>
Seaside Sparrow (MacGillivray's)	<i>Ammodramus maritimus macgillivraii</i>
Nelson's Sparrow	<i>Ammodramus nelsoni</i>
Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Red Knot	<i>Calidris canutus</i>
Piping Plover	<i>Charadrius melodus</i>
Wilson's Plover	<i>Charadrius wilsonia</i>

Northern Bobwhite	<i>Colinus virginianus</i>
Yellow Rail	<i>Coturnicops noveboracensis</i>
Little Blue Heron	<i>Egretta caerulea</i>
Tricolored Heron	<i>Egretta tricolor</i>
Swallow-tailed Kite	<i>Elanoides forficatus</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
Peregrine Falcon	<i>Falco peregrinus</i>
Southeastern American Kestrel	<i>Falco sparverius paulus</i>
Gull-billed Tern	<i>Gelochelidon nilotica</i>
Whooping Crane	<i>Grus americana</i>
Florida Sandhill Crane	<i>Grus canadensis pratensis</i>
American Oystercatcher	<i>Haematopus palliatus</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Black-necked Stilt	<i>Himantopus mexicanus</i>
Least Bittern	<i>Ixobrychus exilis</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
Black Rail	<i>Laterallus jamaicensis</i>
Swainson's Warbler	<i>Limnothlypis swainsonii</i>
Wood Stork	<i>Mycteria americana</i>
Whimbrel	<i>Numenius phaeopus</i>
Painted Bunting	<i>Passerina ciris</i>
Bachman's Sparrow	<i>Peucaea aestivalis</i>
Red-cockaded Woodpecker	<i>Picoides borealis</i>
Prothonotary Warbler	<i>Protonaria citrea</i>
King Rail	<i>Rallus elegans</i>
Black Skimmer	<i>Rynchops niger</i>
Cerulean Warbler	<i>Setophaga cerulea</i>
Kirtland's Warbler	<i>Setophaga kirtlandii</i>
Appalachian Yellow-bellied Sapsucker	<i>Sphyrapicus varius appalachiensis</i>
Least Tern	<i>Sternula antillarum</i>
Barn Owl	<i>Tyto alba</i>
Golden-winged Warbler	<i>Vermivora chrysoptera</i>

Examples of High Priority Species

Pine Savanna/Grassland Specialists

Much of South Georgia was in pine savanna habitat prior to European colonization of the state. Pine savanna also occurred locally in the Piedmont and portions of the mountains, although generally on a much smaller scale. The Red-cockaded Woodpecker, Bachman's Sparrow, Henslow's Sparrow, Loggerhead Shrike, Southeastern American Kestrel, and Northern Bobwhite thrived in these savanna habitats, particularly in the Coastal Plain. Starting in the 1700s longleaf pine savanna was converted to agriculture, harvested for lumber, and lost due to fire suppression, human development, and as a result of injuries trees sustained during pine sap extraction for turpentine and naval stores. More open grasslands were scattered throughout portions of the state

where soils, geology, micro-climate, frequent fire, and other physical or ecological forces shaped vegetative communities by inhibiting or preventing woody vegetation from growing. Many of these areas were lost due to fire suppression, but plowing for agriculture, overgrazing, and attempts to grow trees in these “wastelands” also reduced the number of functional grasslands remaining.

The result of this onslaught of human activity today is a landscape devoid of expansive areas of pine savanna and very few remaining open grasslands. However, some larger areas of pine savanna survived these assaults, artifacts of unique historical occurrences. Two good examples of these are the Red Hills quail plantations, saved by wealthy industrialists as personal recreation lands, and the two largest military bases, Ft. Stewart and Ft. Benning, whose military mission over several decades led to the conservation on hundreds of thousands of acres of pine savanna habitat. Today these areas hold significant numbers of Red-cockaded Woodpeckers and Bachman’s Sparrows, and likely substantial numbers of some of the other species mentioned previously. In the case of the Red-cockaded Woodpecker, Ft. Stewart has served as a source for reintroduction efforts to other sites. Conservation efforts for several pine savanna species are building and expanding off these core areas.

Beach-nesting Birds

This group of birds includes the solitary nesting species - Wilson’s Plover and American Oystercatcher - and colonial nesters such as Gull-billed Tern, Black Skimmer, and Least Tern. The factors that result in their inclusion as high priorities for conservation in Georgia are extremely limited and vulnerable breeding habitat, historic reductions in populations, and reduction in the number of extant, low disturbance, nesting locations. The species listed above represent a partial list of species in need of conservation action.

Beach nesting birds are dependent on similar, specific, beach attributes to fulfill nesting and chick rearing requirements. The attributes include wide accretional beach, adequate beach elevation to thwart normal tidal inundation, a degree of isolation from uplands, and proximity to quality feeding sites. These attributes rarely combine on the Georgia Coast, especially for the colonial birds dependent on the greatest level of isolation. When the attributes do combine, the resulting beach is frequently also favored by recreationists, ensuring frequent disturbance during incubation and chick rearing in spring and early summer. The primary threats to these species are 1) increasing access to historically isolated areas of coastal Georgia by recreational users and their dogs, 2) vehicular use of beaches for travel, recreating, law enforcement, and sea turtle nest patrols, 3) reductions in the number of nesting locations due to sea level rise, 4) contaminants including dioxin, mercury, PCBs, and toxaphene, 5) physical loss of emergent sands due to beach nourishment projects, and 6) feral, introduced, and invasive animals, including cats, pigs, horses, bobcats, donkeys, coyotes, and fire ants.

Immediate conservation actions are needed and include; 1) Developing a state legislative mechanism that automatically provides protection for newly developing, persistent, emergent, sand bars on the outer coast. Currently only five sand bar islands, including Little Egg Island Bar, St. Catherine Island Bar, Pelican Spit, Satilla Marsh Island, and Williamson Island, are covered under the Georgia Natural Resources Board, Shorebird and Sea Bird Habitat Protection Rule; 391-4-7-.03 (also known as the Bird Island Rule), which protects seabird and shorebird

nesting and roosting at these sites. Since sand bar habitats are highly dynamic and ephemeral protected seabird nesting locations can easily be lost to storms, erosion, or other factors. A legal mechanism is needed to protect recently formed or created sand bar habitats as well as future sand bars as they are established and become valuable to seabirds for nesting. The recently created dredge spoil island in Brunswick Harbor has become one of the most important sea bird colonies in the state, but since its creation post-dates the Bird Island Rule, which became effective on May 20, 1998, there is no specific protection for the site, making it difficult for Law Enforcement to enforce posted closure. This, and similar sites, should be included within the Bird Island Rule to assist with enforcement. 2) Continue to work with island managers to recognize and protect higher value shorebird nesting locations through signage and symbolic fencing where appropriate, 3) Limit or eliminate vehicular use of beach areas recognized for high beach-nesting values. Examples include the south end of Middle Beach on Ossabaw Island, all of Little St. Simons Island, the south end of Sea and Jekyll islands, Little Cumberland Island, and the South end of Cumberland Island. Limit or eliminate night patrols for sea turtle nesting projects, 4) Identify and control the source of contaminants that could negatively impact the health and reproductive ability of waterbirds, 5) Restrict use of nearshore sand sources for beach nourishment projects, opting for deeper water locations, 6) Eradicate feral hogs, cats, and coyotes on islands where they are found. Reduce feral horse populations on Cumberland Island. Continue to control fire ants as needed on Little Egg Island Bar and Satilla Marsh Island, 7) Continue to educate recreationists frequenting sensitive beach nesting locations and, 8) continue to build regional coordination with monitoring and management. Many colonial seabirds move significantly year to year, and in order to accurately assess their population numbers and trends, it is imperative that states within the Southeast coordinate their efforts.

Isolated Wetlands Dependent Birds

Some of the most at risk species are those dependent on isolated wetlands including Tricolored Heron, Little Blue Heron, Wood Stork, King Rail, Least Bittern, and Black-necked Stilt. These birds represent a much larger group of species that include all of our wading birds, most of our rails, many migrant shorebirds, resident and migratory passerines, waterfowl, and grebes. Wading birds in particular require specific flooded woodland habitats in which to nest. Most wading bird rookeries in Georgia are located within 20 miles of the coast. Even along the immediate coast, freshwater wetlands are used not only for nesting, but also heavily as feeding locations.

Primary threats include; 1) lack of state or federal protection for isolated freshwater wetlands in Georgia, unless a specific location is recognized as a Wood Stork rookery with Endangered Species Act implications, 2) direct loss of isolated wetlands due to increased residential and industrial development and intensive silvicultural practices, 3) environmental contaminants particularly mercury, PCBs, and toxaphene, 4) agricultural and industrial groundwater withdrawal which dries wetlands, 5) climate change scenarios with predicted increases in the variability of rainfall, leading to increased drought conditions punctuated with more extreme rainfall events. This altered rainfall pattern may present new challenges at both ends of the rainfall spectrum, from drought conditions where nesting is not possible, to flood conditions where nests are lost and foraging areas are flooded making them unsuitable for feeding.

These species are in need of immediate management action and recommended conservation actions are; 1) promote state legislation that protects isolated wetlands and non-flowing waters. This will help safeguard and stabilize waterbird populations as well as those of other dependent wildlife, 2) use GIS and remote sensing to determine locations for all freshwater wetlands in regions experiencing heavy development, 3) contact landowners of the most valuable sites to discuss important wildlife values of wetlands and long-term conservation options, 4) pursue acquisition or easements for the highest valued locations, and 5) make development of a regional survey/monitoring protocol for wading birds a priority. Our most recent statewide wading bird survey is 20 years old.

High Priority Habitats and Associated Species

Southwestern Appalachians/Ridge & Valley

Hardwood Forests

The greatest bird conservation issue in this region is conversion of hardwood and mixed pine/hardwood forest to monocultures of loblolly pine, urbanization, and agriculture. A large percentage of natural vegetation has been cleared for other uses, and mature forest and the birds dependent on mature forest are less secure here than in any other physiographic area in the Southern Appalachians. The long-term health of populations of priority birds including Acadian Flycatcher, Wood Thrush, and Yellow-throated Warbler will depend on maintenance and management of remnant forest as well as aggressive restoration efforts. It is recommended that at least eight upland hardwood forest patches greater than 4,000 hectares be sustained and that the number of such patches in the 4,000 to 40,000 hectare range be increased. More than 80% of the mixed mesophytic hardwood acreage within these patches should be managed for long rotation or old growth.

Southern Yellow Pine

Existing short-rotation pine, while of less benefit to birds than mature forest, is nevertheless much more valuable than more intensive land uses, and it is recommended that the current percentage of land in this cover type be retained. All existing southern yellow pine and mixed pine hardwood habitats should be actively and appropriately managed with fire, and current acreage should be increased where possible. Priority species associated with mature pine forests in the Ridge and Valley include Brown-headed Nuthatch and Bachman's Sparrow.

Scrub-Shrub and Early Succession

Suppression of natural disturbance regimes has depleted scrub-shrub and woodland habitats and birds adapted to those conditions such as Prairie Warbler, Orchard Oriole, and Red-headed Woodpecker persist largely in the early succession phases of actively managed forests. The needs of these birds, including game species such as American Woodcock and Northern Bobwhite, should be considered within the context of forest habitat objectives.

Blue Ridge

Mature Forests

This remains the most heavily forested physiographic area in the Southeast. Species of conservation concern in this habitat include Black-throated Blue Warbler, Yellow-throated Vireo, and Cerulean Warbler. The amount of land in agriculture has decreased in the last century, being replaced by forest. Nevertheless, BBS data indicate bird population declines in the Southern Blue Ridge in excess of those in any other areas in the region. Declines are seen in long-distance migrants, short-distance migrants, and permanent residents. However, this information should be interpreted with some caution since BBS routes are situated along roads, and most roads in the Southern Blue Ridge are in valleys where there has been a great deal of development and habitat loss in recent years. These perceived trends may not be representative of population conditions in the bulk of the forested area in this region. This, however, is not necessarily a safe assumption, and there is cause for concern in at least some of the forest types and conditions.

Although some forest types, such as Appalachian oak, remain widespread, most of the area is in a mid-successional stage of closed canopy with a poorly developed understory and ground cover. Many mature forest birds including Wood Thrush, Worm-eating Warbler, and Canada Warbler may be suffering from this deficiency in structure. This will correct itself over time, although perhaps not soon enough to conserve some declining species such as Cerulean Warbler; therefore, some conservationists advocate hastening the process through management. In fact, selective logging was used to improve habitat for Cerulean Warblers in an area where they occur on the Chattahoochee National Forest. In any case, a much greater extent of old-growth conditions in general is desirable for mature forest birds. Much of the mature forest in the Blue Ridge occurs on National Forest lands that are classified as unsuitable for commercial harvest activities, and it is likely that these areas will eventually provide substantial blocks of old-growth habitat. Although largely in USFS ownership, mature forest habitat and associated bird species may also be threatened by several exotic pest species including the Hemlock Woolly Adelgid, Gypsy Moth, and Asian Long-horned Beetle, which are advancing down the Appalachians. Upon arrival in other areas, these species dramatically altered forest structure and bird populations, and the Hemlock Woolly Adelgid has already caused considerable loss of streamside hemlock habitats in the Chattahoochee National Forest.

Early Successional Forest

Other high priority birds inhabit early successional conditions, which also have decreased in extent in recent years. Indeed, the Appalachian subspecies of Bewick's Wren may have become extinct in the past two decades because of loss of this type of habitat. Maintenance of a suitable amount of mid- and high elevation early successional or woodland habitat is a priority conservation need particularly for species such as Golden-winged Warbler, Ruffed Grouse, and Appalachian Yellow-bellied Sapsucker.

Riparian Forests

The lowest elevation riparian forests are most affected by forest loss and fragmentation in recent years. Management of riparian zones and retention or restoration of fragments of suitable size is

another conservation need in the Southern Blue Ridge and of particular importance for Swainson's Warbler, Louisiana Waterthrush, and Kentucky Warbler.

Piedmont

Grasslands and Scrub-Shrub

Open woodlands, grasslands, and savannas were common as late as the 1800s in the Piedmont, and because Native American settlements were apparently common in the area, agricultural fields and other large openings were historically part of the landscape. The three greatest challenges facing the conservation of habitat in the Piedmont today are unchecked urbanization, intensification of agriculture and forest management, and suppression of natural disturbance regimes. Of these, the former is of much greater concern because its effects are essentially permanent. Urban sprawl is an increasingly important issue nationwide and the human population in the Southern Piedmont is growing rapidly. However, no comprehensive planning for growth is in place. Agriculture and forestry are significant land uses in the Southern Piedmont. The general decline in abundance of grassland species is mostly related to changing land use patterns from agriculture to intensive forestry. Remaining agricultural lands are intensively managed, often consisting of frequently harvested or grazed pastures of exotic grass species. The result is a loss of stable, grassland habitats with associated influences on species of conservation concern including Blue Grosbeak, Northern Bobwhite, Grasshopper Sparrow, and Red-headed Woodpecker.

Mature Forests of Southern Pine and Upland Hardwood

Although overall increasing forest acreage and maturity in the Piedmont would suggest greater security for vulnerable bird species, many species' populations have shown declines in patches of protected mature forests embedded within suburban settings where they were once common. Conservation opportunities to manage and maintain bird habitats will require significant involvement from public land managers, public agencies, and private industrial and non-industrial landowners. Public lands are an important component of the Southern Piedmont and may serve as core areas from which to manage or expand habitat. Timber companies are the largest private landowner in the Piedmont, creating tremendous opportunity for increased cooperative management strategies to accomplish bird conservation objectives. Private, non-industrial landowner incentive programs can be increased in key areas as well, further adding to core habitat acreage. Priority species dependent on Southern Pine forests include Red-cockaded Woodpecker, Brown-headed Nuthatch, and Bachman's Sparrow. Upland Hardwood forests are needed to support Wood Thrush and Kentucky Warbler.

Bottomland Hardwood Forests

Encroachment from urbanization, industrialization, and intensive pine management influence both the extent and connectivity of riparian forests in the Piedmont. In addition, closed canopy forests that lack a diverse understory and degradation of water quality due to development and sedimentation and chemical run-off from roads can negatively influence species such as Swainson's Warbler and Louisiana Waterthrush. Altered hydrology can also influence habitat quality for these species as well as Prothonotary Warbler. Consideration must be given to connecting large blocks of riparian forest, management prescriptions to improve understory structure, and appropriate management activities in streamside areas.

Southeastern Plains and Southern Coastal Plain

Pine Forests

As in other pine-dominated uplands of the Southeast, fire suppression, conversion to other land uses, and short-rotation pine plantations have significantly altered the nature of the South Atlantic Coastal Plain. Maintenance and restoration of large tracts of fire maintained pine savanna are the keys to health of high priority pine and pine-grassland bird species including Red-cockaded Woodpecker, Southeastern American Kestrel, Bachman's Sparrow, and Brown-headed Nuthatch. Pine plantations have some wildlife value, and maintenance of a diversity of age classes over landscapes can help maintain many bird species, including some that are of reasonably high priority.

Bottomland Hardwood

The bottomland hardwood bird community requires large tracts of forest in river systems including the Savannah, Altamaha, Ogeechee and Satilla. These areas are needed to support significant numbers of breeding Swallow-tailed Kite, Northern Parula, Prothonotary Warbler, and Swainson's Warbler. Maintenance and restoration of large patches of bottomland forest ranging in size from 2,000 to 40,000 hectares in this physiographic area should assure the health of these birds.

Maritime Forest and Scrub-Shrub

Coastal maritime forest and scrub-shrub habitats not only support much of the eastern population of Painted Bunting but also are extremely important for in-transit migrants. Much of this forest has been developed for intensive human use, and what remains should be maintained. Although likely secure on several barrier islands, on the mainland, birds occupying these habitats may face additional challenges from parasitism by Brown-headed Cowbirds and increased predation by feral and domestic cats as well as avian predators such as crows and jays.

Coast and Islands

About eighty species of waterbirds and several species of rails and songbirds use the coastal environs of Georgia during some part of their annual cycle. Some of these birds are coastal specialists, dependent on habitats found only on, or primarily within the coastal zone for all of their life-sustaining needs. Due to their specialization, many coastal dependent waterbirds are experiencing population stresses, or biological bottlenecks as a result of direct habitat loss or indirect loss due to disturbance. As breeding and feeding sites are increasingly restricted in scope and number, the flexibility needed by our priority species to respond to natural changes in their nesting and feeding habitats is eliminated. These coastal specialists are included on our High Priority Species List. High priority habitats critical to some of our most threatened bird species are described.

Beach/Dune/Tidal Flats, Pools, and Creeks

These tidally influenced habitats form a particularly diverse and rich waterbird area. High priority species including all of our seabirds, and our highest ranked shorebirds such as Piping Plover, Red Knot, Wilson's Plover, American Oystercatcher, Marbled Godwit, and Whimbrel are all obligate tidal lands species. Of our priority wading birds, Tricolored Herons are restricted

to our coastal zone, and roughly half of the state's Wood Storks depend, in part, on the tidal pools and feeder creeks for foraging.

The most pressing waterbird conservation issues on Georgia's tidally influenced habitats include sea level rise and human disturbance of nesting areas by day-use recreation. Two of Georgia's shorebirds, and virtually all of Georgia's resident seabirds, including Brown Pelican, Royal Tern, Gull-billed Tern, Sandwich Tern, Laughing Gull, Least Tern, and Black Skimmer, nest directly on the ground on terrace and dune habitats that are only a few feet above mean sea level. These sites are increasingly under threat of the effects of tidal inundation from rising water level and possibly increased tidal amplitudes. Additionally, these species depend on disturbance-free beaches and Georgia's barrier beaches have been discovered by a rapidly increasing human population interested in shoreline recreational activities. The state needs a long-term mechanism to ensure disturbance-free nesting areas in this highly dynamic, ephemeral landscape. All of our waterbirds depend on healthy abundant live food resources. Water quality will play a major role in the future of the migrant, wintering, and resident breeding birds on the Georgia Coast. Development of uplands, including hammocks, is impacting estuarine water quality with siltation and contaminant loading. Increased dock and marina development will deliver petroleum residues from increased numbers of boats. All of the water flowing down our five major Atlantic drainage rivers mixes with seawater to create the rich estuarine waters of the coastal marshes. Everything put into the watersheds of the Savannah, Ogeechee, Altamaha, Satilla, and St. Mary's rivers eventually ends up on the coast, influencing the quality and quantity of invertebrate and vertebrate foods for waterbirds. River born contaminants will end up in waterbird food resources, eventually influencing their health and reproductive potential. Contaminant control and monitoring will be an important aspect of waterbird conservation efforts.

Saltmarsh

The expanse of saltmarsh between Georgia's barrier islands and mainland comprises about one third of all saltmarsh habitat on the U.S. Atlantic Coast. This area harbors a number of obligate saltmarsh bird species and subspecies including the Seaside Sparrow, Saltmarsh Sparrow, Clapper Rail, and Worthington's Marsh Wren, as well as other species dependent upon saltmarsh habitats including Nelson's Sparrow and possibly the Black Rail. Sea level rise is the greatest threat to saltmarsh habitats, although contaminants, siltation, dredging, filling, petroleum residues, and predation by upland mammals may also be significant threats.

Isolated Freshwater Wetlands

All of our wading birds are either entirely dependent, or primarily dependent upon isolated freshwater wetlands for nesting. Wading birds nest above the freshwaters of Carolina bays, gum swamps, flooded interdune swales, cypress domes, and temporary depressional wetlands; anywhere shrubs and trees are sitting in standing water throughout the spring and early summer. Our high priority wading bird species also feed regularly in freshwater wetlands throughout the year. There are no state or federal laws currently protecting isolated freshwater wetlands in Georgia. Dewatering is eliminating freshwater wetlands throughout the Coastal Plain, particularly on interior timberlands, and on the coast where development pressures are highest. To successfully manage our priority wading bird populations, we need to adequately address the loss of isolated freshwater wetlands, seeking a mechanism to protect the sites of highest current and future value.

High Priority Areas

1. Chattahoochee National Forest – Particularly Brawley Mountain and the Ivy Log/Gum Log area. The last site where nesting Golden-winged Warblers still occur in Georgia is at the Brawley Mountain site. About 200 acres of habitat for Golden-wings was created here recently by logging and prescribed burning, although numbers have dwindled due to the delay in finally getting this habitat on the ground. Ivy Log/Gum Log is the only nesting site for Cerulean Warblers in the state and habitat maintenance work was done here recently.
2. Piedmont NWR and Oconee National Forest – Breeding Red-cockaded Woodpeckers and Bachman's Sparrows occur at these sites as well as many other bird species of lower conservation concern.
3. Bond Swamp NWR – This national refuge and the surrounding Ocmulgee River corridor are home to one of the larger populations of Swainson's Warbler.
4. Altamaha River Delta – This is an important area for shorebirds and waterbirds including Whimbrels, Red Knots, Piping Plovers, Wilson's Plovers, American Oystercatchers, Least Terns, Gull-billed Terns, Black Skimmers and many more. It provides breeding habitat as well as migration stop-over and wintering habitat.
5. Barrier Islands – Most provide nesting, stop-over, and wintering habitat. Those particularly important to shorebird stop-over and wintering are Little St. Simons, middle beach on Ossabaw, Sapelo, the south ends of St. Simons and Jekyll, Little Cumberland, and the south end of Cumberland. Several of the less developed islands, particularly Wassaw, Blackbeard, Sapelo, and St. Catherines, provide substantial habitat for Painted Buntings as well.
6. Little Egg Island Bar, St. Catherines Island Bar, Pelican Spit, Satilla Marsh Island, and Brunswick Harbor Dredge Spoil Island – These isolated islands provide the best waterbird nesting sites in the state. Species that nest here include Brown Pelican, Gull-billed Tern, Sandwich Tern, Least Tern, Royal Tern, American Oystercatcher, Black Skimmer, and Wilson's Plover. These areas are also heavily used by birds during migration stop-over and in winter.
7. Altamaha WMA – This management area provides a significant amount of habitat for high priority marsh birds such as the King Rail and Least Bittern. Wood Storks also occasionally feed here as do Gull-billed Terns.
8. Okefenokee NWR – This is the only site in the state known to have breeding Florida Sandhill Cranes. This refuge may also harbor a significant number of King Rails, although that is unknown at present. Pine uplands here support Red-cockaded Woodpeckers and Bachman's Sparrows.
9. Savannah, Ogeechee, Altamaha, Satilla, and St. Marys Rivers – The flood plains and adjacent uplands are the stronghold for nesting Swallow-tailed Kites in the state. The Altamaha and Satilla Rivers appear to be the most important of these.

10. Ft. Stewart, Ft. Benning, the Red Hills region – These are our most expansive areas of pine savanna habitat and harbor the largest populations of Red-cockaded Woodpeckers and Bachman’s Sparrow in the state. Other high priority birds that occur here in numbers are Southeastern American Kestrel, Loggerhead Shrike, and Henslow’s Sparrow. Silver Lake WMA and Joseph Jones Ecological Research Center also have significant number of Red-cockaded Woodpeckers and Bachman’s Sparrows.
11. Paulk’s Pasture, Townsend, and Moody Forest WMAs – Henslow’s Sparrows winter here in good numbers. These are our best known and studied sites for this species.
12. Coastal Saltmarsh – Substantial numbers of nesting MacGillivray’s Seaside Sparrows occur throughout low marsh areas of the saltmarsh. Other high priority species including the Nelson’s Sparrow and Saltmarsh Sparrow winter here in significant numbers. Black Rails may nest in high marsh areas, although this has not been confirmed.

Problems Affecting High Priority Species and Habitats

The overwhelming threat to high priority species is loss of suitable habitat and this loss is caused by a variety of factors. Urban and suburban expansion causes both direct loss of habitat and degradation of habitat quality, exposing birds to increased risk of predation from domesticated and natural predators and parasitism by brown-headed cowbirds. Coastal development, including an explosion of dock construction and a push to build bridges to many marsh hammocks is a significant problem for many species. Habitat fragmentation is also a significant threat resulting in loss of some species as breeding birds in remnant patches of habitat and reduced productivity of those that remain. Chemical, and possibly bacterial and viral, contamination of habitats and food resources impacts some high priority species, particularly on the coast. Recently it has become clear that climate change will likely be one of the most significant threats to wildlife and their habitats in the future. Some of its potential impacts in Georgia are listed below.

A large suite of birds and other wildlife species are threatened by the loss of the longleaf pine ecosystem or other mature, frequently burned pine forests. Restrictions on the management of forests and wetland habitats including thinning and harvest, prescribed fire, and manipulation of water levels threaten the health of habitats and associated species. Human disturbance stresses numerous high priority species including beach nesting birds, migrating and wintering shorebirds, birds utilizing rookeries for nesting, and birds using pre-migration staging areas. Poorly understood threats include anthropogenic causes of mortality including collisions with lighted buildings, communications towers, and wind turbines. Recent changes in federal Clean Water Act protections for small wetlands could also negatively affect many wetland-dependent species. For migratory species, threats may occur outside of Georgia’s physical boundaries such as loss of winter or migratory stopover habitat, poisoning or shooting in countries with fewer protections, collection for the pet trade, or, in the case of pelagic species, conflicts with fishing gear and lighted navigational aids, masts, and other structures on ships.

Climate Change:

While there is a significant amount of uncertainty surrounding the impacts climate change will have on our native species, there are several broad areas of concern. It is likely that a warming

climate will cause the ranges of many species to shift northward, possibly leading to negative interactions with other species or less favorably environmental conditions that affect reproduction and survival. Some species will likely lose a significant amount of habitat because there are spatial and temporal impediments to habitat migration. This may result in dramatic population declines, extirpations, or even extinctions of species. A number of species including, Seaside Sparrow, Saltmarsh Sparrow, and Nelson's Sparrow, have been added to this SWAP bird list specifically because of the threats posed by climate change.

Sea Level Rise

The fact that Georgia's coast is relatively undeveloped and has limited shoreline hardening should allow the coast to migrate and adjust better than the more developed shorelines of other states as sea level continues to increase. However, portions of our coast with beach development and shoreline hardening will likely lose their beaches and developed areas inland may serve as barriers to saltmarsh migration. Another concern is the rapidity with which sea level rise is predicted to occur. Establishment of new beaches and saltmarsh may not be able to keep pace with net loss of these habitats, thereby significantly reducing the amount of habitat available for these highly specialized birds.

Direct impacts: The overall impact on beach nesting birds will depend on the balance between erosion and accretion, and the relative frequency of high tide events. There is evidence that the amplitude of high tide events is increasing at a greater rate than mean sea level rise. This may pose a serious threat to many coastal nesting species, from the seabirds and shorebirds that nest on our beaches to the rails, sparrows, and wrens that nest in our coastal marshes. Tidal inundation already causes numerous nest failures each year among all of these coastal species.

Fresh water impoundments on the immediate coast provide critical fresh water resources to a wide range of species from waterfowl and marsh birds to shorebirds and wading birds. It will be more difficult to maintain these impoundments structurally as sea level continues to rise, and to maintain fresh water in them as salt water invades the river systems.

Indirect Impacts: As sea level rises, and salt water pushes further up our rivers, there will be alterations in coastal habitats that will likely impact breeding and migratory species. A number of priority wading birds, including the Federally Threatened Wood Stork, regularly forage in the intertidal marshes that will likely be impacted as sea level rises. There will also be a retreat upriver of tidal forests as salinity increases.

Trophic asynchrony

Many species of migratory songbirds have been documented returning to their breeding grounds and nesting earlier in the season as the climate continues to warm. There is a concern that the timing of peak bird nesting, and the flush of insects that feed their young, will become asynchronous, leading to lower productivity rates.

Trophic asynchrony is likely much more of a problem in the Arctic, where climate change has been occurring more rapidly than in temperate regions. This would potentially influence several arctic nesting shorebirds that are on Georgia's SWAP bird list, particularly the red knot and

whimbrel. Arctic warming may influence breeding habitat, prey availability, quality, and timing, and potentially shift or alter other ecological interactions.

Range Shifts

As climate warms, it is likely that there will be a northward shift of the range of some species where suitable habitat is available. Georgia's Blue Ridge Mountains provide the southernmost breeding range for a number of species and it is quite plausible that we may lose some of these nesting populations if they shift their breeding grounds northward. SWAP listed species that may move north out of Georgia include Golden-winged Warbler and Cerulean Warbler. Others include Blue-winged Warbler, Canada Warbler, Winter Wren, Veery, Red-breasted Nuthatch, and Brown Creeper.

Ocean Warming

As oceans warm, there is the risk of altering the prey base that supports our coastal birds. Fish die-offs and related seabird colony collapse in the North Pacific have been linked to warming ocean waters. Most evidence on the Atlantic coast at this point is fairly speculative however.

Addressing all of these conservation issues will require a combination of regulatory enforcement, protection through acquisition and easement, appropriate management through management plans, agreements and incentives, technical assistance and advisement to land managers, and outreach to the public. Landowners, land managers, and Georgia's citizens must appreciate not only the value of our natural resources, including birds and other wildlife, but must also be educated as to the threats facing these species and protections and management actions required to preserve these valuable resources.

Research and Survey Needs

Several areas of research and survey have been identified to assist in the conservation of priority bird species in Georgia. These needs fall into several broad categories.

Secretive Species

Some groups of birds, particularly secretive marsh birds and nocturnal species, are poorly understood. Inventory and monitoring protocols for these species should be developed and implemented, and should be compatible with similar efforts in other parts of the Southeast or the species' range. Since the original SWAP was completed in 2005, several survey and monitoring efforts have been initiated for secretive or difficult to detect species. In recent years the Standardize North American Marsh Bird Monitoring Protocols have been used to survey King Rails and Least Bitterns (as well as other species) at several sites. Data from these surveys are compatible with those collected across the U.S. and Canada and can be aggregated with other data to look at population trends at local, regional, national, or continental scales. Surveys for Black Rails are being conducted using protocol developed in the Chesapeake Bay region of Virginia and Maryland. These surveys fit into a larger effort to monitor this species across the Atlantic and Gulf Coasts. Surveys of nightjars, songbirds, and other species are also using standardized protocols which allow the data to be used at regional or national levels.

Productivity

Although distribution and perhaps abundance of many species is fairly well known, productivity in various habitat types and conditions needs further study. The influence of external agents including contaminants, toxins, and pathogens on both survival and productivity are poorly understood for most species. Recent research and survey work in Georgia has addressed issues of nesting success and productivity of Wood Storks at some nest sites, and very recently work on nesting success and productivity was started for MacGillivray's Seaside Sparrow in our saltmarshes.

Management

Management issues in need of further study include the use of fire and the frequency, intensity, and timing of burning to benefit specific bird species. We must also conduct research and monitor responses to determine the influence of management strategies targeting particular species or groups of species such as game birds or endangered species on other high priority species. For example, do frequent burning and use of restrictor plates on cavities, common management techniques for Red-cockaded Woodpecker, affect the habitat quality of mature pine forests for Southeastern American Kestrel and Brown-headed Nuthatch? Do management practices promoted in agricultural landscapes for Northern Bobwhite also provide habitats for breeding and wintering songbirds? How effective are predator control efforts at key beach nesting waterbird sites?

Permitting for offshore energy exploration has already begun. This includes both offshore wind energy development as well as oil and gas exploration. For birds the risks are several. Any offshore infrastructure, especially with lighting that attracts birds, may become a collision hazard. Any spill would affect pelagic as well as near-shore coastal species. Colonial seabirds would be particularly vulnerable to a spill. The coastal support and transport infrastructure required to support offshore energy extraction may also seriously impact coastal habitat.

While the development of renewable energy sources in Georgia, such as solar and wind farms, should be encouraged, there are potentially negative impacts to wildlife from these developments. Siting issues must be very carefully considered to minimize any impacts to birds. Primarily, physiographic features that concentrate migratory birds and bats should be avoided entirely. Other sensitive sites such as wading bird colonies and Bald Eagle nests should be considered in any siting decision as well.

Winter Distribution and Ecology

Surveys of the winter distribution, habitat use, and ecology of high priority birds are needed for Georgia, because our state serves as an important wintering area for resident species and for many species that breed far north of our borders.

Migration

Perhaps one of the most difficult periods to study in the annual cycle of migratory birds, migration is no less important. A statewide survey of spring and fall migrant occurrence, distribution and abundance is needed. In addition, the distribution, quality and spatial characteristics of migration stopover habitat are poorly understood. For migratory species of

birds breeding in Georgia, such as Swallow-tailed Kite, understanding extent and causes of mortality during migration are critical to the long-term health and stability of the population.

Taxonomy

The taxonomy of some bird species needs additional scrutiny and in many cases Georgia may provide significant habitats for distinctive or geographically isolated subspecies such as the Appalachian Yellow-bellied Sapsucker, Southeastern American Kestrel, and Florida Sandhill Crane.

Influences Beyond Georgia

We must also be involved in efforts to understand the population effects of influences that occur outside of our state boundaries and in assisting our international conservation counterparts in seeking solutions for any limiting factors, regardless of where they occur.

Monitoring

It is imperative that we better communicate, coordinate, and share information with other agencies, organizations, and institutions working to conserve our birds. This needs to be done at the state, regional, national, and international levels. Presently some of the national/international coordinated efforts we are participating in include the Breeding Bird Survey, U.S. Nightjar Survey, and International Shorebird Survey. These programs offer central data storage, retrieval, and analysis. We also participate in several other national and regional conservation efforts; however, these are more loosely coordinated and most do not offer a mechanism for central data handling. Coordinated monitoring and data storage for seabirds across the Southeast states should be pursued, since colonial seabirds often move dramatically from year to year, and this would enable us to better understand their status and trends. In cases such as this a shared database would be the best option. The Avian Knowledge Network offers collaborative databases and this network could be used as a central clearinghouse for data storage and dissemination for many of our bird conservation efforts.

Land Conservation

The Satilla River corridor provides some of the most important Swallow-tailed Kite nesting sites in the state, almost all of which are on private lands. Based on the colonial nature of the species, and their site fidelity, protecting known nesting clusters must be one of the highest priorities for the species. This can be achieved through easements, WRP program enrollment, or fee simple purchase. An enormous long-term land conservation need is providing corridors and areas for beach and saltmarsh habitats to mitigate to as sea level rises. This will be one of our greatest conservation challenges in the coming decades.

Outreach and Education

Most wading bird colony sites are on private lands and as such it will be necessary to increase our outreach and education efforts aimed at landowners so that we can effectively work with the landowners to manage these sites. This is also true for Swallow-tailed Kite nesting aggregations as well as for other species. Outreach and education efforts need to also reach out to boaters and beachgoers to aid in protecting beach nesting birds from human disturbance. Campaigns like the

American Bird Conservancy's "Swim, fish, and play from 50 yards away" could be used effectively in these efforts.

Significant 2005 SWAP priority action item accomplishments for birds

GOAL • Assess status of high priority species

1. Assess populations of high priority terrestrial birds in the Coastal Plain (e.g., Swallow-tailed Kite, Southeastern American Kestrel, Painted Bunting, grassland species).

Work with swallow-tailed kites is ongoing. We have been monitoring nests in the Atlantic drainage rivers and expanded survey work westward in the state, which has led to documentation of kite nesting further west and north than previously known. Have participated in multi-state roost surveys to better estimate population numbers and tested use of nesting platforms and vocal and visual lures as a possible way to establish new nesting sites. This was very successful. Initiated nest monitoring program for Southeastern American Kestrels using power poles and nest boxes along major power line corridors. This effort is ongoing. Tracked kestrels using radio-telemetry to define home range and habitat use along these power line corridors and at other sites with nest boxes. Completed a 3-year multi-state breeding season survey of Painted Buntings to assess population size of the Southeast Atlantic population. This survey led to a population estimate that was several times larger than the previous estimate. Used radio-telemetry to define home range and habitat use of breeding Loggerhead Shrikes. Have conducted surveys for Henslow's Sparrows for several years at several sites. At three of these sites we have intensively monitored populations for 5 years including banding birds to aid in developing a population index or estimate as well as other demographics. Conducted surveys for Bachman's Sparrows and Swainson's Warblers on state-owned and leased properties to determine presence/absence as well as numbers on occupied sites. Assessed the effects of clearcut size on use of clearcuts by Bachman's Sparrows during the breeding season on private industrial forest lands.

2. Conduct aerial surveys for federally listed birds (Bald Eagle nesting surveys; Wood Stork nesting and roosting surveys).

We have conducted annual Wood Stork nest colony flights at least once, and often twice, each year to determine numbers. Several colonies (usually 9-12) are monitored for productivity. Low altitude photography is used in conjunction with visual counts to estimate numbers. Annual nest surveys for Bald Eagles have been conducted every year. Surveys include a flight in January to determine whether nests are active and to locate new nests. The second survey, flown in March, documents nesting success and productivity. Since Bald Eagles are no longer federally listed and have been increasing in number every year since the surveys started we may consider down-scaling these survey efforts in the future.

3. Conduct midwinter waterbird survey and Piping Plover winter survey; conduct research and surveys on Southeastern Red Knot and Whimbrels; investigate American Oystercatcher ecology and demographics

Continue to conduct mid-winter waterbird and Piping Plover survey annually. Have expanded shorebird efforts to include the International Shorebird Survey. Support Virginia Tech with

more frequent Piping Plover surveys. Conducted or supported 2 intensive Red Knot band resighting efforts, with more planned. Satellite tagged 8 Whimbrels in Georgia to track movements to breeding grounds. Most used Hudson Bay, but we did confirm a link to the Mackenzie River Basin population. Also documented routes traveled by birds in fall to wintering areas, including some interesting interactions with severe weather (e.g. hurricanes) and some key wintering sites were discovered. Discovered that some Whimbrels were killed by hunters in the Caribbean, a source of mortality not widely recognized previously. Continue to conduct annual nesting population survey of American Oystercatchers. Studies of incubation and effects of predator control are being conducted on oystercatchers as well. In addition, counts of wintering oystercatchers have been done as a part of a larger Atlantic Coast effort.

4. Expand Breeding Bird Survey routes

The number of breeding bird survey routes has been increased to 96, with approximately 72-75 being run annually. Significant effort has been made to recruit new observers and this effort will continue in the future.

GOAL • Conserve high priority habitats

5. Continue cooperative management for Golden-winged Warbler and other species requiring mid- to high-elevation early successional habitats in the Blue Ridge

A substantial amount of habitat for Golden-winged Warblers was created at Brawley Mountain on the Chattahoochee National Forest by the U.S. Forest Service, with DNR assistance, using logging and prescribed fire. Unfortunately, this habitat creation was delayed for several years due to an environmental group's concerns and few Golden-winged Warblers remain at this site.

GOAL • Conserve high priority species

6. Continue Waterbird Conservation Initiative

Have been heavily engaged in this initiative conducting surveys, monitoring, research, and habitat management related to seabirds, shorebirds, and wading birds. Managed vegetation encroaching on sand spit islands and other beach habitats using prescribed fire, herbicides, dredge spoil deposition, and other tools to create or preserve and enhance nesting and roosting habitat for colonial waterbirds and shorebirds including Least and Gull-billed Terns, American Oystercatchers, and many other species. Worked cooperatively with the Game Management Section to create and maintain shorebird habitat at Altamaha WMA. Have implemented predator control to eliminate coyotes on barrier islands, where they can essentially reduce most beach nesting bird productivity to zero, as well as control of other predators that affect productivity such as feral hogs and raccoons. Worked with the U.S. Army Corps of Engineers to construct and manage an artificial island in Brunswick Harbor for waterbird and shorebird nesting.

7. Implement Red-cockaded Woodpecker conservation on private lands

Have successfully translocated Red-cockaded Woodpeckers to Joseph Jones Ecological Research Center, a private research facility, and to The Nature Conservancy's lands at Moody Forest WMA. Worked with quail plantation owners in the Red Hills region using Safe Harbor to assure these private lands are properly managed to provide habitat for RCWs.

8. Update State-protected species list and work with partners to improve management for these species.

State Protected Species List was updated in 2008. Have been working with numerous partners to improve management of these species. Recommendations on status changes for some species on this list were developed during our SWAP bird list revision meetings.

GOAL • Improve environmental education and outreach

9. Develop technical educational materials (e.g., Georgia Breeding Bird Atlas, revised natural community classification system)

Georgia Breeding Bird Atlas published in 2010. Species accounts for birds on the state protected species list placed on the Wildlife Resources Division website for use by biologists, consultants, researchers, and the general public.

GOAL • Improve public land management

10. Establish or augment populations of gopher frog, striped newt, gopher tortoise and other high priority species on protected lands (Red-cockaded Woodpecker is mentioned in description, but not specifically in the conservation action).

Have translocated 116 Red-cockaded Woodpeckers from lands with surplus birds to Joseph Jones Ecological Research Center, Moody Forest WMA, and Silver Lake WMA. The Red-cockaded population at the Jones Center had been extirpated. With translocation effort there are now approximately 29 active RCW clusters. Moody Forest was down to a single bird prior to translocation efforts there. Now there are several birds in one or two clusters. The number on Silver Lake went from five family groups (clusters) to 25 clusters with translocation efforts.

11. Manage and monitor coastal bird islands to conserve populations of beach-nesting birds.

Regularly monitor all of these sites for nesting seabirds and shorebirds. Managed vegetation on sand spit islands and other beach habitats, control predators where needed.

GOAL • Increase capacity for wildlife conservation

12. Improve biodiversity databases and increase data-sharing with conservation partners

Have shared Breeding Bird Atlas database with Patuxent Wildlife Research Center in their effort to assemble a database containing as many breeding bird atlas datasets as possible. Continue to add bird records to the Biotics conservation database.