Handbook for Nongame Bird Management and Monitoring in the Southeast Region

U.S. Fish and Wildlife Service
Southeast Region

United States Department of the Interior
FISH AND WILDLIFE SERVICE
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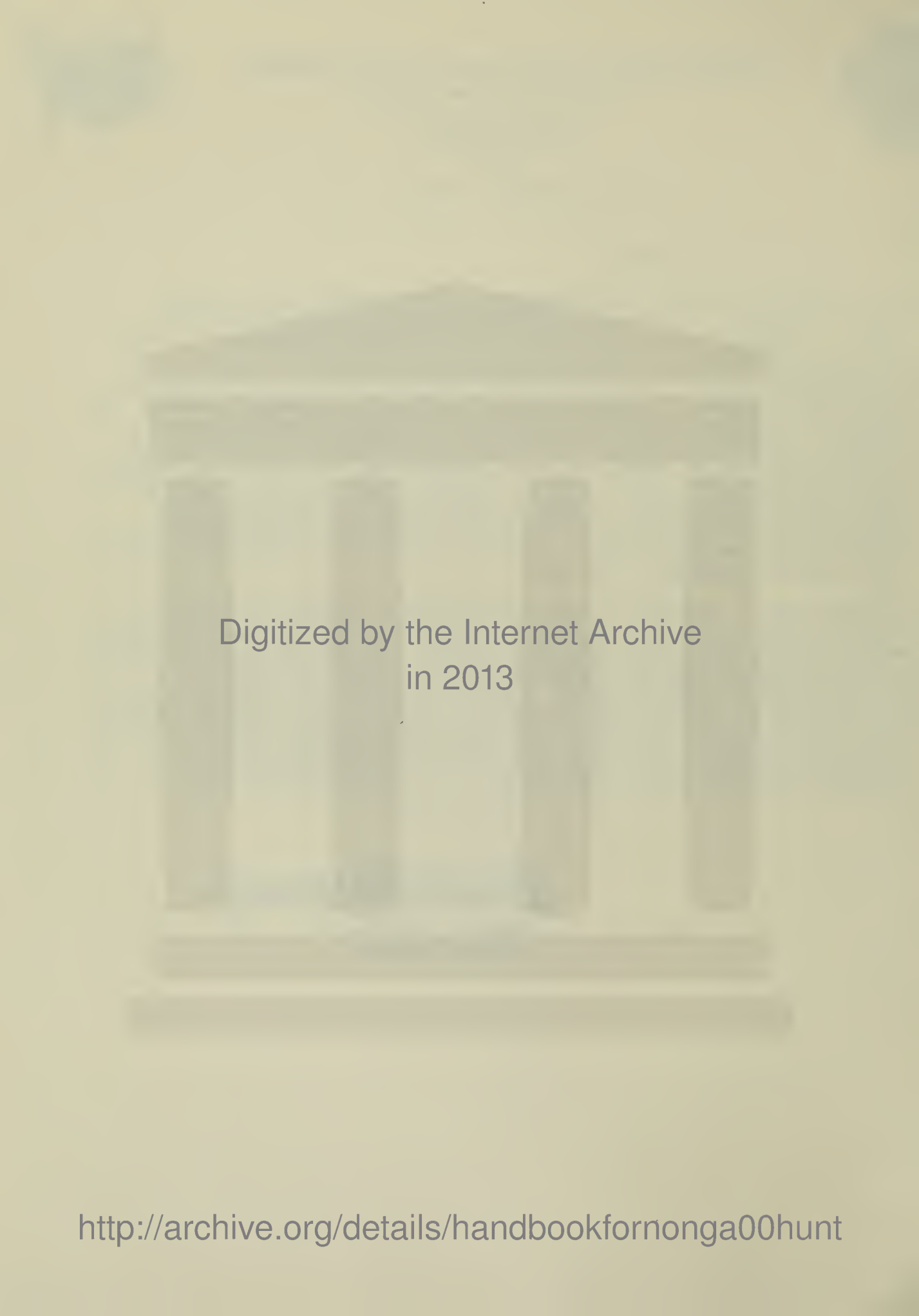
To the Users of this Handbook:

The "Handbook for Nongame Bird Management and Monitoring in the Southeast Region" (Handbook) is a product of the U.S. Fish and Wildlife Service's (Service) Southeast Region and reflects our continuing commitment to protect and manage the diversity of migratory bird species within our jurisdiction. The Handbook serves to highlight concerns over the status of various species and groups of species of nongame migratory birds and to suggest management and monitoring techniques that are intended to understand and enhance these species. In addition to Service activities, the Handbook is intended to be used by other Federal, State, and local organizations and by private citizens to provide benefits to the diversity of nongame migratory birds occurring within the Southeast Region. Finally, this document provides for better understanding of where potential management conflicts involving nongame migratory birds may occur when an agency or organization is striving to reach other priority management objectives.

The first step in avoiding or resolving management conflicts is greater awareness of the needs for a variety of nongame migratory bird species and to understand what actions may constitute conflict. As the user will note, some of the management suggestions addressing known concerns are subject to revision based on future research. However, I strongly encourage all users of this Handbook to consider these management suggestions and to become familiar with nongame migratory bird needs when formulating management plans or planning other actions. We hope to revise this Handbook periodically, so your thoughts and suggestions for improvement will be greatly appreciated.

Sincerely yours,

James W. Pulliam, Jr.
Regional Director



Handbook for Nongame Bird Management and Monitoring in the Southeast Region

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HANDBOOK FOR NONGAME BIRD MANAGEMENT AND
MONITORING IN THE SOUTHEAST REGION

U.S. Fish and Wildlife Service

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INTRODUCTION

Widespread interest in nonconsumptive wildlife resource management has increased tremendously during the 1970's and 1980's. This interest is reflected in the Fish and Wildlife Conservation Act of 1980, as amended, which encourages Federal agencies and States to conserve all nongame vertebrate species. In addition, all States have established natural heritage diversity inventories and many have initiated aggressive nongame or "watchable wildlife" programs. The lead Federal agency to implement nongame bird conservation and management is the U.S. Fish and Wildlife Service (Service).

Preventing migratory birds from becoming threatened species is a primary goal of the Service (U.S. Fish and Wildlife Service 1980, 1987). The Service is also required to monitor and take effective action for maintaining or enhancing species that are candidates for listing under the Endangered Species Act of 1973, as amended. In a related mandate, the 1988 amendments to the Fish and Wildlife Conservation Act specifically require the Service to set management and monitoring objectives for nongame birds.

The Service's Office of Migratory Bird Management has issued several documents that enhance development of a nongame bird management program focusing on research and management opportunities within the Service (U.S. Fish and Wildlife Service 1980, 1987, 1988). This Handbook builds on the national perspective and provides resource managers with basic information on species of Regional concern, research and management ideas using existing programs and policies, and the identification of important habitats that harbor these species within the Southeast Region. This information is intended to be used by Service personnel in carrying out management beneficial to nongame birds on refuges managed by Refuges and Wildlife and hatcheries managed by Fisheries. Similarly, this information is for Service personnel in the Fish and Wildlife Enhancement and Federal Aid in providing recommendations to cooperating local, State, and Federal agencies whose actions involve nongame bird issues and management.

The development of Regional nongame bird management and monitoring objectives for the Service provides preliminary guidance toward addressing management concerns on the health of nongame migratory birds that are not protected through the Endangered Species Act. Both species and habitat values are outlined in this Handbook. Hopefully, the combination will allow for effective management and early alerts for both detected population declines and significant changes to and losses of various habitats.

Organization of the Document

The Handbook is organized into five major parts:

(1) Introduction

(2) Description of concepts, techniques, legislation, programs, policies,

(3) Description of species of Regional concern

(4) Description of management problems, opportunities, and suggestions for broadly-defined habitats, and

(5) Attachments addressing Service activities involving nongame birds.

The structure of the Handbook allows for rapid review of major concepts, programs, and policies through the outline narrative. Detailed information is treated for broadly-defined habitats through tables that list all southeastern bird species, with brief ecological and management notes, likely to be affected by management in each habitat. Specific information on species of Regional concern is treated through species accounts and habitat tables. Finally, attachments include information on the Service's role in nongame bird management, a proposed program outline based on "Nongame Bird Strategies" (U.S. Fish and Wildlife Service 1988), and activities conducted on Service lands in the Region during 1988.

Federal threatened and endangered species are not considered directly in this Handbook. These species and their protection and management concerns are addressed in detail in recovery plans developed by the Service for each species. Setting objectives in management and research of nongame species would encourage active management of these species so that listing under the Endangered Species Act may not be necessary in the future. Some instances where endangered species management enhances other nongame bird species are addressed in this Handbook to point out opportunities for indirect management through the Endangered Species Act. Most waterfowl are also not considered in this Handbook. However, the goals set for the North American Waterfowl Management Plan/Joint Venture and Farm Act Conservation Reserve Program can greatly benefit many nongame birds through wetland protection and enhancement.

Several criteria were used to develop the prioritized list of Regional concern species. First, three nationally derived lists were consulted for species occurring within the Southeast Region. The Service's "Endangered and Threatened Wildlife and Plants; Animal Notice of Review" (50 CFR Part 17, January 6, 1989) identifying candidate species being considered for listing under the Endangered Species Act was the most important source consulted. The next most important source was the "Migratory Nongame Birds of Management Concern in the United States: The 1987 List" developed from Breeding Bird Survey trend analysis in combination with other quantitative and qualitative

data bases (U.S. Fish and Wildlife Service 1987). Finally, "The Blue List for 1986" published by the National Audubon Society was consulted as it serves as an early warning system to population declines and is based on solicited opinions from birdwatchers, researchers, and wildlife managers throughout the United States (Tate 1986). The legal and management status for each species was combined with the extent of their distribution covered by the Southeast Region to develop the final list of species of Regional concern.

As with any prioritized list, there will be differences of opinion on which species should be added or deleted and where species rank in priority. Also included is an auxiliary list of other species that were considered for the Regional concern list but were not warranted for inclusion at present. In some areas within the Southeast Region, species with very local distributions may be of greater management concern than those listed here as Regional priority species. This may be particularly so for Puerto Rico, the Virgin Islands, and South Florida. For this reason, each Service field station is encouraged to develop their own list of species that includes those of Regional concern as well as those of very local distribution occurring within their work area.

The highest priority species are treated in greater detail with species accounts. Each species account illustrates known and potential distribution and provides a synopsis of description, habitat use, reasons for concern, recommended management, and research needs. Service personnel should strongly consider the management, biology, and habitat needs of these highest priority species in all work activities.

Although highlighting species of Regional concern allows for greater awareness of nongame bird issues, most management opportunities will be at the habitat level rather than at the species level. Generalized management problems, opportunities, and suggestions for each broadly defined habitat provide some guidance on habitat management concepts geared towards nongame birds. Each narrative for broadly-defined habitat is accompanied by a habitat table.

Habitat tables provide specific information for all regularly occurring species within the Southeast Region in each habitat, respectively. This information includes:

(1) legal and management status for the bird species,

(2) residency and distributional status for each species,

(3) notes on specific habitat requirements, and

(4) suggestions for consideration when managing or reviewing action(s) that impact the habitat(s) each species occurs in.

Data and information found in species accounts and habitat tables should be applied when possible during management and coordination activities. The species accounts and habitat tables should assist Service personnel by providing information in conducting day-to-day activities as well as benefitting the species treated here. Each field station should develop its own management and research priorities based on the species and habitats occurring within its jurisdiction. In addition to applying management guidelines presented in this Handbook, users are encouraged to develop specific research need proposals as part of their annual research needs and project assessment for budget development purposes. More detailed guidelines will be prepared as additional information is attained and as the Nongame Program develops. Comments on this Handbook are encouraged and appreciated.

Acknowledgements

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MANAGEMENT AND ECOLOGICAL CONCEPTS, MONITORING TECHNIQUES, AND EXISTING LEGISLATION AND PROGRAMS

I. Management and ecological concepts. Some of the newest, most controversial, and often misunderstood concepts in conservation biology are briefly treated here and are presented for consideration by managers. The manager must judge whether any or all of these concepts are applicable on a case-by-case basis, given the specific management objectives.

A. Maintenance of biotic diversity.

1. Biodiversity can be best defined as a full complement of the native plant and animal species occurring in their natural or normal patterns of abundance. Often, maximizing number of species (richness) and species diversity are equated to maximizing biodiversity. This is not the case and the distinction is important.

2. Maximizing biodiversity does <u>not</u> mean having a high diversity of habitat types to attract high numbers of species on a small spatial scale at the expense of area-sensitive or habitat specific species. Attention should be given to minimum area requirements necessary to support viable populations of all species potentially occupying any particular habitat when it is desired to maximize biodiversity.

3. Maximizing biodiversity may not always be practical or desired. However, it may be still possible to increase species richness and species diversity, or specialize on a particular group of species (i.e., waders, shorebirds, forest-interior species). Whatever the management objective, managers should consider land-use patterns, both within and beyond the management unit, and the normal patterns of abundance for species using the available habitats. Special care should be taken to not unnecessarily reduce habitats used by species or groups of species showing widespread patterns of decline or instability.

B. Minimum areas to support viable populations.

1. As general guidance and when compatible with other management objectives, consider managing habitats for the needs of the most area-sensitive or rarest regularly occurring species rather than increasing species diversity at a small scale as mentioned in I.A.2.

2. Many forest-interior species typically require larger areas to support viable populations than are necessary for more open-country species.

3. Forest reserves with thousands of acres of contiguous habitat are likely to maintain most area-sensitive and rare species. Smaller forests may support some area-sensitive species if several habitat needs are satisfied or if small forests are in the vicinity of large forests (Robbins et al. 1989).

C. Edge-effects, especially involving forest-interior species.

1. Creating edges can increase habitat values for many forest birds at a very small scale. However, over indulgence in maximizing edge has been extremely deleterious to habitats supporting forest-interior species (Harris 1988, Temple and Cary 1988).

2. The smaller the forest tract relative to surrounding open habitat, the higher the probability is of typical edge species penetrating into the forest, thus increasing rates of brood parasitism and nest depredation affecting forest-interior species (Ambuel and Temple 1983).

D. Source and sink habitats for populations.

1. Source habitats are defined as supporting a population that produces young in excess of that necessary to maintain the population.

2. Sink habitats are defined as supporting a population where within-habitat reproduction is insufficient to balance local mortality.

3. Populations in sink habitats may appear stable and persist despite depressed reproduction due to continued immigration from more productive source habitats.

4. It is theoretically conceivable, indeed likely, that some sink habitats consisting of large numbers of breeding adults can be supported by source habitats consisting of relatively few breeding adults (Pulliam 1988). Thus, the preferred habitat of a species may not be the habitat with the highest number of individuals.

5. A major management implication in landscape ecology is that without an understanding of relative reproductive success among habitats/populations, population-management decisions based on studies in sink habitats may lead to serious errors. For example, 90 percent of a population may occur in one habitat where the relative abundance of breeding adults may lead to a conclusion that destruction of a nearby alternative habitat would have little impact on the population. However, if the former habitat were a sink and the alternative a source, destruction of the relatively small source habitat could lead to local population extirpation (Pulliam 1988).

6. What is a sink habitat for one species may be a source for other species. Thus, within a diversified hardwood forest, for example, consisting of many different tree species, there may be a number of co-occurring bird species found throughout the forest. However, the most successfully reproducing individuals for each species may be keying into different subdivisions of the habitat. Elimination of some habitat variable (e.g. select cutting of one tree species) may therefore eliminate one or more of the species co-occurring throughout the forest, but not other species. Also reduction in size of a diversified forest may unintentionally eliminate a habitat variable responsible for supporting an area-sensitive species even though the perceived habitat quality is similar on a smaller spatial scale.

E. Effects on "wintering grounds, especially those of tropical habitat conversion on neotropical migrants breeding in North America.

1. Morton and Greenberg (1989), Keast and Morton (1980), Terborgh (1989), and many others argue that declines observed in many long-distance migrant, forest-interior species in North America may have as much or more to do with tropical habitat conversion as with breeding habitat fragmentation. They support this argument by demonstrating that many species are more specialized in their foraging behaviors in the tropics than they are on their breeding grounds. Also, males and females of many species are segregated and ardently defend winter territories individually with different habitat characteristics within tropical habitats.

2. Morton and Greenberg (1989) and Terborgh (1989) further argue that setting a dichotomy on management between breeding habitats in North America and non-breeding habitats in the tropics is unjustified. The full annual cycle of a species should be considered when setting management objectives as negative effects taking place in both breeding and non-breeding seasons are cumulative.

3. Any management regime on the breeding grounds should take into account what may be happening during the non-breeding season. Patterns of perceived habitat specialization on the breeding grounds may be caused by problems during the non-breeding season. This statement applies to all nongame birds, not just neotropical migrants.

F. Contaminant effects on bird populations.

1. The role pesticides has had in heightening awareness of our environment is well-documented. However, environmental contamination remains an insidious and difficult to document phenomena and continues to be a serious problem for many nongame bird species.

2. Pesticide accumulation (DDT and its breakdown products), lead poisoning (from lead shot), botulism, cholera, mercury poisoning, and selenium poisoning (from irrigation run-off among other sources) are among the most well-documented examples of persistent contamination problems with birds. Less obvious water quality issues involving pH (acid-rain), salinity, and dissolved oxygen also may have serious indirect effects on food supply, habitat condition, and health of individual birds.

3. The effects derived from environmental contamination during migration and winter may not be obvious until the following breeding season. Species such as neotropical migrants, including both shorebirds and landbirds, are especially susceptible to contaminants during the non-breeding part of their annual cycle. These species are exposed in the tropics to continuing application of DDT and other pesticides now banned in the United States. Some species undergoing declines in the face of "increasing" habitat may be subject to environmental contamination or disease.

II. Monitoring techniques. Long-term survey methods used to determine population trends; participation in and use of data for each method is encouraged for all personnel to satisfy management needs - Office of Migratory Bird Management, Patuxent Wildlife Research Center, Regional Nongame Coordinator serve as contacts for detailed information on techniques (Wells 1990).

A. Breeding Bird Surveys (Robbins et al. 1986) - through Office of Migratory Bird Management. Consists of 2,000 roadside routes with 50 3-minute stops, 0.5 miles apart, mostly conducted during June. This is the most important survey for tracking trends in breeding birds that are detectable from roadsides.

B. Christmas Bird Counts (Root 1988) - through National Audubon Society (950 Third Avenue, New York, NY 10022) with data managed by Cornell Laboratory of Ornithology (159 Sapsucker Woods Road, Ithaca, NY 14850). Consists of over 1,500 15-mile diameter circles with one 24-hour period for coverage, conducted in late December. Most important survey tracking trends in all winter birds.

C. Breeding Bird Census (Engstrom 1989) - through National Audubon Society with data managed by Cornell Laboratory of Ornithology. Consists of varying numbers of censuses of uniform plots of land, usually between 25 and 150 acres in area, repeatedly visited from April through July, depending on latitude. Important in determining use patterns of specific habitats and changes through time at specific locations.

D. Winter Bird-Population Studies (Engstrom 1989) - through National Audubon Society with data managed by Cornell Laboratory of Ornithology. Similar in format and technique to Breeding Bird Census with repeated visits conducted from December through February.

E. Breeding Bird Atlas Projects (Laughlin et al. 1982, Butcher and Smith 1986) - through Cornell Laboratory of Ornithology. Atlas projects have been started or completed in 29 states and consist of documenting, either by county or by latitude-longitude blocks, the distribution of all breeding species. This information is useful for identifying important habitats for land-use planning and effects of human activities on bird distributions.

F. Colonial Waterbird Surveys - through National Wetlands Research Center and Patuxent Wildlife Research Center, and Office of Migratory Bird Management. Consists of monitoring colonial waterbird breeding populations (gulls, terns, waders) principally on Service lands including those on the Atlantic and Gulf coasts. Conducted at intervals of several years, as funds are available.

G. Colonial Bird Register - through Cornell Laboratory of Ornithology. Serves as a national repository of location and status of all known waterbird colonies (primarily concentrates on beach nesting species such as gulls and terns).

H. International Shorebird Survey (Howe et al. 1989) - through Manomet Bird Observatory, Manomet, MA 02345. Consists of coordinating a network of observers surveying shorebirds at important migration stopover sites. Data used to develop information on population trends of some species.

I. Western Hemisphere Shorebird Reserve Network (Myers et al. 1987) - through National Audubon Society, for more information write 550 S. Bay Avenue, Islip, NY 11751. Uses survey data from coastlines and other areas to identify lands with potential for providing shorebird conservation (foraging and staging areas) during migration and winter. These lands would be included in the Network, which serves to coordinate the amount of habitat protected and appropriately managed for shorebirds. National wildlife refuges with present and potential shorebird use could be included and appropriate management of water levels to accommodate migratory shorebirds would be encouraged.

J. Raptor Migration Counts - through Hawk Migration Association of North America (Hawk Mountain Sanctuary Association, Route 2, Kempton, PA 19529). Consists of seasonal counts of known locations where migrant raptors concentrate during their passage. Mostly conducted in the Northeast and Midwest Regions; however, there is room for expansion in the Southeast Region. Data useful for tracking raptor population trends nationally.

K. Pelagic Bird Surveys (Lee 1986) - sponsored by National Wetlands Research Center and conducted through the North Carolina Museum of Natural History (P.O. Box 27647, Raleigh, NC 27611). Consists of systematic counts of pelagic species off the Mid-Atlantic Coast to the Gulf Stream.

L. Beached Bird Surveys (Simons 1985) - locally conducted and designed to provide baseline data on mortality rates so that impacts of catastrophic events such as oil spills can be quantified as indicated by dead or dying birds on beaches.

M. Bird-Banding - through Bird Banding Laboratory, Office of Migratory Bird Management. The laboratory serves as a centralized storage facility for bird-banding data, which is the principal means to determine migration routes and wintering areas for various breeding populations. Many basic research projects nationally and internationally depend on banding birds for data.

N. Feeder Counts - through Cornell Laboratory of Ornithology. Consists of a nationwide survey tracking birds numbers using backyard feeders and serves as an important part of any Urban Wildlife Program.

O. Nest Record Card Program - through Cornell Laboratory of Ornithology. Exists as of a repository for nest data for all species. Data (not computerized) for analysis and cards for data submittal available upon request.

III. Major existing legislation and programs that could directly or indirectly benefit nongame birds.

A. Federal legislation directly involving the Service.

1. Lacey Act of 1900 - today, gives the Secretary of the Interior (Secretary) the authority to conserve and restore bird species, regulate import of foreign wildlife, and prohibit interstate commerce of wildlife killed in violation of State laws.

2. Migratory Bird Treaty Act of 1918 - implemented the "Convention for the Protection of Migratory Birds" of 1916, between the United States and Great Britain (on behalf of Canada). Today, this act gives the Secretary responsibility to regulate hunting of gamebirds, prohibit the take of any migratory bird except as permitted, and prohibit shipment or export of all migratory birds or their eggs except as permitted. Other similar treaties are with Mexico (1936), Japan (1972), and the Soviet Union (1976).

3. Migratory Bird Conservation Act of 1929 - created the National Wildlife Refuge (Refuge) System, primarily to meet obligations to protect migratory birds pursuant to the Migratory Bird Treaty Act of 1918.

4. Migratory Bird Hunting (Duck) Stamp Act of 1934, as amended - provided a means for financing wetland acquisition for refuges by requiring the purchase of a stamp for all waterfowl hunters ages 16 or older.

5. Fish and Wildlife Coordination Act of 1934, as amended - originally authorized development of migratory bird resting and nesting areas on waters newly impounded by Federal agencies and allowed another avenue to establish refuges. Through various amendments, particularly in 1958, the scope of this act was broadened to give fish and wildlife equal importance and, therefore, consideration in water resource planning and construction. Thus, the Service serves an important role in providing Coordination Act Reports that assess impacts to fish and wildlife resources and that can include specific concerns over impacts to nongame birds.

6. Federal Aid in Wildlife Restoration (Pittman-Robertson) Act of 1938, as amended - established a grant-in-aid funding source for States to conduct wildbird and mammal projects including land acquisition, management, planning, surveys, research, development, and hunter education. Most funded projects are for game species, but nongame projects are not excluded from consideration.

7. Federal Aid in Fish Restoration (Dingell-Johnson) Act of 1950 - established a grant-in-aid funding source for States to conduct sport-fish projects that can indirectly benefit nongame birds through wetland acquisition and management.

8. Sikes Act of 1960, as amended - authorized the Service to work cooperatively with States for developing wildlife and fishery management plans on lands managed by the Forest Service, Bureau of Land Management, Department of Defense, and Department of Energy. Section 203 allows for States to collect user-fees on public lands to provide habitat conservation and rehabilitation. Establishing user-fees based on or through Section 203 should be considered for developing nongame directed management plans on public lands.

9. Wetland Loan Act of 1961 - allowed financing (through intragovernment loans) for wetland acquisition upfront to eventually be repaid by duck-stamp revenues; repayment by duck-stamp revenues was repealed by the Emergency Wetland Resources Act of 1987.

10. Fish and Wildlife Act of 1956 - authorized Secretary to acquire refuge lands for all forms of wildlife including nongame and, later, endangered species.

11. Land and Water Conservation Fund Act of 1965 - established a fund to preserve, develop, and assure accessibility to outdoor recreation resources. Includes funding for land acquisition pursuant to Fish and Wildlife Act of 1956, and includes land acquisition for Park Service, Forest Service, as well as Fish and Wildlife Service.

12. National Wildlife Refuge System Administration Act of 1966 - authorized the Secretary to permit a variety of human uses on refuges as long as they are compatible with the basic purpose of the refuge. Among activities allowed are those for nonconsumptive recreation that in turn, and more importantly for nongame, resulted in greater emphasis on education through interpretive displays and visitor centers regarding natural resource management.

13. National Environmental Policy Act of 1969 - requires all Federally supported actions to fully consider environmental effects of the proposed action (preferred alternative) and all alternatives and to allow public and agency comments, including comments considering nongame needs.

14. Endangered Species Act of 1973, as amended - allows for many actions beneficial to nongame birds including indirect protection of habitats where a listed species occurs (Section 7), requirements to assess regularly the status of all candidate species (Section 4), and funding to study candidates and develop recommended management guidelines to actively conserve species before they require protection through listing (Section 6, includes funding mechanisms to States).

15. Clean Water Act of 1977 and Rivers and Harbors Act of 1899 - together authorizes (Section 404 and Section 10, respectively) the U.S. Army Corps of Engineers to review and permit any construction, dredge, and fill activity within waters of the United States that include navigable waters and jurisdictional wetlands. The Service provides comments and recommendations through Fish and Wildlife Coordination Act Reports, which must be considered prior to permitting any activity. Comments, when appropriate, should include concern for nongame birds and management/mitigation activities necessary to reduce or eliminate impacts form the proposed action.

16. Fish and Wildlife Conservation (Nongame or Forsythe-Chafee) Act of 1980, as amended - provided encouragement to States and Federal agencies to address conservation of nongame wildlife. The major focus of this act is to provide grant-in-aid funding to States when they prepare conservation plans and submit project proposals in accordance with those plans. Unlike other grant-in-aid programs, this act is to be funded through general appropriations from the Department of the Treasury. Funds have yet to be appropriated by the Executive branch. The 1988 Mitchell amendment highlighted conservation of nongame migratory birds by reaffirming the responsibility of all Federal agencies, and the Service's obligations to lead, in the protection and conservation of all bird species.

17. Coastal Barrier Resources Act of 1982 - authorizes the Secretary to recommend additions of coastal areas to the Coastal Barrier Resources System that, if included, would remove some Federal subsidies and incentives for development and wetland destruction. Over 700 miles of undeveloped coastal barriers and associated wetlands on Atlantic and Gulf Coasts are included. The Service, through Section 6 consultation, reviews proposed Federal actions for their compliance with the purposed of wetland protection that also protects nongame birds.

18. Food Security Act (Farm Bill) of 1985 and Agricultural Credit Act of 1987 - allows for numerous opportunities to protect, restore, and rehabilitate wetlands (including bottomland hardwoods) on both Federal inventory lands and privately owned farmlands. In some cases, farmers defaulting on Federal loans can restructure their debt, at least partially, by agreeing to a conservation easement for their wetlands. In other cases, when title to property has been conveyed to the Farmers Home Administration, wetlands and floodplain are protected by conservation easements prior to resale of their property or, in special cases, through a fee title transfer to a conservation agency such as the Service or State fish and wildlife agency. Also, farmers applying for or presently under loans and subsidies cannot grow crops within wetlands unless they were converted to nonfunctional wetland prior to 1985. Violations of this sort are referred to as "swampbusting." A farmer found swampbusting would be denied all Department of Agriculture benefits on all farmlands (including upland) subject to Federal financial assistance programs. Finally, financial incentives are given to farmers voluntarily implementing conservation recommendations by managing their wetland property with approved conservation practices under the Conservation Reserve Program. All of these activities have great potential for nongame birds, especially in providing protection for riparian zones, bottomland hardwoods, emergent wetlands, and other important wetland or floodplain habitats.

19. Emergency Wetlands Resources Act of 1986 - provides for intensifying protection of wetlands by increasing admission fees to certain refuges and increasing duck-stamps price to $15.00, establishing a new Wetlands Conservation Fund to acquire priority wetlands, and accelerating the completion the National Wetlands Inventory (including trend analysis), among other actions.

B. Federal legislation principally involving other agencies.

1. National Park System Organic Act of 1916 - created the National Park Service "to conserve the scenery and natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will

leave them unimpaired for the enjoyment of future generations." In addition to national parks, seashores, recreation areas, preserves, parkways, and monuments, the Park Service conducts research on a number of endangered species and on mechanisms to restore the Everglades natural system.

2. Multiple Use - Sustained Yield Act of 1960 - required that the U.S. Forest Service consider fish and wildlife conservation objectives along with other uses in addition to maximizing timber products.

3. Wilderness Act of 1964 - established on Federal lands (including those managed by the National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, and Bureau of Land Management) a system of protected wilderness areas where management emphasis is on preserving the natural ecological character of the area. Nominations include land masses that are roadless, of at least 5,000 acres, and all roadless islands of any size. Wilderness designation maintains habitat values for benefit of many wildlife populations, especially nongame, by reducing the potential for conflicting management needs.

4. Water Bank Act of 1970 - allowed the Department of Agricultural to sign 10-year conservation agreements giving farmers annual payments (subsidies) to maintain wetlands and waterbodies on their properties. Protection of migratory waterfowl along with other benefits to protecting wetlands were included as purposes.

5. Marine Protection Research and Sanctuaries Act of 1972 - allows the Secretary of Commerce to designate areas as sanctuaries through Title III that are important to marine environments, including land masses where marine mammals and pelagic birds breed.

6. Forest and Rangeland Renewable Resources Planning Act of 1974 - required the U.S. Forest Service to prepare comprehensive assessments of present and anticipated uses, demand for, and supply of renewable resources from both public and private forests. Wildlife represents one of the highest priority resources and nonconsumptive/nongame issues are gaining momentum in the Forest Service planning process.

7. National Forest Management Act of 1976 - directed the Secretary of Agriculture to develop regulations describing the development and revision of land-management plans for each national forest as originally mandated in the Forest and Rangeland Renewable Resources Planning Act. Fish and wildlife resource issues addressed in each plan were require to include limitations on clear-cutting and size and extent of even aged timber stands, provisions for plant and animal diversity, restrictions against timber harvesting that seriously affects watershed integrity, consideration of wildlife habitat in planning, and the

designation and monitoring of indicator species (including both game and nongame species) in assessing response to various forest prescriptions. Also, amendments to the Knutson-Vandenberg Act of 1930, included in the National Forest Management Act, allowed financing protection and improvement of fish and wildlife habitat in the area of timber sales with funds provided by the purchaser of the sale.

8. Forest and Rangeland Resources Research Act of 1978 - consolidated research activities to compliment planning efforts for the U.S. Forest Service. Research efforts include fish and wildlife resources, involving studies on game, nongame (sensitive), and endangered species through Forest Service Experimental Stations. In the Southeast, Forest Service wildlife oriented research focuses on old-growth management, certain endangered species, and management indicator species.

C. Federal agencies, programs and plans not covered by A and B.

1. Environmental Protection Agency - has veto power over any permit issued by the U.S. Army Corps of Engineers involving the alteration of wetlands. The Agency, therefore, can protect wetlands, which often include bottomland hardwoods (Clean Water Act of 1977, Section 404(c)). Also, the Agency oversees approval of chemicals that are used as pesticides and is the primary agency involved with regulating hazardous waste management.

2. U.S. Army Corps of Engineers - in addition to its regulatory authority, this is the primary agency involved with Federal water projects in the Southeast. These projects include the operation and construction of dams and reservoirs, as well as channelization and dredging of rivers, beach restoration, major flood control projects, and construction of levees and jetties. All these activities have potentially serious impacts on wetlands, including entire estuarine and riverine systems. Each of these projects are subject to review and comment through National Environmental Protection, Fish and Wildlife Coordination, Coastal Barrier Resources, and Endangered Species (when listed species are present) Acts.

3. Tennessee Valley Authority - operates and regulates water and natural resources associated with the Tennessee River and its tributaries. Most activities are as described in C.2. but with greater emphasis on wildlife and fisheries. Some of the Authority's activities involve wetland restoration and these should be closely monitored for increasing use by nongame water and shorebirds.

4. Soil Conservation Service and Agricultural Stabilization and Conservation Service - are agencies within the Department of Agriculture that provide technical assistance to landowners on prevention of soil erosion and financial assistance (loans and subsidies) to stabilize farmlands, respectively. Subsidies and technical assistance for the purpose of draining wetlands are being eliminated, with some exceptions. Also, the Soil Conservation Service is charged with delineating wetlands under the swampbuster provision of the Farm Act.

5. Departments of Defense and Energy - operate installations and reservations that involve forestry and wildlife management. These areas have been managed principally for game and timber production with little attention given to nonconsumptive resources and nongame species. Recently however, many installations have realized the importance of managing wildlife in general and endangered species in particular. Other nongame species should also benefit with opportunities existing through the Sikes Act, as amended, to assist military installation biologists in developing well-rounded wildlife management plans.

6. Executive Orders, 11988 "Floodplain Management" and 11990 "Protection of Wetlands" of 1977 - heightened awareness of the public and Federal agencies as to the value of wetlands by requiring Federal agencies to restore and preserve the natural and beneficial values served by floodplains and to minimize wetland destruction, loss, or degradation and to preserve and enhance the natural and beneficial values of wetlands. These Executive Orders require that wetlands and floodplains on Federal lands be protected with appropriate deed restrictions prior to completing any disposal action to private entities.

7. Fish and Wildlife Service's Mitigation Policy - recognizes the definition of mitigation provided by the Council of Environmental Quality that includes a logical sequence of steps: (1) avoiding the impact, (2) minimizing the impact, (3) rectifying the impact, (4) reducing or eliminating the impact over time, and (5) compensating for the impact as a last resort action. Further, the Service's mitigation policy established a concept of Resource Categories, with designation criteria for each category, and mitigation goals for each category. The Mitigation Policy guides decisions on the level of mitigation that would be required based on the scarcity of the resource and indicates what type of measures should be recommended in Fish and Wildlife Coordination Act Reports.

8. Fish and Wildlife Service's North American Waterfowl Management Plan/Joint Venture - initiated as a joint effort with the Canadian Wildlife Service in 1986, reaffirmed the importance of waterfowl as a resource and the interrelationship between the

extent of healthy wetlands and population stability of waterfowl. The Plan sets goals and objectives to reduce habitat losses and optimize efforts to recover declining waterfowl populations. The Plan also encourages forming joint venture committees with private organizations and other Federal agencies and also includes "Partners for Waterfowl" Trust and "Private Lands Initiative." These programs would formulate plans to finance high-priority research and management projects of international concern that can only be addressed through a pooling of resources. Such a joint venture occurs within the lower Mississippi Valley. Although waterfowl conservation is the major focus of the Plan, it also recognizes that other wildlife, including nongame birds, are associated with water and wetlands. All species, including nongame potentially benefitting from the Plan, "must be considered in developing operational plans for habitat preservation."

9. Fish and Wildlife Service's Environmental Contaminants Program - was established as a technical service for assessing the extent and seriousness of various contaminants on fish and wildlife resources. Nongame birds are often selected as bioindicators to measure contaminant levels. Future studies should include interrelationships between nongame bird foraging ecology and levels of environmental contamination.

10. Fish and Wildlife Service's National Wetland Inventory - was established as a technical service for delineating the quantity and quality of existing wetlands and providing a trend analysis on a nationwide scale.

11. Fish and Wildlife Service's Urban Wildlife Program - provides information of nongame bird needs to private citizens at their residences, businesses, or other places through the Office of Migratory Bird Management. Information includes guidance on landscaping, feeding birds, and constructing nest boxes among other items to maximize benefits to nongame birds.

D. Types of State contact agencies, programs, and lands that can benefit nongame birds.

1. Wildlife management agency - Pittman-Robertson Act, State equivalents to National Environmental Policy Act.

2. Nongame and/or endangered species programs or branches (divisions) - Pittman-Robertson Act, Section 6 Endangered Species Act, nongame policies and activities.

3. Natural heritage inventories - support of local species databases.

4. Wildlife management areas and game lands - Pittman-Robertson Act, Sikes Act.

5. State parks, preserves, and recreation areas.

6. State forests - Pittman-Robertson Act.

E. County and municipal policies and lands. Local contacts include Extension Service personnel of the Soil Conservation Service and the Agricultural Stabilization Conservation Service.

1. County and city parks.

2. Wildlife ordinances.

3. Management opportunities on private lands to include hunting clubs, private forests, and private farmlands.

F. Private organizations and their potential role in cooperative nongame management and education.

1. National Audubon Society - includes preserves and the many activities of state and local chapters.

2. The Nature Conservancy - includes preserves, state field offices, Southeast Regional Office, and species databases.

3. National Wildlife Federation - includes state chapters and backyard wildlife programs.

4. North American Nongame Association - forming grassroots support for nongame activities nationwide.

5. Wildlife Management Institute - conducts workshops and publishes materials addressing issues in wildlife management.

6. The Wildlife Society - including local, subsectional, sectional chapters.

7. International Council for Bird Preservation - dedicated to protecting threatened and endangered bird species and the habitats that support them worldwide.

8. Ornithological Societies of North America - includes the American Ornithologists' Union, Cooper Ornithological Society, Wilson Ornithological Society, and Association for Field Ornithologists.

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SPECIES OF REGIONAL CONCERN

SOUTHEAST REGION (R-4)

Introduction

The following is a compilation of species that are considered of Regional concern. Three categories are used:

1) Highest priority are those species, relatively widespread within the region, that are either status review candidates (being considered for federal listing) or are listed as of management concern by the Office of Migratory Bird Management (OMBM) for this Region. (Henslow's sparrow is added as it is listed throughout its breeding range and winters almost exclusively in the Southeast Region.)

2) High priority are those species, occurring locally within the region, that are candidates being considered for listing and those species, relatively widespread at least as breeding species within the Region, that are Blue-listed by the National Audubon Society (NAS).

3) Moderate priority are those species for which widespread documented declines have occurred within the Region and for species that have received legitimate attention over their status within the Region. These include status review species presently not being considered for listing, nationally widespread OMBM and NAS listed species with large migratory or wintering populations in this Region, OMBM listed species occurring locally within this Region, species with limited overall distribution that are of concern, and species showing strong and consistent negative trends in population size from Breeding Bird Survey data.

Also included is an auxiliary list of other species that were considered for the Regional concern list. Four categories are used:

1) Species to watch are those that show some negative trends, but not yet severe or long-term, and those that occur in vulnerable habitats.

2) Game species that are declining and may be included in nongame management activities.

3) Species that may have been of concern or presently of very localized concern, but seem stable or increasing overall.

4) Very common, widespread, and/or species that are habitat generalists with consistent detected declines from Breeding Bird Survey data.

Long and convoluted lists of species can confuse the issue of what constitutes sound nongame bird management. Also, when considered with federally listed threatened and endangered species and priority game species, it will be extremely difficult to affectively manage for all or even a fraction of the nongame species, especially at the local level. A step-down in priority is therefore suggested for handling concerns and remedial management actions involving nongame species. Special projects specifically benefitting these species and careful review of management plans should be stressed for highest priority species and all status review candidates species. High and moderate priority species should also receive attention but these species are listed as of Regional Concern primarily to highlight the many problems besetting nongame birds and to heighten overall awareness of nongame bird issues. Finally, this is a dynamic list as it is likely that changes to it will be made as more is learned about each species involved.

More important and more likely to be considered by wildlife managers is the implementation of habitat management procedures that benefit a large number of nongame species. For example, adroit water level management can benefit nongame marshbirds and shorebirds as well as waterfowl, careful attention to farming procedures and the specialized needs of some species can benefit most open country species (including small game) that are showing serious declines, and attention to the needs of area-sensitive forest-interior species should benefit most forest species. Along this vein, much concern has been raised over the recent decline of many neotropical migrant species, most of which are also associated with large tracts of forested (both mature and second-growth) habitat. A review of Breeding Bird Survey data reveals that many neotropical migrant species are undergoing recent declines and this is reflected in the moderate priority and species to watch categories. Five physiographic areas within the Southeast Region in particular have very high numbers of declining species:

1) Blue Ridge: 25 declining species with 21 of those significant;

2) Ridge and Valley: 13 declining species with 12 of those significant;

3) Mississippi Alluvial Plain: 16 declining species with 10 of those significant;

4) Ozark-Ouachita: 18 declining species with 6 of those significant;

5) Cumberland Plateau: 15 declining species with 6 of those significant

Although it is not clear exactly what may be causing these declines it appears that a combination of loss and fragmentation of breeding and wintering habitats is involved.

Once again this list and the above commentary are advisory in nature. Revisions will occur as we learn more about the status of each species considered and the most affective means to manage for a large variety of nongame species.

Species of Regional Concern, Part A
(Southeast Region, R-4)

Priority Species	Candidates: Widespread	Candidates: Local	OMBM Management Concern: R-4	OMBM Management Concern: Other Regions	National Audubon Society: Blue List	National Audubon Society: Special Concern	National Audubon Society: Local Concern	Breeding Bird Survey (% change/year): National 20-yr 1966-1987 Trend	Breeding Bird Survey (% change/year): Eastern 10-yr 66'-78', 78'-87' Trend	Breeding Bird Survey (% change/year): R-4 20-yr 66-87 Trend	Breeding Bird Survey (% change/year): R-4 Physiographic Areas 20-yr Trend
→ Highest											
American bittern			X		X						
Least bittern			X		X						
Reddish egret	2		X			X					
American kestrel	2(SE)							-0.1		-0.1	2+
Black rail			X								
Snowy plover	2(SE)		X			X					
Gull-billed tern			X								
Barn owl			X			X					
Bewick's wren	1(Appala.)				X				?	-8.2***	4,13,14,15, 19,21,23-
Loggerhead shrike	2(Migrant)		X		X			-3.1**	?	-4.1***	2,3,4,5,11, 13,14,19,21-
Cerulean warbler			X					-3.4***	-3.9**,-0.9	-5.9	4,11,14,15, 19,21-;23+
Henslow's sparrow				X[1]		X		?	?		
Bachman's sparrow	2		X		X			?	?	0.5	3,13-;2,4,11+
Seaside sparrow	2(2subspp.)		X								
→ High											
West Indian whistling-duck	2										
Lesser white-cheeked pintail	2										

Species of Regional Concern, Part A
(Southeast Region, R-4)

Priority Species	Candidates: Widespread	Candidates: Local	OMBM Management Concern: R-4	OMBM Management Concern: Other Regions	National Audubon Society: Blue List	National Audubon Society: Special Concern	National Audubon Society: Local Concern	Breeding Bird Survey (% change/year): National 20-yr 1966-1987 Trend	Breeding Bird Survey (% change/year): Eastern 10-yr 66'-78',78'-87' Trend	Breeding Bird Survey (% change/year): R-4 20-yr 66-87 Trend	Breeding Bird Survey (% change/year): R-4[2] Physiographic Areas 20-yr Trend
West Indian ruddy duck		2									
Puerto Rican broad-winged hawk		2									
Red-shouldered hawk				X	X			2.1	?	0.2	4,5,11,13,19, 21+;15-
Mangrove clapper rail		2				X					
Caribbean coot		2									
White-crowned pigeon		2									
Yellow-billed cuckoo					X			-0.9	1.8**,-5.0**	-1.9	2,4,5,13,14, 15-;3,19,21,23+
Virgin Island screech-owl		2									
Whip-poor-will					X			-0.2	0.6,-0.8	-0.3	13,14,15,21,23-
Common nighthawk					X			-0.1	?	-3.5***	2,3,5,19-;4,11+
Ruby-throated hummingbird					X			1.3	0.4,1.8*	-0.1	2,5,-;3,4, 11,19+
Stoddard's yellow-throated warbler		2									
Elfin Woods Warbler		2									
Grasshopper sparrow					X			-3.2**	?	-10.2***	4,5,13,14, 21,23-

Species of Regional Concern, Part B
(Southeast Region, R-4)

Priority Species	Candidates	OMBM Management Concern Other Regions	National Audubon Society Blue List	National Audubon Society Special Concern	National Audubon Society Local Concern	Breeding Bird Survey (% change/year) National 20-yr 1966-1987 Trend	Breeding Bird Survey (% change/year) Eastern 10-yr 66'-78',78'-87' Trend	Breeding Bird Survey (% change/year) R-4 20-yr 66-87 Trend	Breeding Bird Survey (% change/year) R-4[2] Physiographic Areas 20-yr Trend	Other
Moderate										
Common loon		X(Winter R-4)			X					
Black-capped petrel										Most of world's population feeds along Gulf Stream
Mississippi kite						?	?	-3.4***	3,5-	
American swallow-tailed kite	3C					?	?	0.9		
Sharp-shinned hawk			X(Winter R-4)							
Puerto Rican sharp-shinned hawk	3C									
Cooper's hawk			X(Winter R-4)							
Short-tailed hawk										Small and extremely isolated population in S. FL
Northern harrier		X(Winter R-4)	X(Winter R-4)							
Least tern (Coastal)					X					Very susceptible to human disturbance of beach nests
Black tern		X(Migrant R-4)	X(Migrant R-4)							
Burrowing owl					X			-2.5	2-	Declining in FL
Short-eared owl			X(Winter R-4)							

Species of Regional Concern, Part B
(Southeast Region, R-4)

Priority Species	Candidates	OMBM Management Concern Other Regions	National Audubon Society Blue List	National Audubon Society Special Concern	National Audubon Society Local Concern	Breeding Bird Survey (% change/year) National 20-yr 1966-1987 Trend	Eastern 10-yr 66'-78',78'-87' Trend	R-4 20-yr 66-87 Trend	R-4[4] Physiographic Areas 20-yr Trend	Other
Chuck-will's-widow						-0.8	0.6,-2.0	-1.1*	4,5,11,13-;19+	
Red-headed woodpecker				X		-0.9*	?	-2.3**	3,4,5,13-, 2,11,14+	
Northern "yellow-shafted" flicker						-2.8**	-4.4**,-1.2**	-2.9***	All but 15-	
Olive-sided flycatcher		X(Winter R-4)				-3.5**	3.6,-5.7**			
Eastern wood-pewee						-1.4**	-2.1**,-0.7	-1.9***	3,4,5,13, 19,21,23-	
Wood thrush						-1.7**	1.3**,-4.0**	-2.4***	3,4,5,11,13, 14,19,23-	
Gray catbird						-0.2	0.6*,-1.4*	-2.5***	4,5,11,14,19, 21,23-;15+	
Bell's vireo		X(Local R-4)			X	-2.4		-11.4***	4,5,19-	
Golden-winged warbler		X(Local R-4)		X		-2.8**	-2.2*,-1.9	-1.9	1,23-	
Prairie warbler						-2.2**	-3.7**,-0.4	-3.4***	3,4,13,14,19, 23-;5,21+	
Ovenbird						0.6	1.0,-1.0*	-2.6**	19,21,23-;3, 11,14+	
Kentucky warbler						-1.1*	-0.3,-1.6	-1.1*	4,11,13,14,23-; 3,5,15+	
Painted bunting						-3.3**	?	-6.5***	3,5,19-;11+	

Species of Regional Concern, Part B
(Southeast Region, R-4)

Priority Species	Candidates	OMBM Management Concern Other Regions	National Audubon Society Blue List	National Audubon Society Special Concern	National Audubon Society Local Concern	Breeding Bird Survey (% change/year) National 20-yr 1966-1987 Trend	Breeding Bird Survey (% change/year) Eastern 10-yr 66'-78',78'-87' Trend	Breeding Bird Survey (% change/year) R-4 20-yr 66-87 Trend	Breeding Bird Survey (% change/year) R-4[2] Physiographic Areas 20-yr Trend	Other
Field sparrow						-3.7''	?	-3.7'''	4,5,11,13,14, 15,19,21,23-	
Orchard oriole				X		-1.8''	-0.3,1.1	-1.2'''	4,5,13,19-; 11,15,21+	

[1]Henslow's sparrow winters primarily in R-4.

[2]Physiographic Areas: 1=Subtropical, 2=Peninsular FL, 3=Lower Coastal Plain, 4=Upper Coastal Plain, 5=Mississippi Alluvial Plain, 11=southern Piedmont, 13=Ridge and Valley, 14=Highland Rim, 15=Lexington Plain, 19=Ozark-Ouachita, 21=Cumberland Plateau, 23=Blue Ridge Mountains

?=data not available

'=$P \leq 0.05$;''=$P \leq 0.01$;'''=$P \leq 0.001$

+=positive (increasing) population trend

-=negative (decreasing) population trend

Other Species Considered for the Regional Concern List
(Southeast Region, R-4)

Species to watch

Little blue heron -	BBS R-4 20-yr trend=-3.9***. Are there other data to corroborate this dramatic decline?
Yellow rail -	Winters primarily within R-4; potentially affected by wetland losses in Northern Prairie breeding areas. Very secretive and little is known about its population levels, especially in winter.
Limpkin -	BBS R-4 20-yr trend=-15.48*. Are there other data to corroborate this dramatic decline?
Wilson's plover -	Of some concern as this is a beach nesting bird susceptible to high levels of human disturbance.
American oystercatcher -	Of some concern as this species nests on isolated islands and easily abandons nests if frequently disturbed.
All shorebirds in general; whimbrel sanderling, and short-billed dowitcher in particular -	Susceptible to high levels of habitat loss (quantity and quality) on migration routes as well as breeding and wintering areas. Three species are showing consistent downward trends along the Atlantic Coast from the International Shorebird Survey. Status during migration and winter in R-4 should be closely monitored for all species.
All colonially nesting terns -	Of some concern as whole colonies may abandon from high levels of human disturbance on isolated islands.
Black skimmer -	Of some concern as this is a beach nesting species susceptible to high levels of human disturbance.
Common ground-dove -	BBS R-4 20-yr trend=-6.6***, National 20-yr trend=-5.4**. Are there concerns?
Black-billed cuckoo -	A neotropical migrant, local in R-4, undergoing a recent and steep decline, BBS East 1966-1978=13.4 to 1978-1987=-5.9**.
Belted kingfisher -	BBS R-4 20-yr trend=-1.6***. Are there concerns?
Acadian flycatcher -	A neotropical migrant, widespread in R-4, undergoing a recent decline, BBS East 1966-1978=1.2* to 1978-1987=-1.3*.

Other Species Considered for the Regional Concern List
(Southeast Region, R-4)

Species to watch (con't)

White-eyed vireo - A neotropical migrant, widespread in R-4, undergoing a recent decline, BBS East 1966-1978=0.3 to 1978-1987=-1.2".

Northern parula - A neotropical migrant, widespread in R-4, undergoing a recent decline, BBS East 1966-1978=1.2 to 1978-1987=-2.1".

Chestnut-sided warbler - A neotropical migrant, local in R-4 undergoing a recent decline, BBS East 1966-1978=2.2" to 1978-1987=-3.8"; BBS R-4 20-yr trend=-6.4"'.

Black-throated green warbler - A neotropical migrant, somewhat local in R-4, undergoing a recent decline BBS East 1966-1978=0.3 to 1978-1987=-3.1"; BBS R-4 20-yr trend=-4.8"'.

Hooded warbler - A neotropical migrant, widespread in R-4, appears stable overall (BBS 20 yr trend=1.4') but steep local declines in centers of abundance have occurred in Ozark-Ouachita, Cumberland Plateau, and Blue Ridge.

Canada warbler - A neotropical migrant, local in R-4, undergoing a recent decline, BBS East 1966-1978=-2.7 to 1978-1987=-2.7"; BBS R-4 20-yr trend=-14.6"'.

Scarlet tanager - A neotropical migrant, somewhat widespread in R-4, undergoing a recent decline, BBS East 1966-1978=2.6" to 1978-1987=-1.2".

Rose-breasted grosbeak - A neotropical migrant, local in R-4, undergoing a recent decline, BBS East 1966-1978=6.1" to 1978-1987=-4.1".

Lark sparrow - Local and uncommon, BBS R-4 20-yr trend=-3.0", National 20-yr trend=-2.5". Are there concerns?

Le Conte's sparrow - Winters almost exclusively within R-4; potentially affected by wetland losses in Northern Prairie breeding areas. Very secretive and little is known about its population levels on wintering grounds.

Sharp-tailed sparrow - Winters almost exclusively within R-4; potentially affected by wetland losses in Northern Prairie breeding areas. Are there data on population levels in wintering areas?

Other Species Considered for the Regional Concern List
(Southeast Region, R-4)

Species to watch (con't)

Northern oriole - A neotropical migrant, widespread but uncommon in R-4, undergoing a recent decline, BBS East 1966-1978=2.0' to 1978-1987=-2.9'; BBS R-4 20-yr trend=-2.6'''.

Red-crossbill - Status unknown, possibly a unique population, subspecies, or even species in the Southern Appalachians that may be affected by the recent losses of spruce-fir forests. Life history is very complex.

Game species undergoing detectable declines that may be included in nongame bird management

American black duck - Winters in R-4, local breeding; plight of this species is well-documented.

Mottled duck - Resident in R4 along Gulf Coast and Florida, this species is experiencing steep declines, BBS R-4 20-yr trend=-9.2'''.

Northern bobwhite - Resident and widespread in R-4, this species is experiencing declines in every physiographic area, BBS R-4 20-yr trend=-2.7'''.

Species that may have been of concern, but seem stable or increasing overall

Yellow-crowned night heron - Some local concern, however no real pattern of decline exists.

White ibis - Dramatic declines in South Florida along with most other wading species but more limited in overall range.

Fulvous whistling-duck - Very irregular in occurance and abundance, no clear trends.

Black vulture - Very local concerns, but no real pattern of decline exists.

Osprey - Recovering since DDT was banned, expanding throughout its range.

Merlin - No clear pattern of decline exists.

Other Species Considered for the Regional Concern List
(Southeast Region, R-4)

Species that may have been of concern, but seem stable or increasing overall (con't)

King rail -	May be of very local concern, but no real pattern of decline exists.
Sandhill crane -	Local in distribution, no serious concerns have been raised outside of Mississippi.
Sooty tern -	Local concern over its specific nesting requirements; presently well protected.
Brown noddy -	Local concern over its specific nesting requirements; presently well protected.
Eastern screech-owl -	Some concern over perceived declines, no clear trends.
Hairy woodpecker -	Some local concerns, however overall population trends are positive.
Purple martin -	Action on past concern has apparently allowed for a dramatic reversal in population trends BBS R-4 20-yr trend=1.8".
Eastern bluebird -	Action on past concern has apparantly allowed for a dramatic reversal in overall population trends. BBS R-4 20-yr trend=0.04, however BBS East 1966-1978=-6.3" to 1978-1987=9.8".
Veery -	BBS East 1966-1978=1.6' to 1978-1987=-2.4'. Another neotropical migrant showing recent declines, however very local in R-4 (Blue Ridge) with BBS R-4 20-yr trend=15.8"'.
Yellow warbler -	Some local concerns, however overall population trends are up, at least in R-4.
Black-throated blue warbler	This is one of the very few neotropical migrants, occurring primarily in the Blue Ridge Physiographic Area in R-4, which is holding its own or even increasing in R-4 and the East overall.
Swainson's warbler -	Some local concern for this widespread but uncommon forested wetland specialist. Appears to be increasing or holding stable everywhere except in the Blue Ridge Physiographic Area where it is now very local.
Dickcissel -	Widely scattered local concern for this very erratic species; no clear patterns.

Other Species Considered for the Regional Concern List
(Southeast Region, R-4)

Very common or widespread (habitat generalists) species with detected declines

Eastern phoebe

Eastern kingbird

Blue jay

Northern mockingbird

Brown thrasher

Common yellowthroat

Yellow-breasted chat

Northern cardinal

Indigo bunting

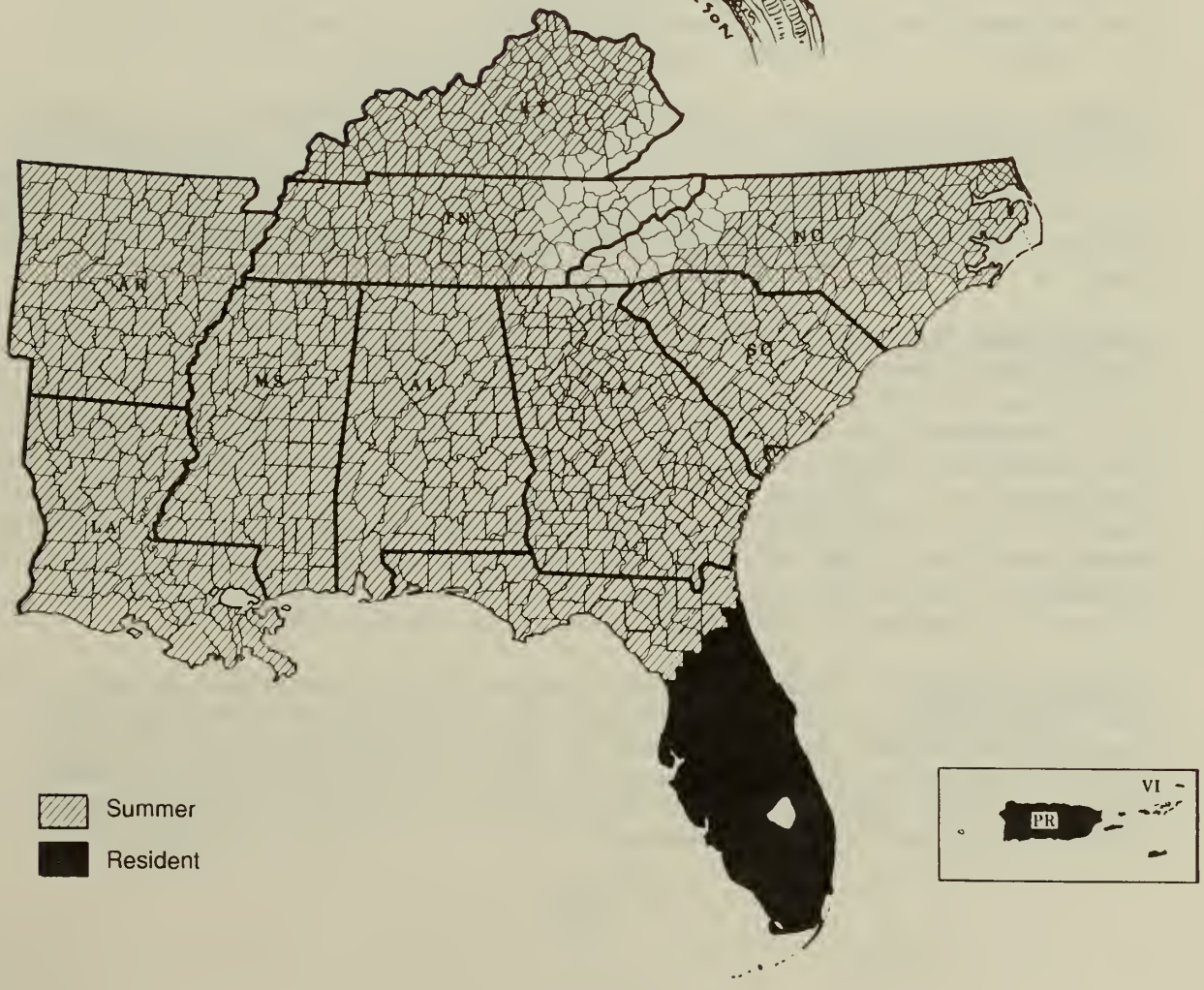
Rufous-sided towhee

Eastern meadowlark

Chipping sparrow

American goldfinch

Least Bittern



LEAST BITTERN

(*Ixobrychus exilis*)

Description. The least bittern is the smallest of the heron family in North America. The head and back are dark whereas the underparts are white, streaked with pale buffy yellow. The most distinctive characteristic is the buffy yellow wing patches that are most obvious when the bird is in flight. Least bitterns are very secretive and are most often seen when flushed from marsh vegetation. The rapid "coo-coo-coo" call often can be heard in the early morning hours during the breeding season, April-July. This species "freezes" with bill pointed straight-up when disturbed.

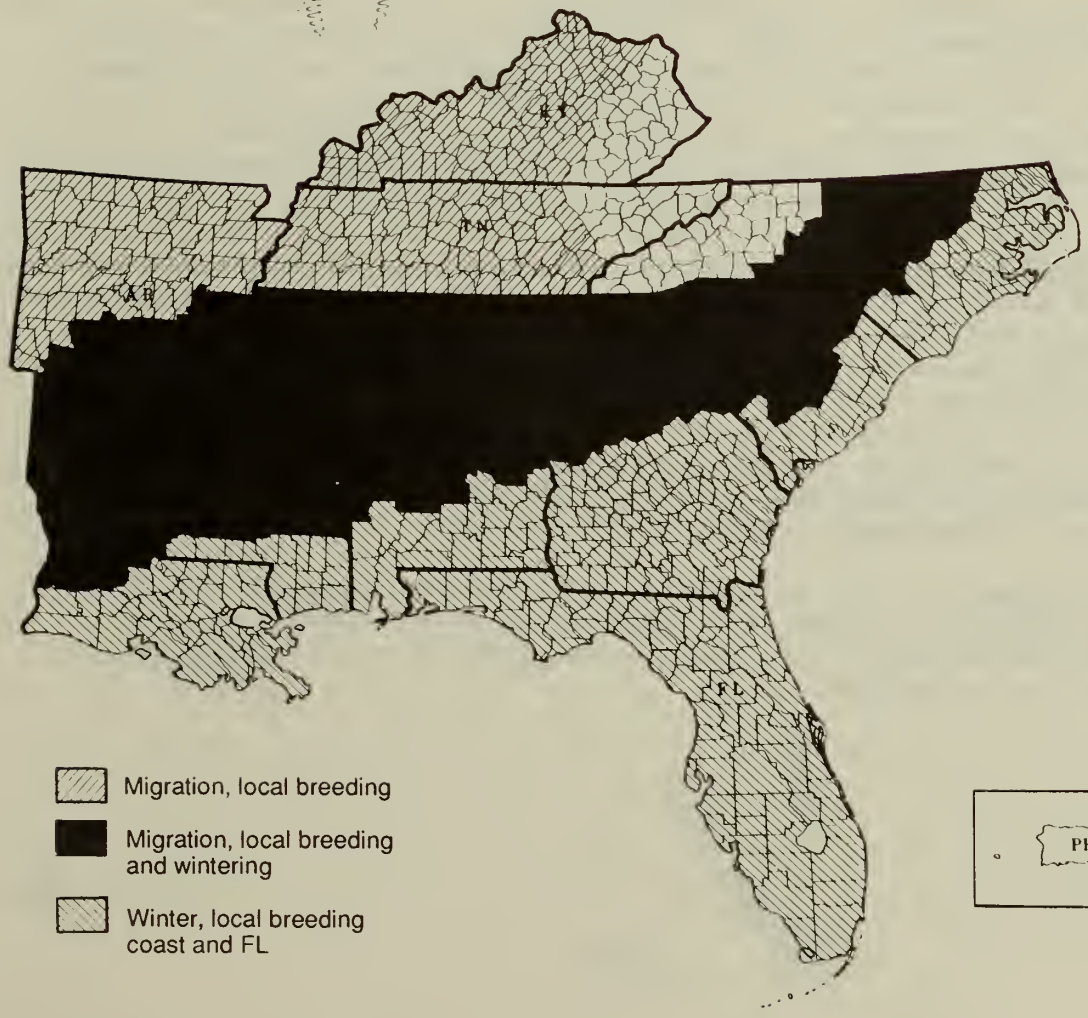
Habitat. This species is found in freshwater and saltwater marshes. The least bittern prefers dense stands of freshwater emergent vegetation (usually cattails and sawgrass), especially in marshes with widely scattered shrubs. The least bittern is thought to retreat to central and southern Florida during winter. The extremely secretive nature of this species during winter may cause it to be overlooked.

Reasons For Concern. The least bittern is totally dependent on wetland habitats throughout its range. This species seems to be most abundant in Florida where rapid conversion of wetlands for other uses have contributed to the equally rapid decline of this species. The pattern of wetland loss and declines in least bittern populations is found throughout the Southeast Region.

Recommended Management. Protection and enhancement of emergent wetlands would greatly benefit the least bittern. This species is known to use farm ponds that have tall emergent vegetation along shallow shorelines. Moist soil management, on refuges and other managed lands, improves habitat cover for waterfowl and should also enhance habitat for least bitterns if some impoundments are allowed to be partially flooded and covered in emergent vegetation. Standardized breeding season call counts should be conducted where possible. Regulatory reviews involving emergent wetlands (especially freshwater) should stress the importance of these habitats to the least bittern, a species of management concern to the Service.

Research Needs. Little information exists on the population dynamics of the least bittern on the breeding grounds. Research into the types of emergent vegetation most preferred by this species would be profitable as would studying the potential adverse effects of common reed supplanting other emergent vegetation. The importance of wetlands during migration and winter also need to be determined.

American Bittern



AMERICAN BITTERN

(*Botaurus lentiginosus*)

Description. Moderate sized and plump, the American bittern is characterized by having rich brown upperparts set off by black neck streaks. This species is famous for its "freezing" behavior with bill pointed straight-up when disturbed. The call most often heard is a distinctive "oonk-a-lurk" given during the early morning hours at the onset of the breeding season.

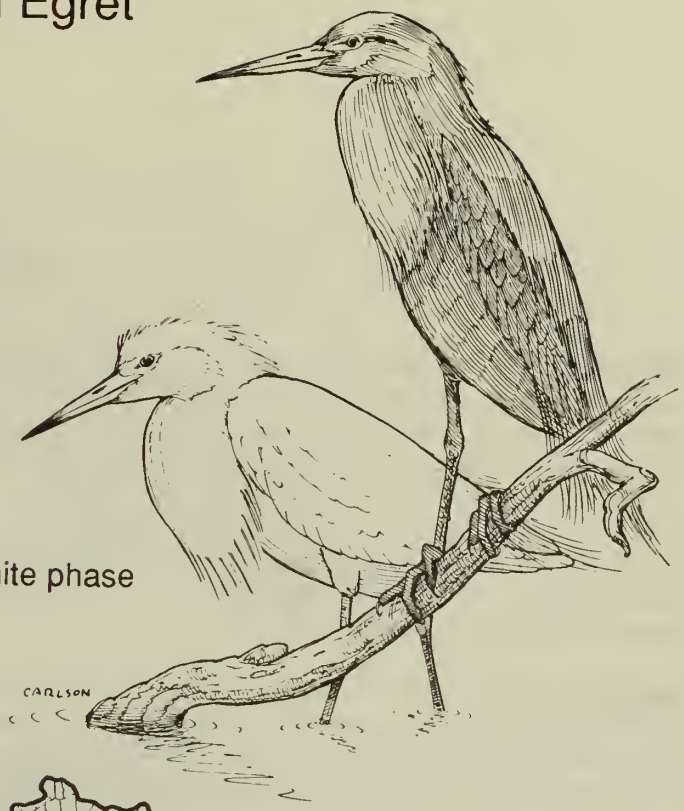
Habitat. The American bittern is found to breed primarily in freshwater marshes, preferring dense stands of cattails or other tall emergent vegetation. Although local nesting does occur in coastal areas, this species breeds primarily in the northern two-thirds of the Southeast Region. Most birds concentrate in winter along the coastal plain.

Reasons For Concern. The American bittern is totally dependent on wetland habitats throughout its range. The rapid loss of freshwater emergent wetlands especially has influenced this species decline. As a breeding species, this bittern is of state concern in Alabama, Kentucky, North Carolina, and Tennessee. The Southeast Region also represents the primary wintering ground for populations breeding in the Midwest and Northeast Regions where the species is declining precipitously.

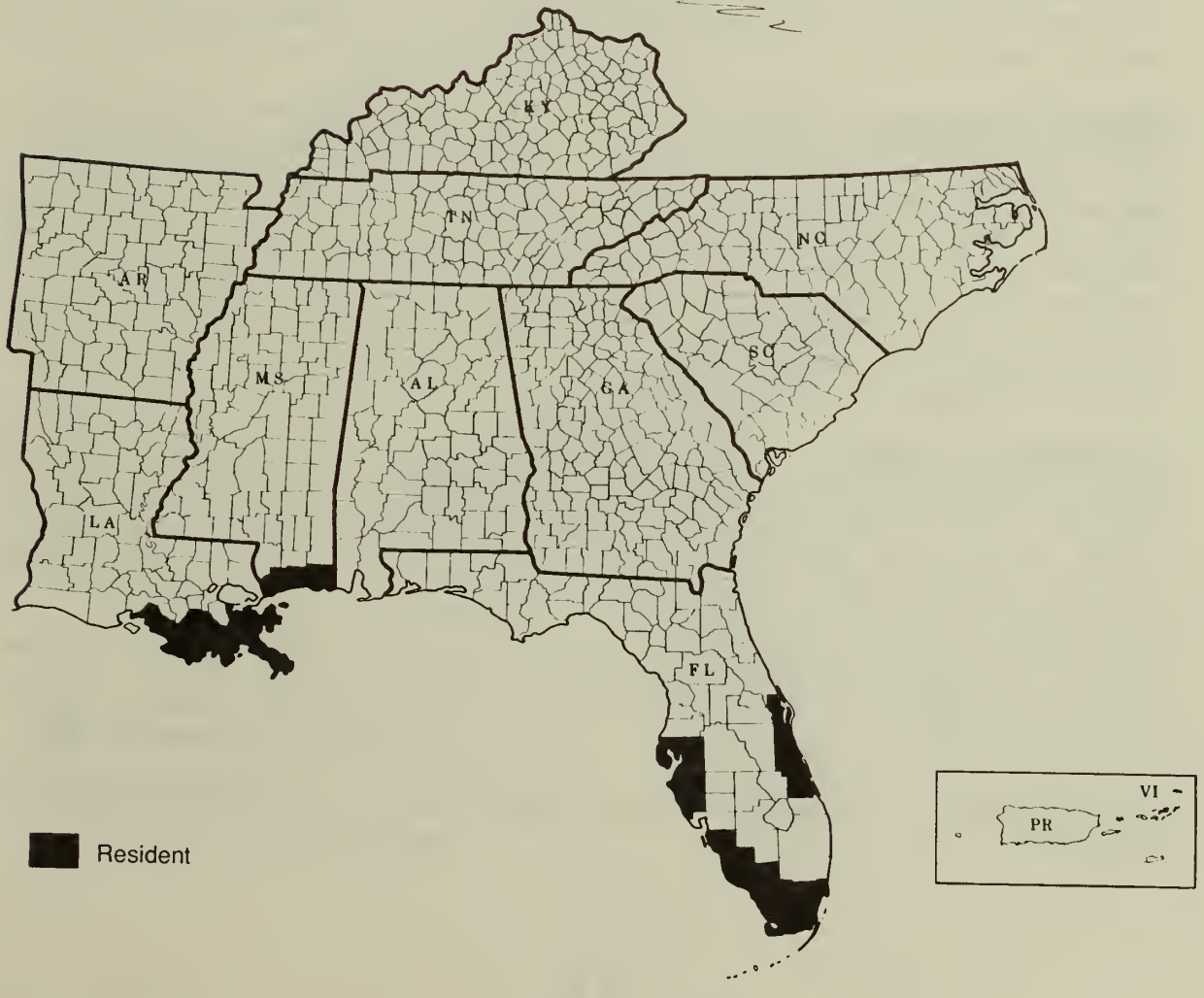
Recommended Management. Protection and enhancement of freshwater emergent wetlands would greatly benefit the American bittern. Moist soil management on refuges and other managed lands improves habitat cover for waterfowl and should enhance habitat for American bitterns if some impoundments are allowed to be partially flooded and covered in emergent vegetation. Standardized breeding season call counts should be conducted where possible. Regulatory reviews involving freshwater emergent wetlands should stress the importance of these habitats to the American bittern, a species of management concern to the Service.

Research Needs. Little information exists on the migratory and winter habitat needs of this species. Frequent marsh burning to increase emergent species diversity should be conducted to investigate effects on both bittern species.

Reddish Egret



White phase



REDDISH EGRET

(Egretta rufescens)

Description. Moderate sized and long legged, the reddish egret superficially resembles the more common little blue heron. Adult reddish egrets can be of dark or white morphs. The dark morph is most common in the United States portion of the range of this species and is deep reddish brown on the head and neck and slaty blue on the body. White morph birds are usually all white. The bill in all individuals is stout and sharply bicolored with pink base and black tip. Feeding behavior is often very active and clownlike, with individuals dashing about with their wings spread.

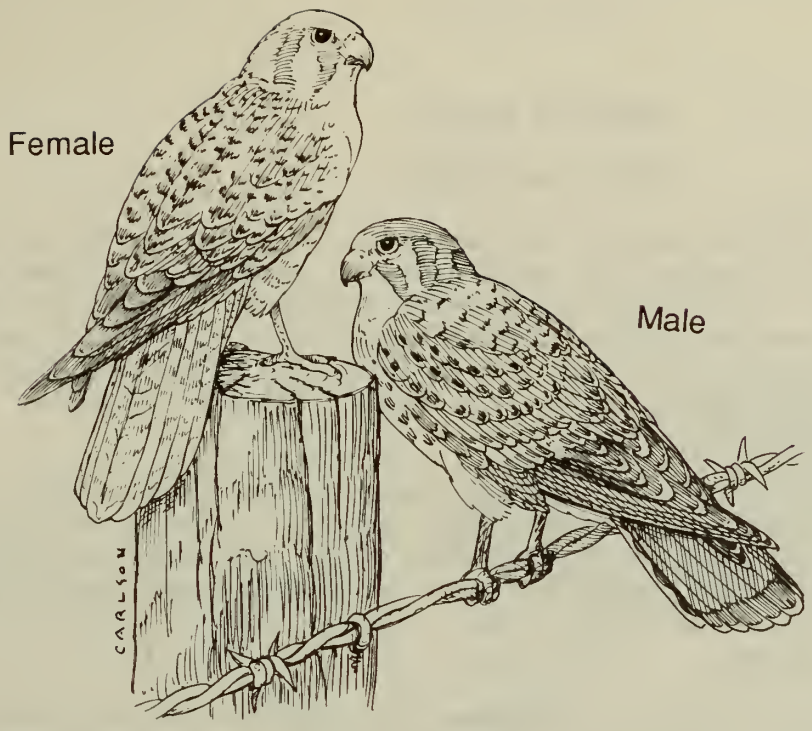
Habitat. The reddish egret is found almost exclusively in coastal areas of southern Florida and Louisiana. Non-breeding strays can be found all along both coasts and in Puerto Rico. Nesting is confined almost entirely to protected islands with extensive coastal scrub or mangrove cover, while feeding habitat primarily includes estuarine wetlands and remote beaches.

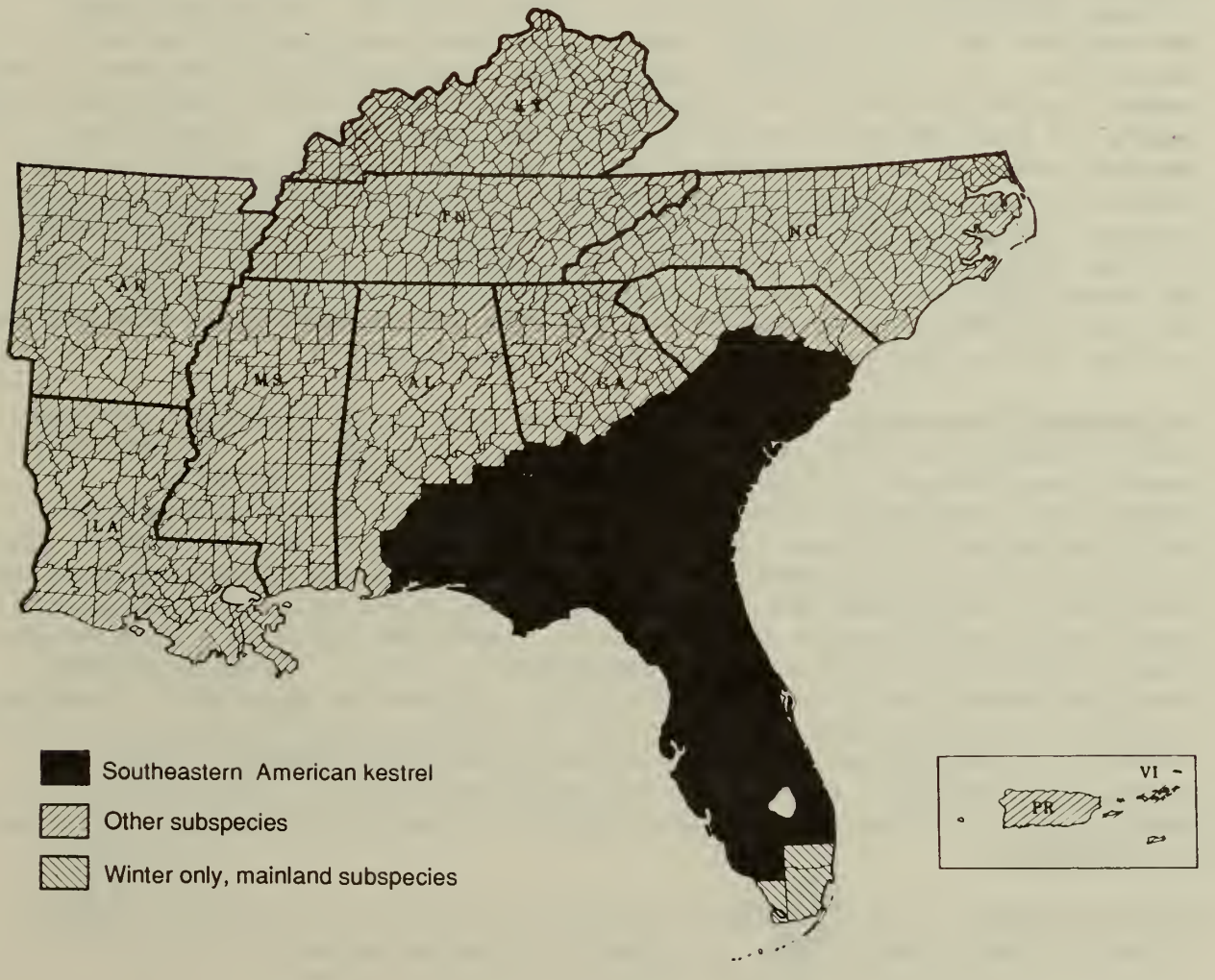
Reasons For Concern. Reddish egrets possess elegant plumes during the breeding season. This species, therefore, was a prime target for plume-hunters during the late 19th and early 20th centuries. Reddish egrets apparently never recovered from being nearly exterminated from the United States in 1890. Although they have spread slowly north in Florida from the Everglades and east into Louisiana from Texas, it is still rare to uncommon. Many nesting colonies are heavily disturbed by boat and jet ski use in adjacent waterways. The specialized nesting (mangroves and coastal scrub) and feeding (coastal flats) habitats of the reddish egret, relative to other herons, may have hampered its recovery.

Recommended Management. Protection and enhancement of mangrove and coastal scrub nesting habitat and estuarine foraging habitat is essential for this species. Much of the reddish egret population in Florida is protected within the confines of Everglades National Park and secondarily on national wildlife refuges. Most of the Louisiana breeding birds are found within Breton National Wildlife Refuge in the Chandeleur-Breton Sound area. Regulatory reviews involving mangroves and estuarine wetlands in Louisiana and Florida should stress the importance of these habitats to the reddish egret, a candidate for federal listing and a species of management concern to the Service.

Research Needs. Limits on population growth and range expansion should be determined.

American Kestrel





AMERICAN KESTREL

(*Falco sparverius*)

Description. The American kestrel is the smallest falcon in the United States and is characterized by a rufous tail and two black "moustache" streaks on each side of the head. This species is sexually dimorphic in both size and plumage. The male is smaller and more brightly colored with red tail and blue wings. The female dorsally is colored rufous brown with transverse black bars. The call of the American kestrel is a shrill "killy killy killy," usually heard when disturbed.

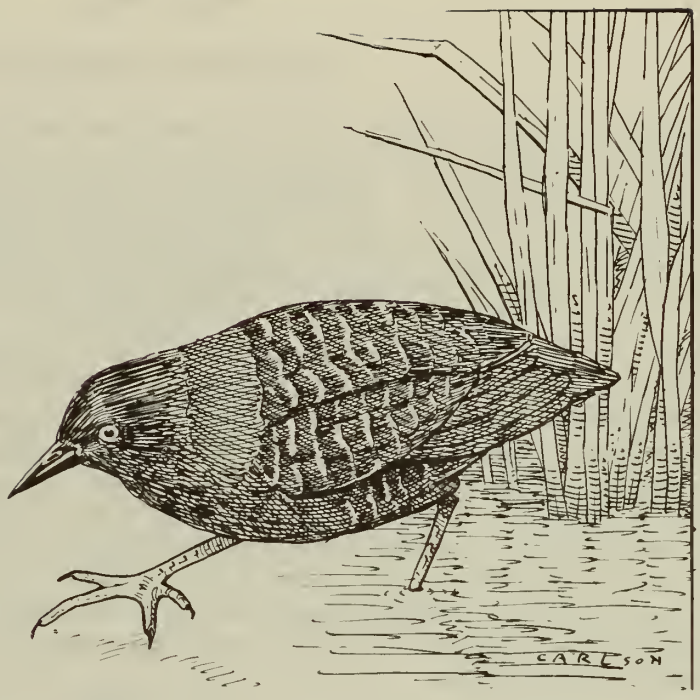
Habitat. The American kestrel is found throughout the Southeast Region in coastal plain open pine woodlands. Also, this species occurs in agricultural areas, open edges of river bottomlands, coastal areas, and suburban (urban) areas. The American kestrel requires cavities for nesting and primarily uses old woodpecker cavities in old or dead trees, but also uses a variety of holes in buildings and nest boxes.

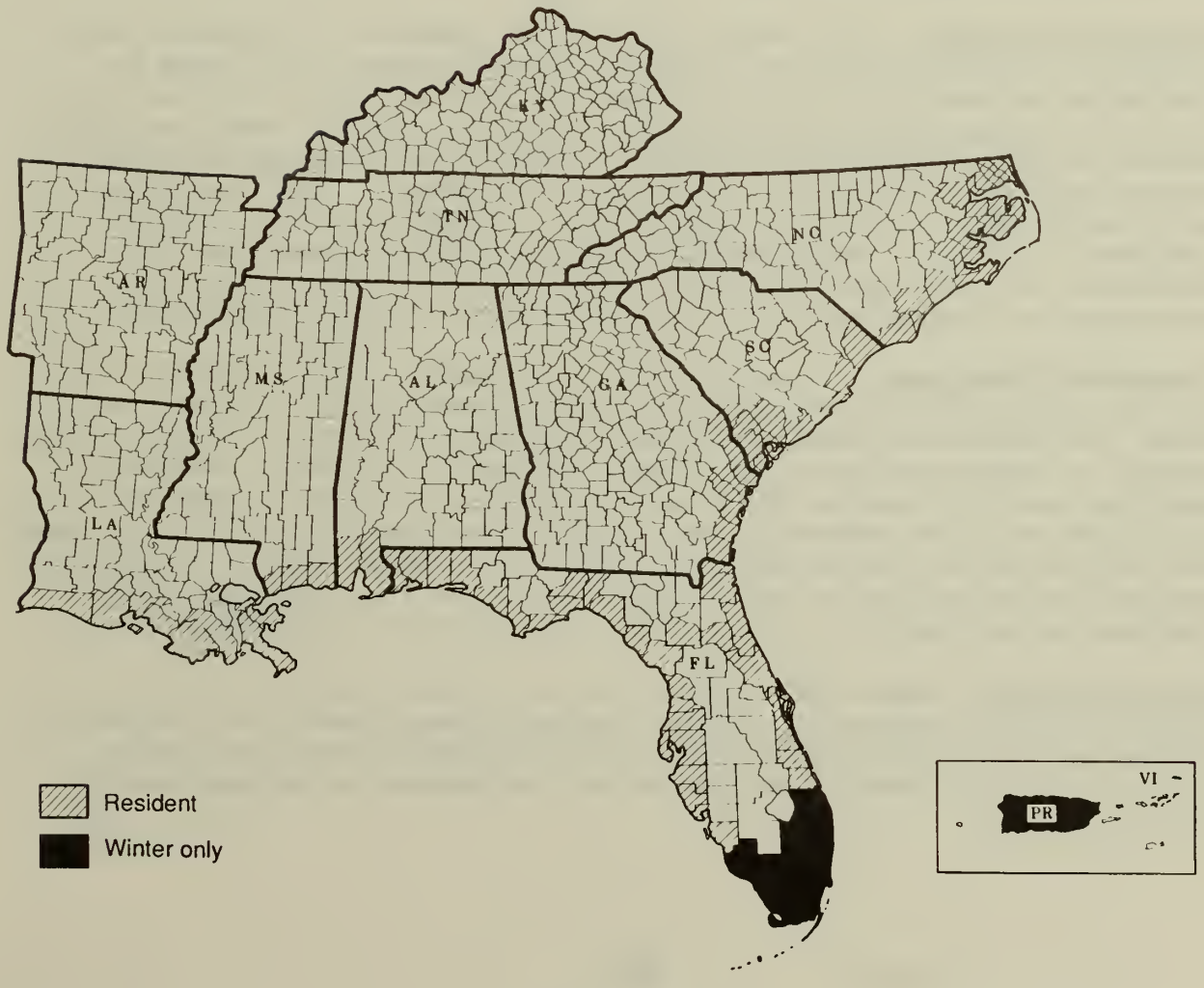
Reasons For Concern. The resident subspecies occurring in Florida, southern Alabama, southern Georgia, and southern South Carolina, the southeastern American kestrel (*F. s. paulus*), has declined noticeably during the last two decades. In Florida, this subspecies is listed as State Threatened. The reason for the decline is not clearly known but loss of nest sites through the removal of dead and dying trees may be an important factor. Outside the breeding range of the southeastern subspecies, the American kestrel is still common but has experienced declines as both a breeding and wintering species in some areas. Kestrels feed on insects along roadways and farmlands where they may be susceptible to pesticide bioaccumulation. Northern populations add greatly to the total numbers of American kestrels found in winter, thus, the true status of the southeastern subspecies and identification of possible problems during winter will be difficult to determine.

Recommended Management. Old and dying trees with large woodpecker cavities along woodland edges are important for the American kestrel. In addition, kestrels are known to nest in managed 25-40 year old loblolly pine plantations; management of kestrels in these habitats should be compatible with standard silvicultural practices when nesting trees are maintained. Nest boxes have been used successfully to increase the numbers of nesting pairs in some areas. Controlling the numbers of European starlings that compete with kestrels for nest sites is also important. Pesticide use should be minimized along roadways and in agricultural areas where possible. These management practices already occur on national wildlife refuges and they can be expanded to Federal inventory lands and Conservation Reserve Lands through conservation easement recommendations. Regulatory reviews of land management plans, especially on national forests and military installations, should consider impacts on the southeastern American kestrel, a candidate for Federal listing by the Service.

Research Needs. Forest management practices should be reviewed with respect to kestrel reproduction with an emphasis on snag management. Potential effects of pesticides on kestrels should be studied in detail.

Black Rail





BLACK RAIL

(*Laterallus jamaicensis*)

Description. The black rail is the smallest North American rail (about the length of a sparrow) and is characterized by a slaty black back with small white spots on the back. This rail has a short dark bill, short tail, and dark red eyes. Young of other rail species are often confused for black rails as they are also small and dark. The black rail is very rarely seen but its distinctive "ki-ki-derr" call is often heard at night.

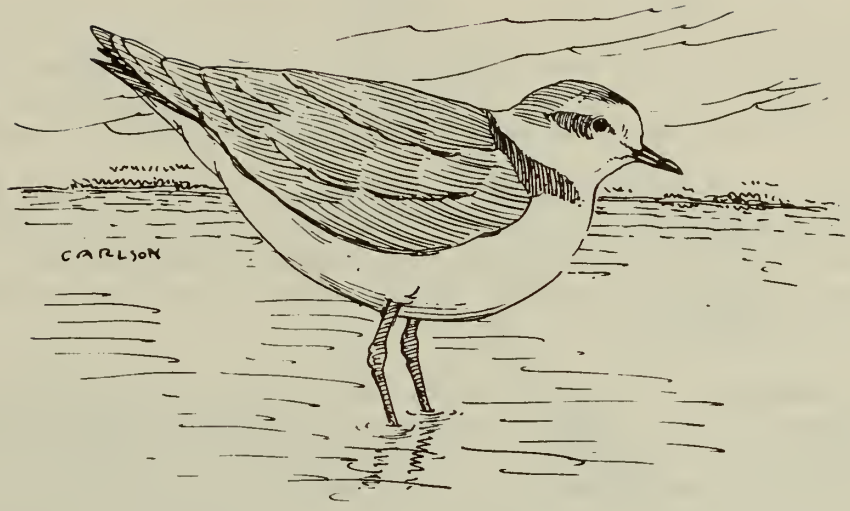
Habitat. The black rail is resident in the Southeast Region primarily in the upper reaches of tidal and infrequently flooded salt and brackish marshes in rush, cordgrass, saltgrass, and glasswort (pickleweed). The portions of marsh the black rail inhabits are rarely inundated, usually with only an inch of water present at peak high tide. Freshwater marshes, meadows, and damp fields will support black rails but the extent these habitats are used remains unclear in the Southeast Region; these are the habitats primarily used in the Midwest and northern Great Plains. The black rail is apparently very rare away from coastal areas within the Southeast Region. Interior breeding populations are possible and may represent southern extensions of the Midwest population.

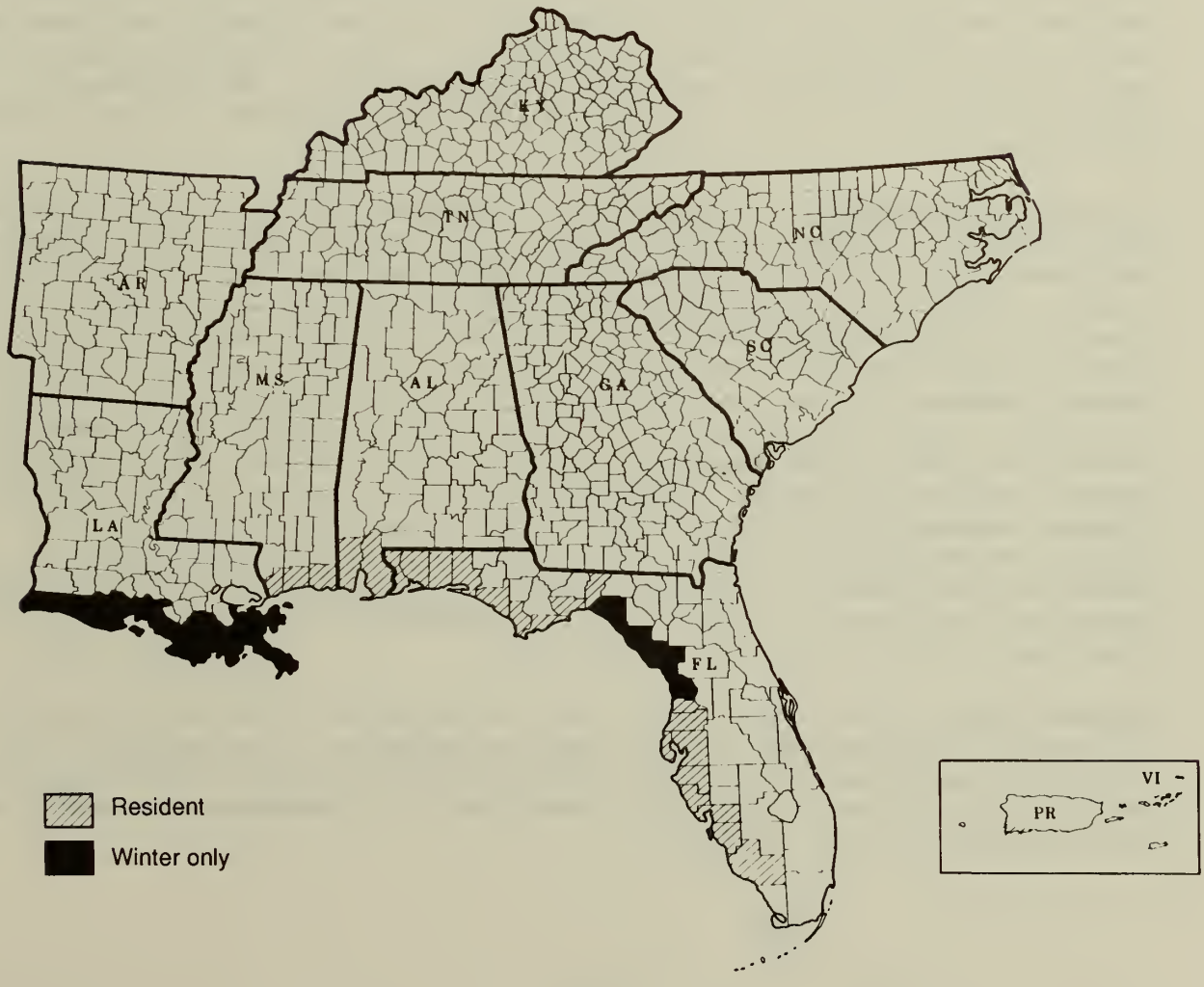
Reasons For Concern. The black rail is mostly dependent on brackish and saltwater wetlands within the Southeast Region although it is found in freshwater wetlands in Florida and possibly elsewhere. Much of this habitat has been lost to diking and flooding for mosquito control, dredge and fill operations, drainage projects, highway rights-of-way, housing developments, marinas, municipal dumps, and industrial developments. This species may be affected when its habitat needs are not considered during waterfowl improvement projects. Such management when carefully planned can be compatible with this and other rail species as well as benefitting the many game and nongame species associated with open water within marshes.

Recommended Management. Protection and enhancement of tidal wetlands that are not completely inundated at high tide is essential for this species. Moist soil management, which includes a shallow perimeter (where saltgrasses, rushes, or sedges can grow) and careful attention to flooding schedules, provides important habitat for black rails while still benefitting waterfowl on refuges and other managed lands. Standardized breeding season call counts and radiotelemetry studies should be conducted where possible. Regulatory reviews involving tidal wetlands should stress the importance of these habitats to the black rail, a species of management concern to the Service.

Research Needs. Data are sparse on population sizes where this species is known to occur. Surveys in interior freshwater areas should be conducted to determine if and where breeding black rail populations occur within the Southeast Region; however, coastal survey and habitat use studies should take precedence.

Snowy Plover





SNOWY PLOVER

(Charadrius alexandrinus)

Description. The snowy plover is a small shorebird with gray upperparts and pure white underparts, similar in color to its beach sand habitat. This species differs from other small plovers by having a combination of black legs and a black, thin, and relatively long bill. This species also lacks a complete neck band in all plumages but usually has a dark earpatch.

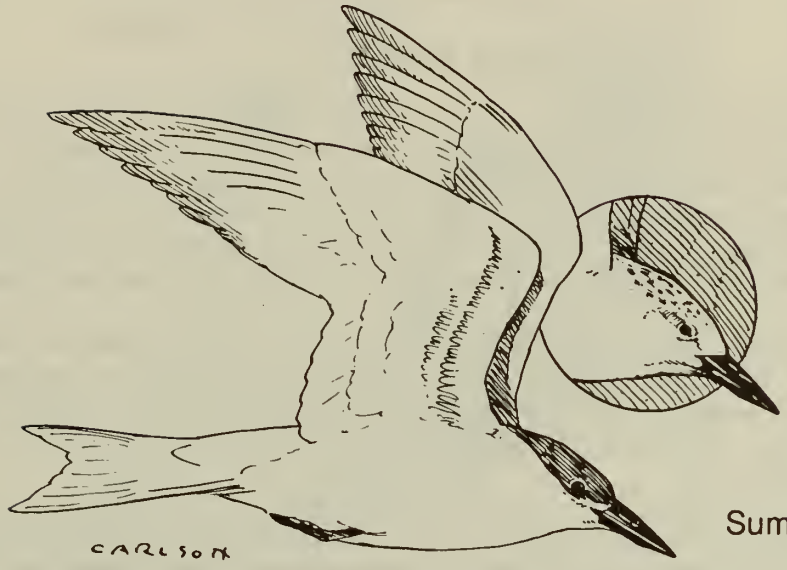
Habitat. The snowy plover breeds on expansive open dry, sandy beaches while it feeds on invertebrates on both dry and tidal sand flats. Nests are simple excavations in beach sand surrounded with shells, pebbles, and sometimes near driftwood and tufts of vegetation. Dredge spoils near the coast can provide temporary nesting habitat.

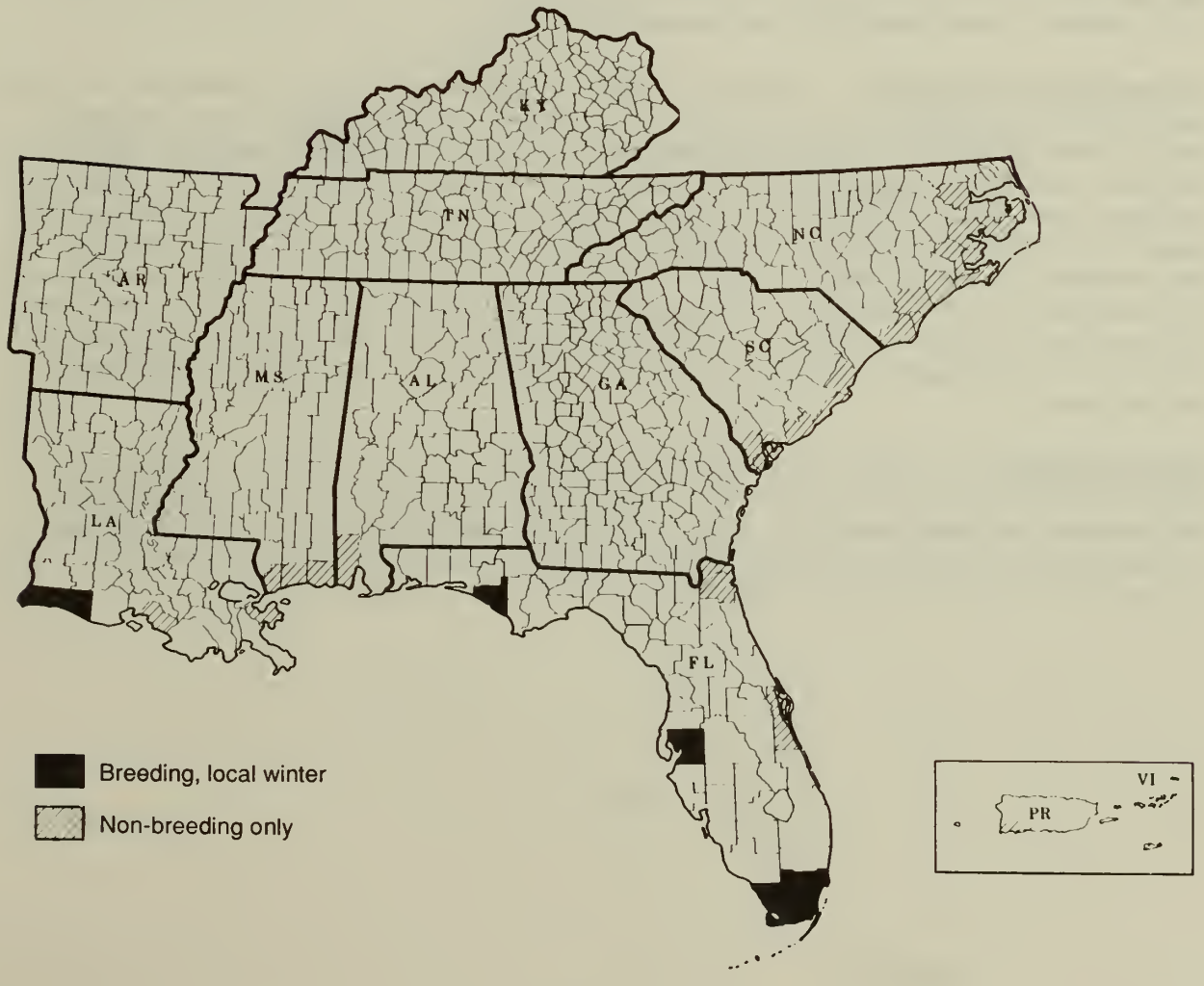
Reasons For Concern. The southeastern snowy plover (C. a. tenuirostris), the resident subspecies, is almost completely dependent on beach habitats on the gulf coast and in the Caribbean. Inlet stabilization, which may include dredging sandflats, may cause direct habitat loss, especially for foraging. Conflicts with increasing recreational use of beaches have resulted in poor reproductive success for this species in recent decades. Extensive beach travel by foot and by vehicle and the increase of predation by domestic dogs and cats have all acted to disrupt nesting activities. Dredge spoil nesting habitats are usually overgrown by vegetation or constructed upon within a year and do little to offset the losses in natural habitats. The southeastern snowy plover is of concern or State listed in the Caribbean, Florida, Alabama, and Mississippi.

Recommended Management. Protection and enhancement of upper beach zones would greatly benefit the snowy plover. This species breeds within the confines of Gulf Shore Islands National Seashore and within several national wildlife refuges. Restriction of human use in known and suspected snowy plover nesting areas within these sanctuaries should be enforced from Mid-March to Mid-August. Signs denoting a protected upper beach zone for this and other beach nesting species (such as least tern) are usually adequate on these federal properties. Other areas, especially near inlets and passes where waves and currents replenish upper beaches, also should be restricted from overuse by humans, vehicles, and pets. Dredge spoils that are replenished annually to minimize vegetation encroachment may provide acceptable nesting habitat. Proposed construction on dredge spoils used by this species should be postponed until August to allow successful nesting. Regulatory reviews should stress the importance of this species as a candidate for Federal listing and a management concern species to the Service.

Research Needs. Thorough surveys of the snowy plover's abundance throughout its range in the Southeast Region should be conducted. The possibility of formulating management guidelines so that dredge spoils may effectively offset natural habitat losses should be investigated in cooperation with States and the U.S. Army Corps of Engineers.

Gull-billed Tern





GULL-BILLED TERN

(Sterna nilotica)

Description. The gull-billed tern is a medium sized tern with a thick (gull like) black bill. The plumage of this species is all white underneath, all pale gray above, and black legs and feet. Breeding plumage birds have a black crown and nape while nonbreeding birds have a nearly all white head. Unlike most other terns, this species hunts for flying insects over fields and marshes and rarely dives into water.

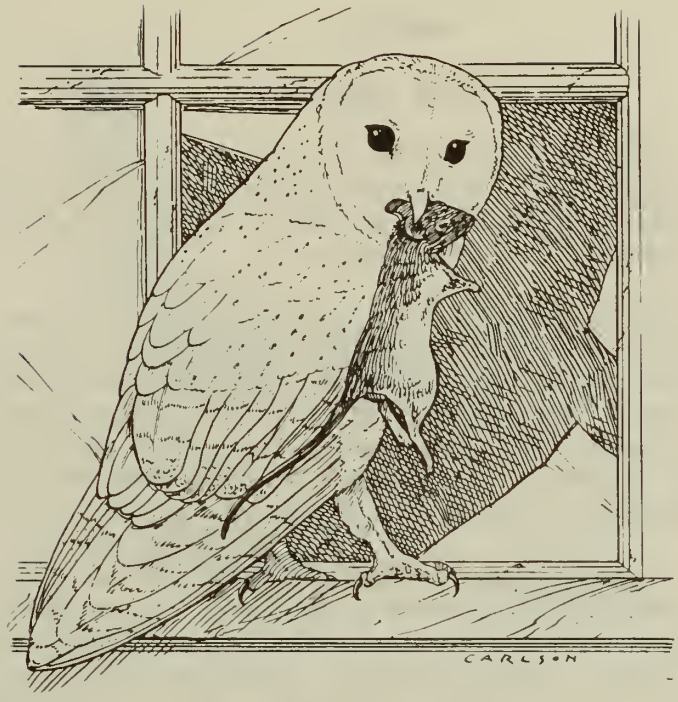
Habitat. Gull-billed tern nesting habitat consists of sparsely vegetated estuarine islands, barrier beaches and islands, dredge spoil, and shell mounds. Gull-billed terns often nest in colonies with other tern species and black skimmers. Gull-billed terns feed primarily in and over brackish and saltwater marshes.

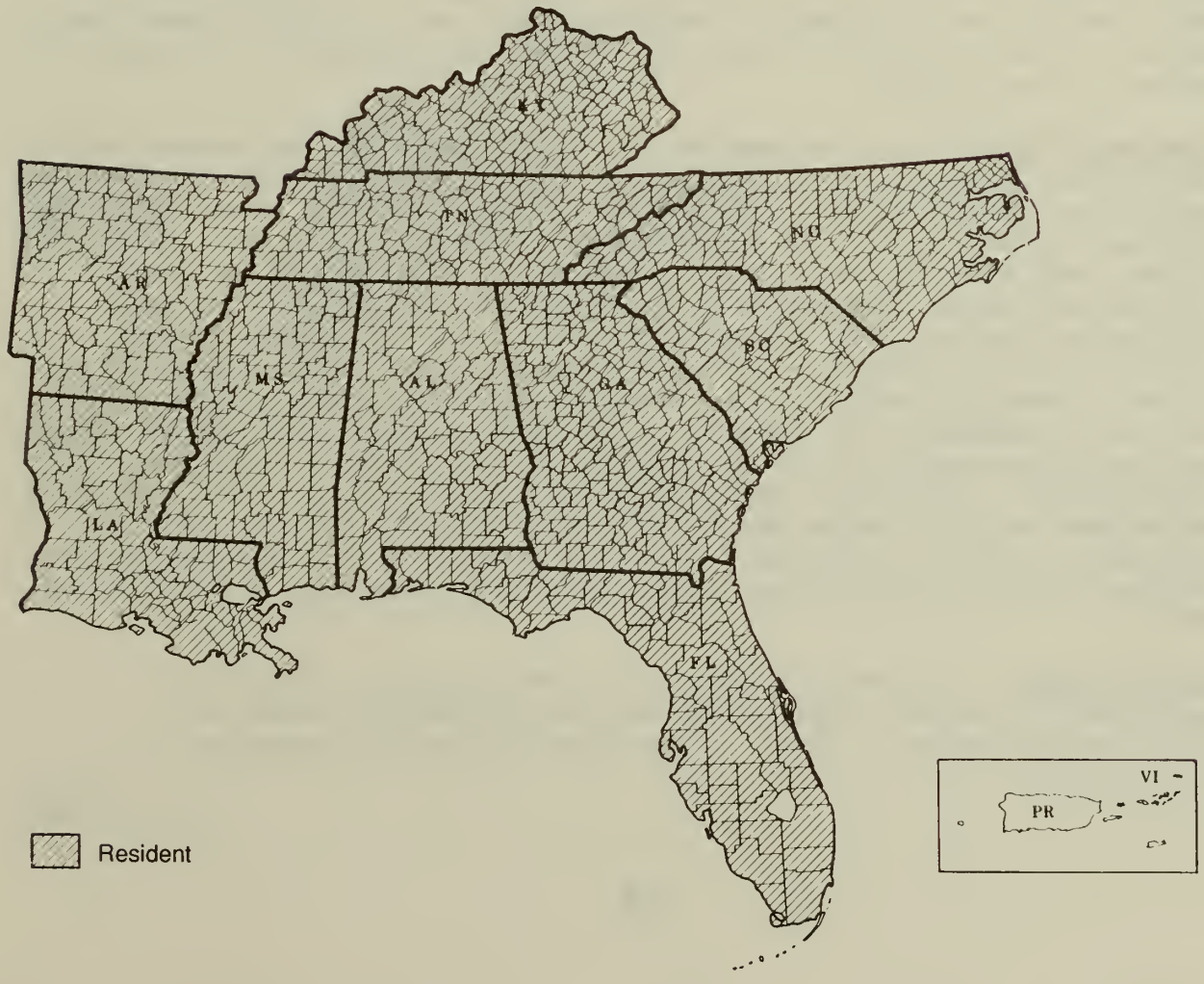
Reasons For Concern. The gull-billed tern occurs locally in widely scattered breeding colonies throughout its range. Less than 2,000 breeding birds occur within the Southeast Region, principally in North Carolina, South Carolina, Florida, Louisiana, and the Virgin Islands. This species is highly susceptible to catastrophic events including habitat disturbance and nest disturbance from predation and human activities.

Recommended Management. Protection and enhancement of known breeding colonies would greatly benefit the gull-billed tern as well as many other colonial beach nesting birds. Some colonies occur within national seashores and national wildlife refuges and should be protected from disturbance. Other colonies are subject to human access and steps should be taken to minimize human-related disturbance. Dredge spoils may be used for nesting habitat but vegetation encroachment must be minimized and human activity should be restricted to the nonbreeding season (August to March). Regulatory reviews of brackish and saltwater wetlands should stress the importance of these habitats for foraging gull-billed terns, a species of management concern to the Service.

Research Needs. Limits on the gull-billed tern's distribution, relative to other beach nesting colonial terns, should be determined. The possibility of formulating management guidelines that may encourage gull-billed terns to successfully nest on dredge spoil islands should be investigated in cooperation with States and the U.S. Army Corps of Engineers.

Barn Owl





BARN OWL

(*Tyto alba*)

Description. The barn owl is a moderately large owl with a "heart shaped" face and no eartufts. Upperparts are buffy to rusty-brown while underparts are typically white (sometimes buffy to cinnamon) with dark spots. The most often heard call is a raspy, hissing screech.

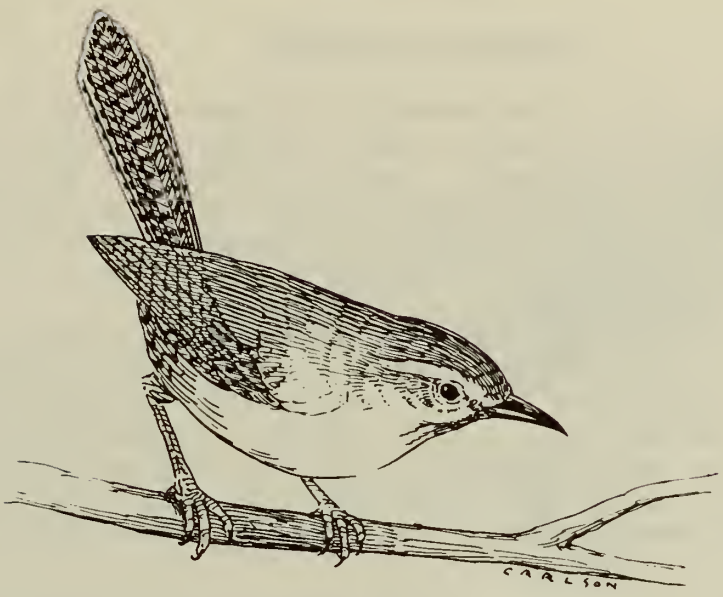
Habitat. The barn owl is found primarily near human habitations and where caves or large tree cavities occur. This species feeds in open areas, especially grassy fields, farmlands, marshes, and even some suburban areas. Nests are constructed in a wide variety of sheltered situations including barns, churches, silos, under bridges, caves, large tree cavities, covered duck blinds, and large tunnels in riverbanks. These same shelters are used for daytime roosting during the nonbreeding season.

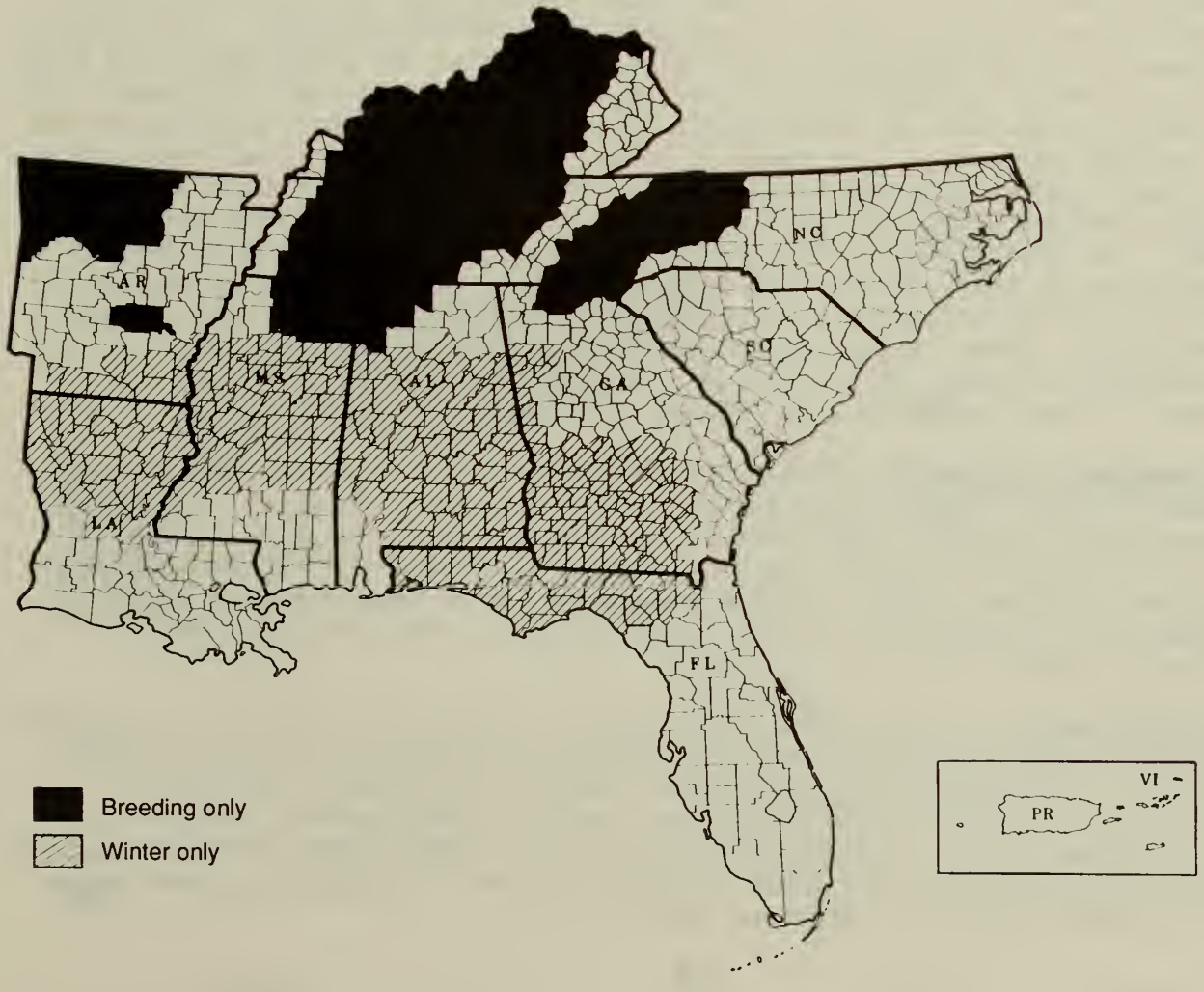
Reasons For Concern. Primary concerns for the barn owl revolve around changes during recent decades in farming practices. Conversion of cropland to industrial or suburban development and reduction of dairy and sheep pastureland may contribute to the barn owl's decline. The loss of hedgerow field borders, which support a rodent preybase, and an increasing use of pesticides are important factors explaining this species decline where farming remains widespread. Loss of nest sites where older buildings are removed is another critical factor.

Recommended Management. The barn owl can greatly benefit from reinstituting "inefficient" farming techniques that favor the preybase for this species. Positive management includes reducing the use of pesticides, allowing hedgerows and weedy plants to form field borders, and leaving some seed crop on the ground after harvest. These practices already occur on national wildlife refuges and they can be expanded to Federal inventory lands and Conservation Reserve lands through conservation easement recommendations. Barn owls respond positively to nest-box programs that replace old buildings or other "unsafe" structures. The combination of a nest-box program and moist-soil management that encourages some vegetative cover at least through the breeding season should greatly benefit this species on refuge and other managed lands. Conservation recommendations and regulatory reviews regarding agricultural activity should stress the importance of integrated pest management, inefficient farming, and cavity nest sites (including maintaining old farm buildings) for the barn owl, a species of management concern to the Service.

Research Needs. The levels of pesticide bioaccumulation in barn owl populations should be determined for developing specific guidelines in pesticide application. Little is known about the winter movements of this species.

Bewick's Wren





BEWICK'S WREN

(*Thryomanes bewickii*)

Description. A small, long-tailed songbird, the Bewick's wren is characterized by a long white eyebrow, white tail spots, reddish brown upperparts, and pale gray underparts. The similar and much more common Carolina wren differs from Bewick's wren by having chestnut underparts and no tail spots. The song of the Bewick's Wren is a variable high, thin buzz followed by warbling; somewhat similar to the song sparrow.

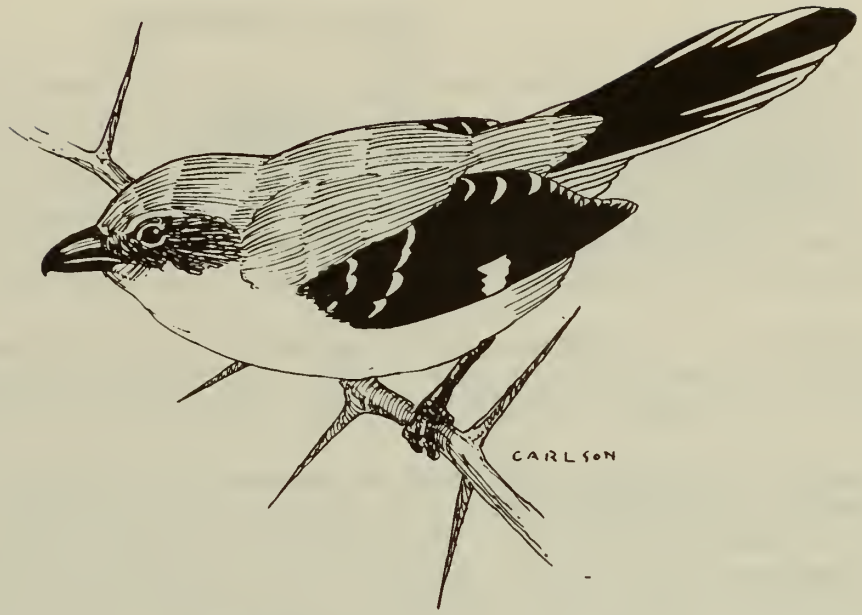
Habitat. During the 1800's and early 1900's, the Bewick's wren was common in heath bald habitats as well as rural and suburban yards in Appalachian Mountain valleys. This species is still found locally in oak-hickory forests of central Kentucky and Tennessee, and in the Ozark highlands of Arkansas. Brush piles, hedgerows, and old farm buildings are included in the list of potential nest sites. During winter, most Bewick's wrens move into the western Piedmont and coastal plain of the Southeast Region where they occur in brushy areas.

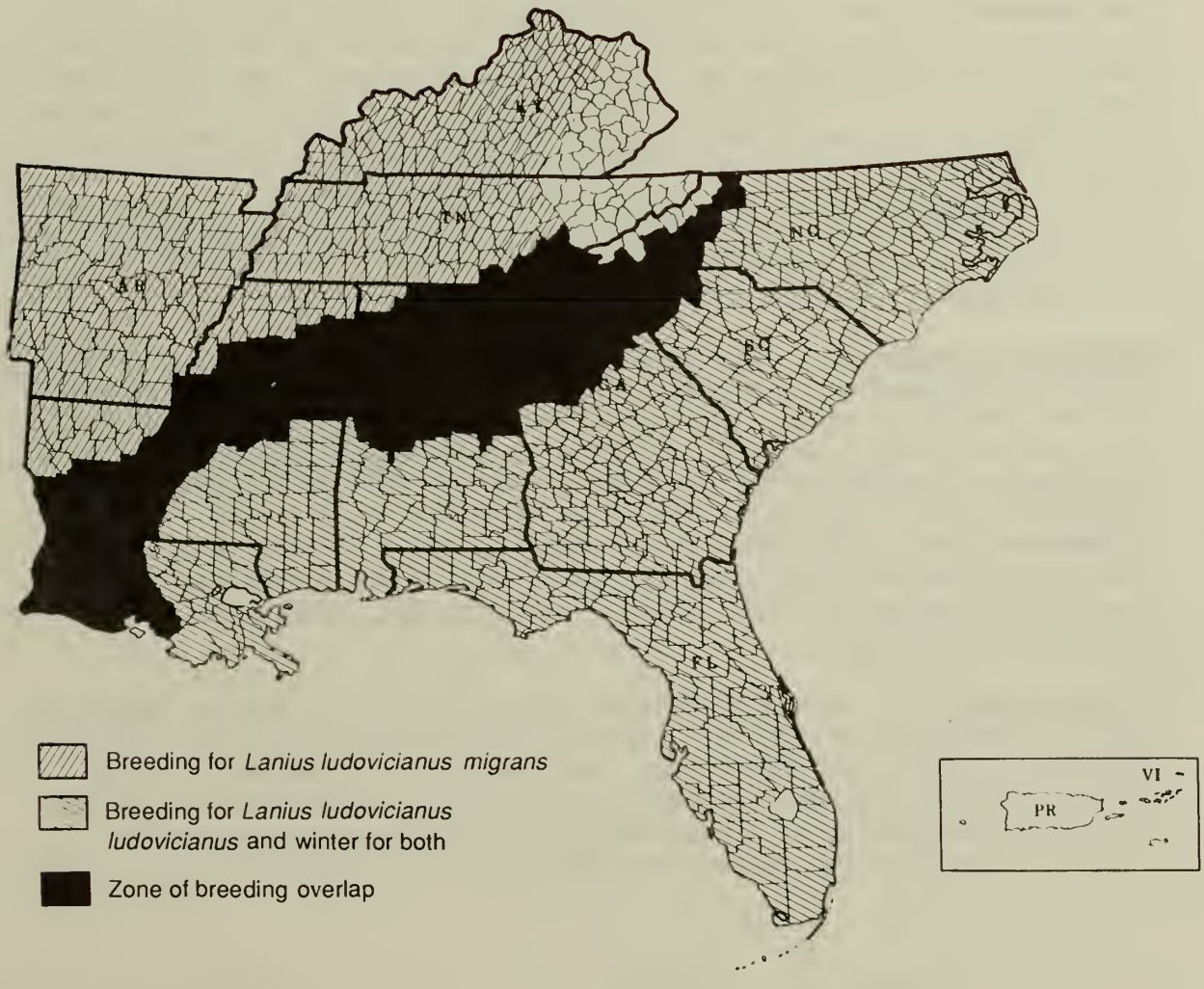
Reasons For Concern. Two subspecies of the Bewick's wren occur in the Southeast Region and both have declined since the 1920's. The Appalachian Bewick's wren (*T. b. altus*) is apparently nearing extirpation throughout its Appalachian highland breeding range within the Southeast Region. The nominate subspecies (*T. b. bewickii*) also has declined since the early 1960's but still can be found in central Kentucky, central Tennessee, and Ozark highlands. The reasons for decline are speculative. One suggestion is that the declines may be related to regional increases in exotic European starling and house sparrow and native house wren and song sparrow. These species are all extremely aggressive and are often cited to have caused the decline of the Bewick's wren. The Bewick's wren seems to favor small areas of open brushy habitat surrounded by large forests; these habitats have been replaced by smaller forest patches surrounded by large areas of farmland or early successional vegetation. Thus, changes in habitat that influenced regional range expansions for some species also may have influenced range retraction in Bewick's wren, independent of intense interspecific aggression.

Recommended Management. Perhaps management of Appalachian and oak-hickory hardwoods that reduces edges but maintains very small ($\leq$5 acres) and widely-spaced brushy patches would benefit the Bewick's wren. Placing nest boxes near the ground in brushy areas may benefit this species. Regulatory reviews of land management plans should consider factors affecting Bewick's wren, especially the Appalachian subspecies which is a candidate warranted for Federal listing.

Research Needs. A detailed habitat analysis is needed to quantify and qualify landscape characteristics favored by Bewick's wren throughout its breeding range in the Southeast Region. Winter habitat requirements are poorly understood as well. The presettlement status of this species should be ascertained. Early colonial settlement may have facilitated a range expansion with the proliferation of small openings that was reversed when these became consolidated into very large openings.

Loggerhead Shrike





LOGGERHEAD SHRIKE

(*Lanius ludovicianus*)

Description. A medium sized species, the loggerhead shrike has a distinctive black facial mask. The wings and tail are dark, contrasting with white wing patches that are visible in flight, a bluish gray head and back, and white underparts. The rapid wingbeats and undulating flight are characteristic. The thick black bill has a hooked tip. Shrikes are known also as "butcher birds" for their habit of impaling prey (insects, small birds and mammals) to barbed wire fences and thorny shrubs.

Habitat. The loggerhead shrike primarily occurs in open-country habitats such as farmlands and roadways, but also in open woodlands and savannahs. Nests are usually concealed in shrubs or short trees with dense crowns.

Reasons For Concern. Despite an abundance of "suitable" open-country habitat, loggerhead shrike populations in most Southeast Region States are undergoing declines. These declines are most severe with the migrant loggerhead shrike (*L. l. migrans*), which breeds in the Southeast Region primarily in Kentucky, Tennessee, and Arkansas and winters throughout. The nominate subspecies (*L. l. ludovicianus*), breeding and wintering in the remaining states, also has declined. The causes of these declines are not clearly understood but may involve conversion from "inefficient" to "efficient" farming techniques. Most important is the loss of hedgerows, short shade trees, and thorny vegetation for nesting and a reduction of native pastureland as a preferred foraging habitat. An indirect impact may involve increased use of pesticides along roadways and in farmlands. Negative effects from pesticides have not been shown in reproductive effort but dieldrin has been shown to significantly affect hunting efficiency in young loggerhead shrikes, possibly lowering overwinter survival.

Recommended Management. The greatest opportunity to enhance breeding habitat for loggerhead shrikes is through management of farmlands on national wildlife refuges and Federal inventory lands and through the Conservation Reserve Program. Farming techniques, to include restoring shelterbelts (including thorny shrubs) and instituting integrated pest management, would constitute important conservation easement recommendations. Conversion from commodity crops to pasture or other short-grass habitat also would be beneficial to the loggerhead shrike, a species of management concern and a candidate (*L. l. migrans*) for Federal listing by the Service.

Research Needs. Direct and indirect effects of pesticides on loggerhead shrikes need to be determined. Specific descriptions also are needed for developing habitat configurations that benefit this species in rural areas. The presettlement status of this species should be ascertained. The early development of widespread agriculture may have served to initially increase the range and abundance of this species.

Cerulean Warbler

CERULEAN WARBLER

(Dendroica cerulea)

Description. A small bird, the male cerulean warbler is characterized by bluish upperparts, white underparts with black breast band and blue-gray streaking on the sides, and two prominent white wing-bars. The female has blue-green upperparts and pale yellow underparts. The cerulean warbler however, is heard more often than it is seen. The song is a short, fast, accelerating series of buzzy notes on one pitch, usually ending with a single buzz note about a tone higher; "wee wee wee wee bzzz" or "just a little sneeze."

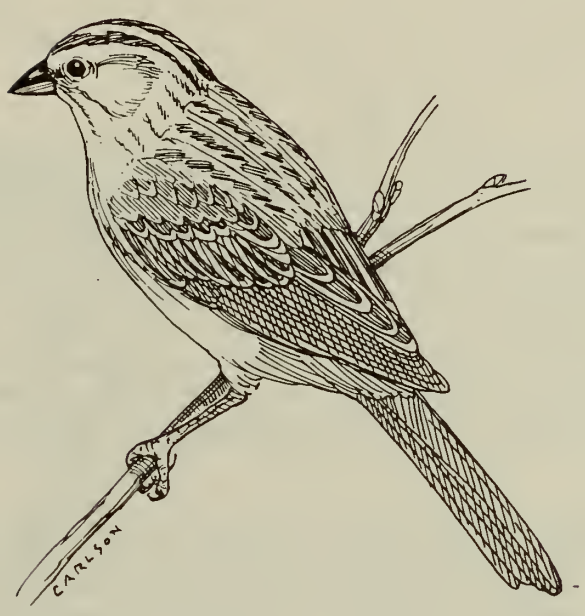
Habitat. The preferred breeding habitats of the cerulean warbler are mature (closed canopied) bottomland and steeply-sloped cove hardwood forests with usually sparse understory. This species usually nests at heights in excess of 40 feet. The cerulean warbler is locally distributed throughout its range and often forms loose "colonies." Population centers occur along most middle elevation riparian systems within the Southeast Region. Cerulean warblers generally avoid elevations above 3500 feet in the Appalachian highlands as well as the coastal plain, except along the Roanoke River in North Carolina. The principal migration corridor is along the Mississippi River system.

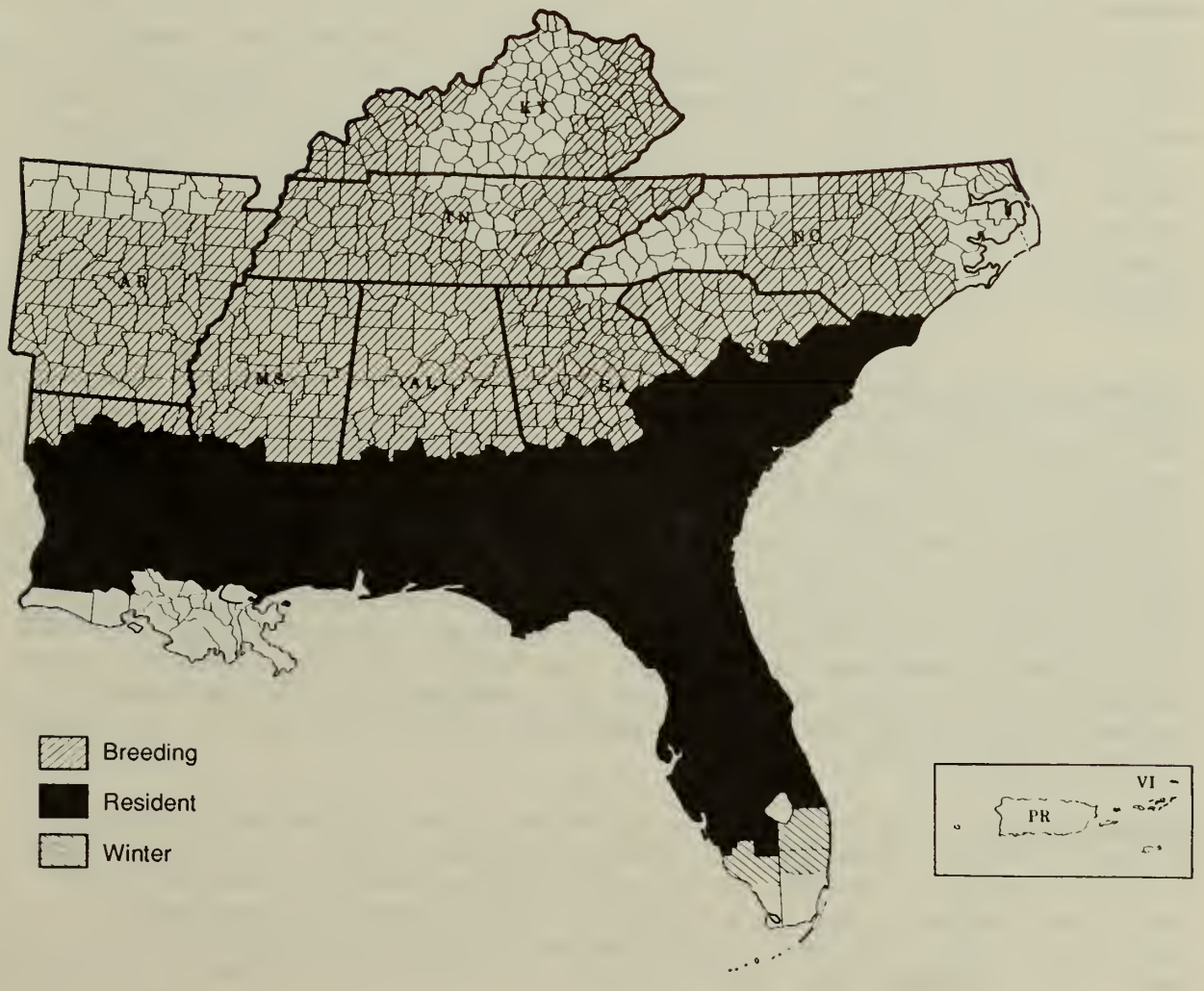
Reasons For Concern. Steep population declines have been detected along the Ohio and Mississippi River Basins, the distributional core for this species. Reasons for the decline may be associated with losses to mature hardwood habitats and the colonial nature of the cerulean warbler. This is one of the most area sensitive species found in hardwood forests. No less than 1750 acres of contiguous forest appear to be required for this species to occur, with peak probability of occurrence exceeding 7,000 acres. In addition, large areas of mature trees with a high and dense canopy are becoming uncommon throughout the cerulean warbler's range. Two trees often cited to harbor cerulean warblers were chestnut and American elm, both no longer occur as forest dominants due to disease. The cerulean warbler is also susceptible to brood parasistism from brown-headed cowbirds.

Recommended Management. Management of bottomland and Appalachian Cove hardwood forests should minimize fragmentation by creating large mature stands with dense canopies, with only very small and widely spaced open areas to avoid excessive habitat edge. Opportunities exist for restoring large stands of mature bottomland hardwoods that would benefit cerulean warblers and many other songbird species on national wildlife refuges, Federal inventory lands, and through the Conservation Reserve Program. Song surveys should be conducted during late May and June where suitable habitats exist. Regulatory reviews involving middle elevation bottomland and Appalachian Cove hardwood forests should stress the importance of these habitats to the cerulean warbler, a species of management concern to the Service.

Research Needs. The population dynamics of this species and its habit of forming loose colonies should be investigated to determine if "available" but unoccupied habitat is indeed identical to occupied habitat. The cerulean warbler is a neotropical migrant and it is unknown how extensive conversion of Andean cloud forests is affecting this species.

Bachman's Sparrow





BACHMAN'S SPARROW

(Aimophila aestivalis)

Description. The Bachman's sparrow is a large sparrow, with large bill and a long rounded tail. Plumage varies from dusky-gray brown in extreme southern populations to more reddish brown in northern and western populations. The song of the Bachman's sparrow is distinctive and is heard from at least March through August. The song starts with a clear and loud whistle and is followed by a long trill or warble, on a different pitch.

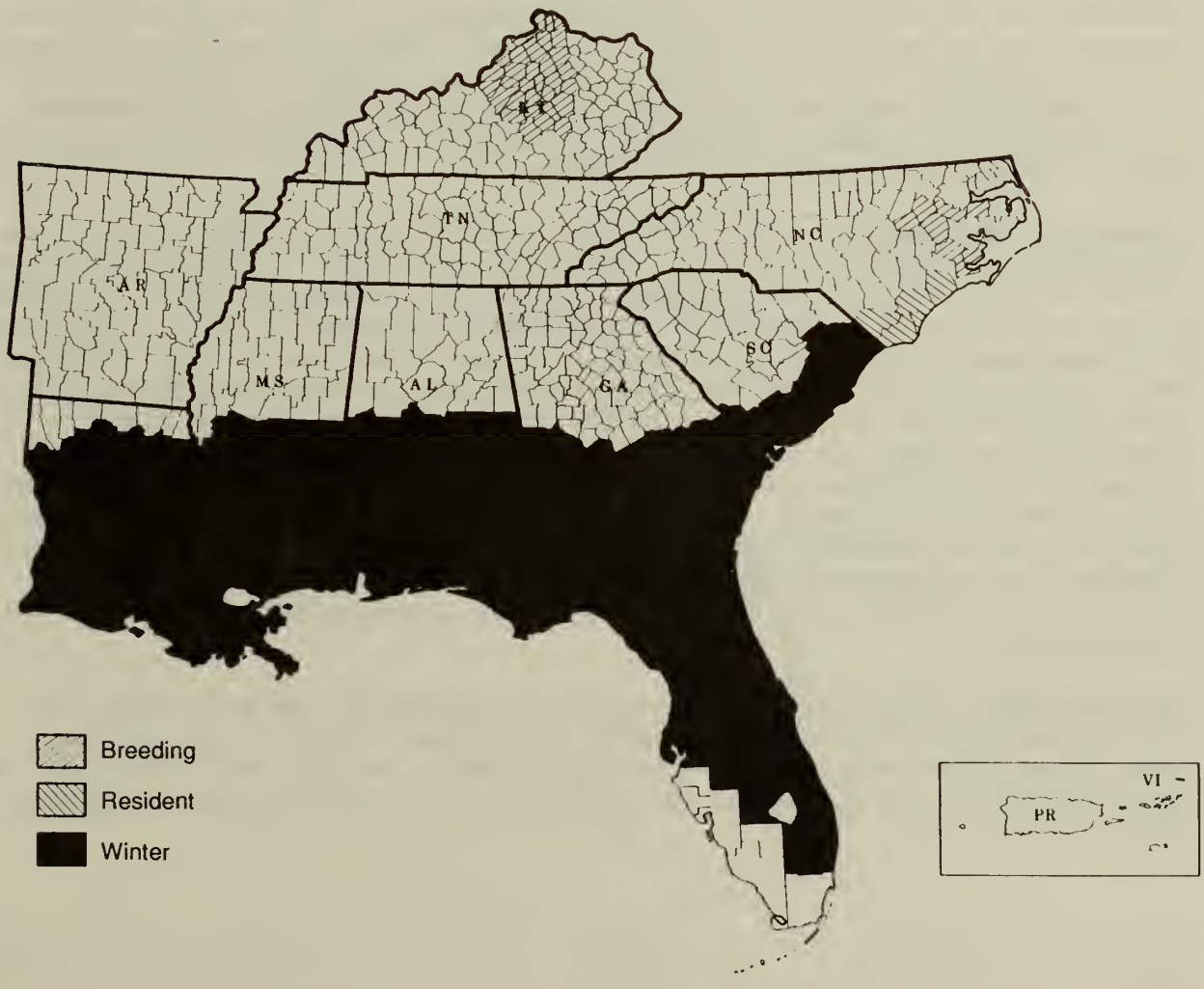
Habitat. The primary habitat used by this species is open pine woodlands with dense ground cover but little or no understory. In addition, oak-pine and scrub palmetto woodlands with dense ground cover are used. Development of ferns and bunch grasses with regular burning seems to be optimal for this ground-nesting species, especially when the overstory is composed primarily of pine. Early successional vegetation after logging is usable but only before dense hardwood understory vegetation develops. Dense woodlands with little or no ground cover and woodlands with a well-developed understory are avoided. The Bachman's sparrow expanded its range into the Midwest and Northeast Regions early this century. This expansion has apparently been reversed since the 1980's.

Reasons For Concern. The Bachman's sparrow is presently declining throughout the core of its range, encompassed totally within the Southeast Region. Initial cutting of densely stocked virgin pine woodlands allowed for extensive openings that were quickly invaded by early successional vegetation and subsequently by Bachman's sparrow. Similarly, initial land clearing of upland hardwoods that were not immediately converted to farmland, developments, or replanted with trees also encouraged the spread of the Bachman's sparrow. The advent of more efficient landscape conversions and the development of dense secondary growth in previously cleared land probably led to the demise of this species on the periphery of its range. Widespread conversion of natural stands of loblolly and longleaf pine, with dense wiregrass or sawpalmetto understory, to densely stocked monocultures of loblolly and slash pine may account for population declines within the Southeast Region. Finally, fire suppression allows rapid understory development in otherwise suitable pine stands.

Recommended Management. Presently, the most effective management guidance for Bachman's sparrow is the same as that of habitat management for the endangered red-cockaded woodpecker. Maintenance of oldgrowth longleaf and loblolly pine woodlands, with 20-to-25 foot spacing between trees, would benefit both the woodpecker and the sparrow. A 2-to-5 year burn rotation is recommended for maintenance of dense but short ground cover. Recently cleared areas planted with longleaf pine are suitable to this species for a longer time period than areas planted with loblolly pine. Areas cleared by burning appear to be preferred over areas cleared by mechanical means. Powerline corridors that are frequently mowed may also provide some habitat for this species. Land management plan reviews should stress the importance of pine woodlands for the Bachman's sparrow, a candidate for Federal listing and a species of management concern to the Service.

Research Needs. A detailed study is needed on the population dynamics of Bachman's sparrow under various forest management regimes throughout the Southeast Region. Concepts in landscape ecology should be applied to understand Bachman's sparrow ecology and define subsequent management practices. Winter ecology of this species is poorly understood. Effects of commercial raking of pine needles need to be determined.

Henslow's Sparrow



HENSLOW'S SPARROW

(Ammodramus henslowii)

Description. The Henslow's sparrow is a small sparrow, with a short pointed tail and a large flat head. Head color tends to be greenish, which is unique among sparrows, and wings are deep chestnut. These sparrows are very secretive and hard to see in the open unless the observer is persistent in flushing them.

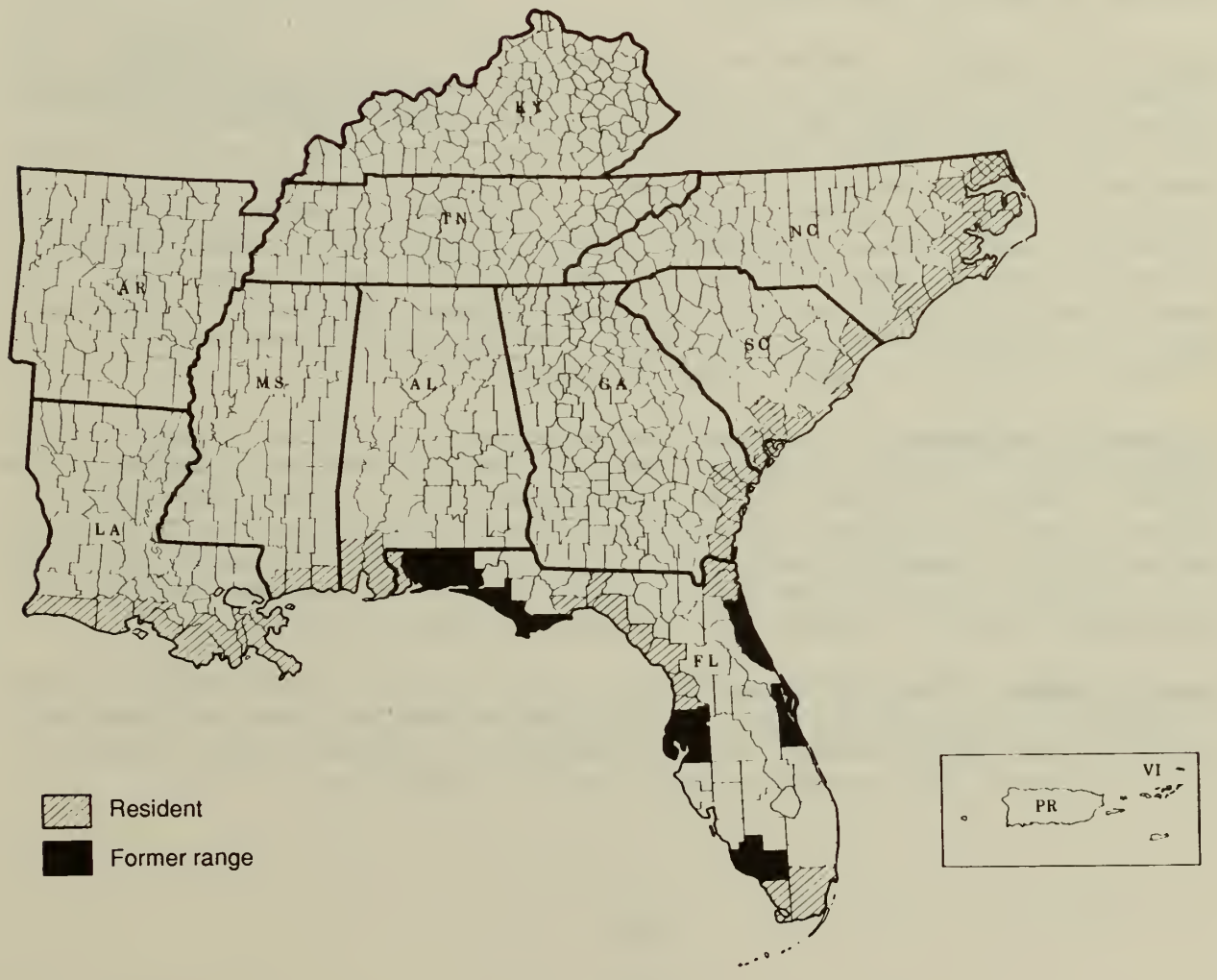
Habitat. The primary habitats used by Henslow's sparrow in the Southeast Region are wet meadow, often dominated by broomsedge, and wet wiregrass within longleaf pine woodlands. Maintained corridors along utility lines also provide suitable habitat where moist broomsedge is present.

Reasons For Concern. This species is undergoing widespread declines in its breeding range, which is directly north of the Southeast Region. Detected declines appear associated with the recent trend for fields to not remain idle long enough to provide suitable breeding habitat. Although only a local breeding species in the Southeast Region, the wintering range of the Henslow's sparrow is principally within the coastal plain from South Carolina to Texas. Old field acreage is also declining in the wintering grounds. This decline is due to decreasing cropland and more efficient use of what cropland remains. The habitat of the Henslow's sparrow is transitory in nature and requires some type of cyclic disturbance to be maintained.

Recommended Management. Utility corridors may be the only habitats receiving dependable maintenance in keeping "old-field" conditions. Maintenance of open pine woodlands through fire management, which also encourages dense wiregrass ground cover, should be beneficial to the Henslow's sparrow and is consistent with management for red-cockaded woodpecker and Bachman's sparrow. Cropland that is fallow for three-to-five years should develop dense broomsedge ground cover, which should be maintained to the extent practical. When field conversion does occur it should not be from October through March to allow successful overwintering. Opportunities to manage cropland for this species include inefficient farming on national wildlife refuges and Federal inventory lands and can be expanded to Conservation Reserve lands through conservation easement recommendations. Land management plan reviews should address the winter habitat needs of the Henslow's sparrow, a species of management concern to the Service.

Research Needs. There may be differences in overwinter survival among the three primary habitats in which Henslow's sparrows are found. A study to compare overwinter survival rates among oldfields, utility corridors, and open pine woodlands would be helpful in planning future management priorities for this species.

Seaside Sparrow



SEASIDE SPARROW

(*Ammodramus maritimus*)

Description. A small, rather non-descript species, the seaside sparrow has a yellow patch between eye and bill, the bill is proportionately long and tapering, and the tail is short and pointed. Atlantic coast populations have drab-gray plumage. Gulf coast populations are more buffy to yellow in plumage, especially on underparts and eyeline. The apparently extinct dusky seaside sparrow (*A. m. nigrescens*), from the Titusville Florida area, had blackish upperparts and dark heavy streaking on underparts. The federally endangered Cape Sable seaside sparrow (*A. m. mirabilis*), from extreme South Florida, has greenish upperparts and moderately streaked underparts. The song of the seaside sparrow resembles that of the red-winged blackbird but is shorter and buzzier.

Habitat. Seaside sparrows are found in emergent wetlands primarily in coastal brackish (breeding) and saltwater (wintering) marshes. Dense and moderately tall stands of cordgrass, rush, and saltgrass constitute the major plant species used by the seaside sparrow. The Cape Sable subspecies differs from all other populations by also occurring in freshwater marshes, primarily sawgrass and muhley grass prairies.

Reasons For Concern. Seaside sparrows are totally dependent on emergent wetlands and are sensitive to fragmentation of these habitats. The apparent extinction of the dusky seaside sparrow was attributed to impounding its limited salt marsh habitat for mosquito control, as well as by marsh drainage, development, dredge-and-fill operations, and frequent wildfires in the brackish marshes near the St. Johns River. This species may be impacted when its habitat needs are not considered during waterfowl improvement projects. All seaside sparrow populations are potentially subjected to these same impacts, and population declines have been documented throughout the species range. In addition, the spread of shrubby woody plants in some areas of Florida has resulted in loss of seaside sparrow habitat.

Recommended Management. Protection and enhancement of coastal emergent wetlands would greatly benefit this species. Populations are protected within national seashores and national wildlife refuges, but the vast majority of habitat occurs outside these Federal properties. Song counts should be conducted where possible from April to June. Regulatory reviews of dredge and fill operations should stress the importance of coastal emergent wetlands to the seaside sparrow, a species of management concern to the Service.

Research Needs. Some population declines need to be studied in greater detail as they are not associated with outright loss of habitat. These declines may be due to more subtle changes in the ecosystem, as with the recent absence of seaside sparrows from marshes south of the St. Johns River.

SCIENTIFIC NAMES OF PLANTS (all bird scientific names can be found in Habitat Tables)

Plants

American elm (*Ulmus americana*)
Broomsedge (*Andropogon virginicus*)
Cattail (*Typhus* sp.)
Chestnut (*Castanea dentata*)
Cordgrass (*Spartina bakeri*)
Glasswort (pickleweed; *Salicornia* sp.)
Hickory (*Carya* sp.)
Loblolly pine (*Pinus taeda*)
Longleaf pine (*Pinus palustris*)
Muhley grass (*Muhlenbergia capillaris*)
Oak (*Quercus* sp.)
Rush (*Juncus* sp.)
Saltgrass (*Distichlis* sp.)
Sawpalmetto (*Serenoa repens*)
Sawgrass (*Cladium jamaicense*)
Sedge (*Carex* sp.)
Slash pine (*Pinus elliottii*)
Wiregrass (*Aristida stricta*)

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Skaggs, M. B. 1979. Present and past status of Bewick's wren. Redstart 46:132-137.

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MANAGEMENT PROBLEMS, OPPORTUNITIES, AND SUGGESTIONS FOR BROADLY-DEFINED HABITATS, OUTLINE NARRATIVE, AND HABITAT TABLES

Outline narrative addressing nongame bird management problems, opportunities, and suggestions for habitats. Each habitat narrative is accompanied by corresponding HABITAT TABLES. This information provides guidance for Service lands and can serve as advice to all other parties when managing for nongame birds. Management actions favoring some species or some habitats may unavoidably come in conflict with other species or nongame bird management in other habitats. Therefore, this information could be useful for understanding what type of conflicts may arise in such situations and for developing the best means to resolve these conflicts while fulfilling desired management objectives.

Habitat tables are provided for identifying species that may be present in any particular habitat, their basic ecology, and tips for their management. Note that some game species are included when deemed appropriate. Also, note that many species are treated under more than one habitat category. Roman numerals for each table corresponds with narrative addressing management problems, opportunities, and suggestions. Standard State abbreviations are used under distribution. This information is provided to heighten awareness of the species occurring throughout the Southeast Region. The bird life of many States and geographical areas are treated in various books; these treatments and local authorities should be consulted to refine the information presented here. In addition to local treatments, Service personnel are encouraged to consult the references listed below.

Abbreviations under management status are E = Endangered, T = Threatened, HTC = highest priority for regional concern, HC = high priority for regional concern, and MOC = moderate priority for regional concern.

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I. Open ocean (including within sight of shoreline, bays, inlets, intercoastal waterway)

A. Primary management problems.

1. Open ocean environmental contamination from tanker oil spills and from outer continental shelf drilling activities on lease sales administered by the Minerals Management Service (Department of the Interior).

2. Insular nesting habitats subjected to depredation from natural and introduced predators, human disturbances, and accumulation of pollutants, among other impacts.

3. Natural catastrophes such as hurricanes and squalls.

B. Management opportunities and suggestions.

1. Encourage monitoring of off-shore oil rigs and tankers for safeguards against spills.

2. Coordinate volunteer beach bird surveys to provide baselines in comparison with spill events.

3. Provide protection, where appropriate, to isolated nesting and open ocean foraging habitats against human-related impacts, to include nominations as sanctuaries through the Marine Protection, Research, and Sanctuaries Act of 1972, or inclusion into the National Wildlife Refuge System.

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D. Fish and Wildlife Service Contacts.

1. Patuxent Wildlife Research Center.

2. National Wetlands Research Center.

I. Open Ocean (including areas within sight of shoreline, bays, and inlets)

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Red-throated loon *Gavia stellata*		Winter Atlantic and Gulf	Along coast	
Common loon *Gavia immer*	MOC	Winter Atlantic and Gulf	Along coast	Susceptible to contaminants
Horned grebe *Podiceps auritus*		Winter Atlantic and Gulf	Along coast	
Red-necked grebe *Podiceps grisegena*		Winter Atlantic	Along coast	
Northern fulmar *Fulmarus glacialis*		Mar. and Oct. North Carolina	Shelf	
Black-capped petrel *Pterodroma hasitata*	MOC	All year Atlantic and Caribbean	Deep waters, principally off Cape Hatteras	Now restricted as a breeder only at Hispaniola; high levels of Mercury in tissue found
Bermuda petrel *Pterodroma cahow*	E	Bermuda and adjacent north Atlantic waters(?)	Deep waters, may forage off Cape Hatteras	Nests on Nonsuch Island (Bermuda), foraging behavior and range poorly known
Cory's shearwater *Calonectris diomedea*		May-Nov. Atlantic, Gulf, Caribbean	Shelf	
Greater shearwater *Puffinus gravis*		May-Nov. Atlantic and Gulf	Shelf	

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Sooty shearwater *Puffinus griseus*		May-June Atlantic	Shelf	
Manx shearwater *Puffinus puffinus*		March North Carolina	Shelf	
Audubon's shearwater *Puffinus lherminieri*		Apr.-Nov. Atlantic, Gulf, Caribbean	Shelf	Protection of nesting sites on isolated islets around Culebra and VI
Wilson's storm-petrel *Oceanites oceanicus*		Apr.-Oct. Atlantic, and Gulf	Shelf	
Leach's storm-petrel *Oceanodroma leucorhoa*		May, Aug. Atlantic	Shelf	
Band-rumped storm-petrel *Oceanodroma castro*		June-Aug. Atlantic	Deep water	
White-tailed tropicbird *Phaethon lepturus*		Apr.-Sept. Atlantic, Gulf, Caribbean	Shelf	Protection of nesting areas, Bermuda, Bahamas through Caribbean
Red-billed tropicbird *Phaethon aethereus*		Apr.-Sept. Caribbean	Shelf	Protection of nesting areas, VI, PR, Lesser Antilles
Masked booby *Sula dactylatra*		Apr.-Aug. Gulf	Nearshore-shelf	Protection of nesting areas, small islands off PR, and VI

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Brown booby *Sula leucogaster*		Apr.-Aug. Gulf and Caribbean	Nearshore-shelf	Protection of nesting areas through Caribbean
Red-footed booby *Sula sula*		Apr.-Aug. Caribbean	Nearshore-shelf	Protection of nesting areas through Caribbean
Northern gannet *Morus bassanus*		Winter Atlantic and Gulf	Nearshore-shelf	
Brown pelican *Pelecanus occidentalis*	E (LA, MS,PR, VI)	All year Atlantic, Gulf, Caribbean	Along coast	Protection of nesting areas throughout Region
Great cormorant *Phalacrocorax carbo*		Winter Atlantic	Along coast	
Double-crested cormorant *Phalacrocorax auritus*		All year Atlantic and Gulf	Along coast	
Magnificant frigatebird *Fregata magnificens*		Summer Gulf and Caribbean	Along coast-shelf	Robs other seabirds of food; nests throughout Caribbean
Red-necked phalarope *Phalaropus lobatus*		May, Aug.-Oct. Atlantic	Shelf	
Red phalarope *Phalaropus fulicaria*		Mar.-Apr., Dec. Atlantic	Shelf	

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Pomarine jaeger *Stercorarius pomarinus*		Sept.-May Atlantic, Gulf, and Caribbean	Shelf	
Parasitic jaeger *Stercorarius parasiticus*		Sept.-May Atlantic and Gulf	Shelf	
Long-tailed jaeger *Stercorarius longicaudus*		Sept.-Oct. Atlantic	Deep water	
South polar skua *Catharacta maccormicki*		June-Sept. Atlantic	Deep water	
Most gull species *Larus* spp.		Winter Atlantic, and Gulf	Along coast	
Black-legged kittiwake *Rissa tridactyla*		Winter Atlantic and Gulf	Shelf	
Most tern species *Sterna* spp.		All year Atlantic, Gulf, Caribbean	Along coast	Many nest along coast, barrier islands
Roseate tern *Sterna dougallii*	T	Migrant Atlantic; Winter Gulf and Caribeean	Deep water	Protection of isolated breeding areas, FL Keys, Bahamas, VI, PR
Arctic tern *Sterna paradisaea*		May-June Atlantic	Deep water	

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Bridled tern *Sterna anaethetus*		Apr.-Sept. Atlantic, Gulf, and Caribbean	Shelf	Protection of breeding areas, Bahamas through Caribbean
Sooty tern *Sterna fuscata*		Apr.-Sept. Atlantic, Gulf, and Caribbean	Shelf	Protection of breeding areas, Dry Tortugas, Caribbean, Bahamas, Bahamas, Chandeleur Island (LA)
Brown noddy *Anous stolidus*		Apr.-Sept. Gulf and Caribbean	Shelf	Protection of breeding areas, Dry Tortugas, Caribbean, Bahamas
Dovekie *Alle alle*		Winter North Carolina	Shelf	
Razorbill *Alca torda*		Winter North Carolina	Shelf	

II. Openwater and emergent wetlands.

A. Primary management problems.

1. Wetland losses through dredging and filling, drainage and diversion, some levee and dike construction, and creation of reservoirs among many other activities.

2. Lack of suitable open water foraging habitat for some species, nearby cover for marsh nesting species, or trees for species requiring cavities or elevated nesting structures.

3. Limited and rapidly decreasing wetlands in the Caribbean coupled by intense hunting there has led to serious declines in a number of wetland species, many of which are now candidates for federal listing.

B. Management opportunities and suggestions.

1. Effective use of Fish and Wildlife Coordination Act, Clean Water Act, Rivers and Harbors Act, Farm Act, Endangered Species Act, and North American Waterfowl Management Plan to help protect freshwater emergent wetlands. Restoration and enhancement activities outside Service lands can often be supported through Pittman-Robertson on and Dingell-Johnson Act funds.

2. Management tools for enhancing open water foraging habitat for many species may include open marsh water management and pothole blasting. Open water is encouraged when deemed appropriate to not only provide foraging habitat but to also retard eventual encroachment of some emergent wetlands by more terrestrial vegetation. There are limits, however, on how much open water can occur before adversely affecting some marsh species, especially rails, not dependent on open water. Determining when these limits are exceeded is still a debated subject.

3. Breeding rails require some water to be present for food resources but not too much as to swamp nests and disrupt breeding behavior. Dewatering of impoundments should occur before Mid-April and should be gradual to provide maximum edge between moist soil and marsh; this edge is preferred by foraging rails. Wetland management should also maximize nesting cover from emergent perennial vegetation. Habitat for rails and other marsh nesting birds can be provided every year along with other management activities by flooding different impoundments in different years (Eddleman et al. 1988, Fredrickson and Reid 1986, Fredrickson and Taylor 1982, Rundle and Fredrickson 1981).

4. Fall migrant rails and other marsh birds require shallow flooding of impoundments to commence earlier than is conventional for waterfowl management, beginning in late summer or early fall

(rather than late fall or winter). Also migrating rails require a variety of shallow water depths, robust cover, and short-stemmed seed-producing plants (Rundle and Fredrickson 1981). Flooding impoundments too deeply and too early results in early macrophyte senescence, which affects waterfowl as well as rails, and loss of cover.

5. Spring migrant rails require shallow flooding ($\leq$5 inches), but with some habitat provided at depths up to 20 inches. Rail response is best when partial drawdowns concentrate invertebrate prey which also benefit late spring dabbling ducks. Land-leveling on national wildlife refuges or other waterfowl management areas should be discouraged as it minimizes the topographic relief that provides maximum amount of vegetation/water interface preferred by foraging rails and other marshbirds.

6. Fire management in marshes is often important for retarding scrub encroachment, reducing overall vegetative cover, and increasing diversity of emergent vegetation. This is extremely beneficial to waterfowl, and long-legged waders. However, care should be taken on timing and extent of fire use. In marshes with high rail densities, extensive burning should not be conducted from March through July if possible to avoid disruption of breeding. Studies at several national wildlife refuges are underway to determine exactly when and under what conditions prescribed fire can be a useful tool for natural resource management.

7. A balance should be maintained to not unnecessarily reduce existing forested wetland (bottomland hardwoods) acres or reduce the potential for forested wetlands to be rehabilitated. These areas provide essential nesting habitat for many species foraging on emergent wetlands and provides nesting sites and cover for many other species. In South Florida and the Caribbean, mangroves represent important habitats for colonially nesting waders. Many tree nesting species will respond to artificial nesting platforms or nest boxes/covered structures in otherwise open habitats.

C. Key references.

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D. Fish and Wildlife Services Contacts.

1. Patuxent Wildlife Research Center.

2. National Wetlands Research Center.

3. National Wetlands Research Center.

E. Other Contacts.

1. National Park Service, Everglades National Park.

II. Fresh, brackish, and coastal open water and emergent wetlands

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Common loon	MOC	Winter regionwide, mostly near coast	Large lakes, reservoirs, and channels	Potentially susceptible to contaminants
Least grebe *Tachybaptus dominicus*		Resident PR	Swamps dominated by cattail	
Pied-billed grebe *Podilymbus podiceps*		Resident	Forages in fresh and brackish; nests primarily in freshwater emergents	Benefitted by open marsh water management
Eared grebe *Podiceps nigricollis*		Winter Gulf Coast		
Western grebe *Aechmophorus occidentalis*		Winter LA Coast		
American white pelican *Pelecanus erythrorhynchos*		Winter Gulf Coast and FL		
Double-crested cormorant		Resident coast, local but increasing interior	Requires trees for nesting	Conflicts with catfish farming
Anhinga *Anhinga anhinga*		Resident coasts, FL; Summer Miss. Valley	Nests in trees in or near forested swamps	
American bittern *Botaurus lentiginosus*	HTC	Summer local; winter Coastal Plain	Extensive emergent vegetation cover, primarily freshwater	Harmed by excessive open marsh water management

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Least bittern *Ixobrycus exilis*	HTC	Summer except Appalachia; winter FL, Caribbean	Extensive emergent vegetation cover	Harmed by excessive open marsh water management
Great blue heron *Ardea herodias*		Resident	Tree nests	Benefitted by open marsh water management
Great white heron *Ardea herodias occidentalis*		Resident FL Keys	Nests on protected mangrove islands	Protection of nesting colonies from human disturbance essential
Great egret *Casmerodius albus*		Summer except Appalachia; winter Coastal Plain, Caribbean	Tree nests	Benefitted by open marsh water management
Snowy egret *Egretta thula*		Resident lower Coastal Plain and Caribbean; summer upper Coastal Plain	Tree nests	Benefitted by open marsh water management
Little blue heron *Egretta caerulea*		Resident lower Coastal Plain and Caribbean; summer upper Coastal Plain	Tree nests	Benefitted by open marsh water management
Tricolored heron *Egretta tricolor*		Resident lower Coastal Plain and Caribbean	Tree nests	Benefitted by open marsh water management
Reddish egret *Egretta rufescens*	HTC	Resident coastal LA and S. FL, local	Nests on protected mangrove and coastal scrub islands	Protection of nesting colonies from human disturbance essential
Green-backed heron *Butorides striatus*		Summer; resident coast, FL	Prefers hardwood cover	Benefitted by open marsh water management

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Black-crowned night-heron *Nycticorax nycticorax*		Summer except Appalachia; resident coast, FL, Caribbean	Tree nests, cover for day roosts	Benefitted by open marsh water management
Yellow-crowned night-heron *Nyctanassa violaceus*		Summer except Appalachia; resident Gulf Coast, FL, Caribbean	Tree nests, cover for day roosts	Benefitted by open marsh water management
White ibis *Eudocimus albus*		Resident lower Coastal Plain	Tree nests	Benefitted by open marsh water management
Glossy ibis *Plegadis falcinellus*		Resident coast, FL	Ground nests	Benefitted by open marsh water management
White-faced ibis *Plegadis chihi*		Resident SW. LA	Ground nests	Benefitted by open marsh water management
Roseate spoonbill *Ajaia ajaja*		Resident S. FL and SW. LA	Nests on protected mangrove and coastal scrub islands	Benefitted by open marsh water management
Wood stork *Mycteria americana*	E	Resident lower Coastal Plain	Tree nests	See recovery plan
Fulvous whistling-duck *Dendrocygna bicolor*		Summer Coastal Plain, irregular at other seasons; resident S. FL, SW. LA, PR	Ground nests in freshwater marshes and rice fields	Benefitted by open marsh water management
West Indian whistling-duck *Dendrocygna arborea*	HC	Resident Caribbean	Roosts and nests in trees, nocturnal foraging	Once common, now very rare in PR and VI

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Wood duck *Aix sponsa*		Resident	Nests in cavities in or near forested swamps	Readily uses nest boxes
American black duck *Anas rubripes*		Winter northern latitudes; summer NC, local	Open water for foraging; nests in emergent vegetation	Benefitted by open marsh water management
Mottled duck *Anas fulvigula*		Resident FL and coastal LA	Open water for foraging; nests in emergent vegetation	Benefitted by open marsh water management
Lesser white-checked pintail *Anas bahamensis bahamensis*	HC	Resident Caribbean	Open water for foraging; nests on dry land	Now local in PR
West Indian ruddy duck *Oxyura jamaicensis jamaicensis*	HC	Resident Caribbean	Open water for foraging; nests in emergent vegetation	Now local in PR
Masked duck *Oxyura dominica*		Resident Caribbean, local	Secretive, usually remains hidden amongst floating vegetation	
Osprey *Pandion haliaetus*		Summer coasts; migrant interior; resident FL; winter Caribbean	Nests in trees and on utility poles	Recovering after DDT banned; will use artificial nests
Florida snail kite *Rostrhamus sociabilis plumbeus*	E	Resident and local in S. FL	Feeds primarily on apple snails	See recovery plan
Bald eagle *Haliaeetus leucocephalus*	E	Resident FL, local but increasing elsewhere	Nests in large trees, forages in interior around large reservoirs	Recovering after DDT banned; high human disturbance at nest sites, see recovery plan

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Northern harrier *Cirus cyaneus*	MOC	Winter	Feeds primarily on small marsh birds and mammals	
Merlin *Falco columbarius*		Winter Coastal Plain, Miss. Valley, Caribbean	Feeds primarily on small marsh birds	
Peregrine falcon *Falco peregrinus*	E	Migrant throughout; winter along coasts, FL, Caribbean	Found where concentrations of waterfowl occur	Recovering after DDT banned, see recovery plan
Yellow rail *Coturnicops noveboracensis*		Winter lower Coastal Plain, local; migrant elsewhere	Dense emergent vegetation cover, very shallow water	Harmed by excessive open marsh water management
Black rail *Laterallus jamaicensis*	HTC	Resident Gulf and Atlantic Coasts to N. FL; summer interior (local?); winter PR, S. FL	Dense emergent vegetation cover, very shallow water	Harmed by excessive open marsh water management
Clapper rail *Rallus longirostris*		Resident coastal	Dense brackish and saltwater emergent vegetation with shallow water	Harmed by excessive open marsh water management
King rail *Rallus elegans*		Summer except Appalachia; resident coast, Miss. Valley	Dense emergent vegetation cover, shallow water	Harmed by excessive open marsh water management
Virginia rail *Rallus limicola*		Winter lower Coastal Plain; migrant elsewhere	Dense emergent vegetation cover, shallow water	Harmed by excessive open marsh water management
Sora *Porzana carolina*		Winter Coastal Plain; migrant elsewhere	Dense emergent vegetation cover, shallow water	Harmed by excessive open marsh water management

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Yellow-breasted crake *Porzana flaviventer*		Resident PR	Dense emergent vegetation cover, shallow water	Harmed by excessive open marsh water management
Purple gallinule *Porphyrula martinica*		Summer lower Coastal Plain; resident peninsula FL	Open water for foraging; nests on emergent vegetation	Benefitted by open marsh water management
Common moorhen *Gallinula chloropus*		Summer except Appalachia; resident Coastal Plain	Open water for foraging; nests on emergent vegetation	Benefitted by open marsh water management
American coot *Fulica americana*		Resident, much more common in winter	Open water for foraging; nests on emergent vegetation	Benefitted by open marsh water management
Caribbean coot *Fulica caribaea*	HC	Resident Caribbean	Nests in freshwater emergents	Once abundant, now uncommon in PR and rare in VI
Limpkin *Aramus guarauna*		Resident FL, (local) and PR (extirpated?)	Ground nest in or near hardwood swamps; feeds on apple snail	May persist in Rio Abajo Commonwealth Forest in PR
Sandhill crane *Grus canadensis*	E(MS)	Resident FL, S. GA, S. MS; migrant elsewhere	Ground nest; forages in prairies, crop fields, and lakeshores	See recovery plan for MS subsp.
Common snipe *Gallinago gallinago*		Winter	Edges of emergent vegetation in shallow freshwater	
Wilson's phalarope *Phalaropus tricolor*		Mid Apr.-early June, late July-Mid. Nov.	Forages usually in shallow ponds	Water levels 2-10 inches at sewage ponds and impoundments

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Bonaparte's gull *Larus philadelphia*		Migrant throughout; winters coast and FL,	Forages and roosts on large lakes, and locally inland reservoirs	
Ring-billed gull *Larus delawarensis*		Winter except Appalachia	Forages and roosts on large lakes, and reservoirs	
Herring gull *Larus argentatus*		Winter except Appalachia	Forages and roosts on large lakes, and reservoirs	
Gull-billed tern *Sterna nilotica*	HTC	Summer coastal, local; winter FL, LA, very local	Hawks for insects over marshes	Protection of isolated nesting colonies essential
Caspian tern *Sterna caspia*		Migrant throughout; resident along coasts except summer NC	Forages and roosts on large lakes, and reservoirs	
Common tern *Sterna hirundo*		Migrant near coast; summer NC nearcoast	Nests primarily on protected sand islands	
Forster's tern *Sterna fosteri*		Resident LA; summer NC; winter along coast; migrant elsewhere	Nests on emergent vegetation; forages over open water	Benefitted by open marsh water management
Least tern *Stern antillarum*	E (interior) MOC (coastal)	Summer Miss. Valley, local, and along coasts	Nests on beaches, sandbars, spoil islands; open water for foraging	Protection of nesting colonies from human disturbance critical

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Black tern *Chlidonias niger*	MOC	Early Apr.-mid June, early July-early Oct.	Forages for insects over marshes, fields, and skims water surface	Water levels 2-10 inches at sewage ponds and impoundments
Black skimmer *Rynchops niger*		Resident along coasts	Nests along beaches, sandbars, spoil islands; forages along channels	Protection of nesting colonies from human disturbance important
Barn owl *Tyto alba*	HTC	Resident mainland	Covered, elevated nest sites, feeds primarily on small marsh mammals	Responds to artificial nest sites
Short-eared owl *Asio flammeus*	MOC	Winter mainland; resident Caribbean	Roosts on ground, feeds primarily on small marsh birds and mammals	
Belted kingfisher *Ceryle alcyon*		Resident mainland; winter Caribbean	Nests in vertical banks near water	Benefitted by open marsh water management
Tree swallow *Tachycineta bicolor*		Winter coast and FL; summer Miss. Valley; migrant elsewhere	Roosts on emergent vegetation, nests in tree cavities	
Northern rough-winged swallow *Stelgidopteryx serripennis*		Summer mainland except peninsular FL	Nests in vertical banks near water	
Fish crow *Corvus ossifragus*		Resident Piedmont Coastal Plain, Peninsular FL; Summer Miss. Valley	Most abundant near brackish and saltwater wetlands, also along major river systems	Depredates young and eggs of other marsh species

II. Fresh, brackish, and coastal open water and emergent wetlands

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Sedge wren *Cistothorpus platensis*		Winter Coastal Plain; migrant elsewhere	Shallow sedge and rush marshes, with scattered shrubs present	
Marsh wren *Cistothorus palustris*		Winter Coastal Plain, resident coasts	Dense emergent vegetation cover	
Common yellowthroat *Gothlypis trichas*		Summer mainland; resident Coastal Plain	Dense emergent vegetation cover with some shrubs present	
Sharp-tailed sparrow *Ammodramus caudacutus*		Winter mainland coastline	Dense primarily saltwater emergent vegetation for foraging	
Seaside sparrow *Ammodramus maritimus*	HTC	Resident mainland coastline with fragmented distribution	Dense emergent vegetation, brackish for breeding and saltwater for wintering	Harmed by excessive open marsh water management
Cape Sable seaside sparrow *Ammodramus maritimus mirabilis*	E	Resident SW. FL, very local	Dense emergent vegetation cover with some shrubs present	See recovery plan
Song sparrow *Melospiza melodia*		Winter mainland; resident N. latitudes	Dense emergent vegetation cover with some shrubs present	
Swamp sparrow *Melospiza georgiana*		Winter mainland	Dense emergent vegetation cover with some shrubs	

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Red-winged blackbird *Agelaius phoeniceus*		Resident mainland	Nests and roosts in emergent vegetation	Crop pest
Great-tailed grackle *Quiscalis mexicanus*		Resident SW. LA	Usually nests in trees	Depredates young and eggs of other marsh species
Boat-tailed grackle *Quiscalis major*		Resident coasts and FL	Usually nests in trees	Depredates young and eggs of other marsh species

III. Interior mudflats (including sewage ponds and moist-soil impoundments).

A. Primary management problems.

1. Loss of exposed flats through dredging, improperly managed levee and dike construction, and creation of steep impoundments, among other activities.

B. Management opportunities and suggestions.

1. Effective use of Fish and Wildlife Coordination Act, Clean Water Act, Rivers and Harbors Act, Farm Act, and North American Waterfowl Plan to protect and enhance flats.

2. Fall migrant shorebirds require shallow flooding of impoundments to commence earlier than is conventional for waterfowl management, beginning in late summer (rather than late fall or winter). A mix of habitat conditions ranging from open water and mudflats to dense emergent vegetation can be accomplished within and among impoundments. Shorebirds, in general, prefer more open conditions with sparse cover, while rails and other marshbirds prefer dense cover. Adroit management of impoundments throughout an annual cycle can benefit most if not all marsh, shore, and open water species, including waterfowl (Fredrickson and Taylor 1982, Howe 1990). Peak fall migration for shorebirds in the interior of the Southeast Region is from mid-July through to early October and each interior national wildlife refuge should consider providing critical stopover points for these species.

3. In preparing impoundments for fall migrating shorebirds, first disk the basin in early July if necessary to remove vegetation growth and then flood to 3 inches at shallowest depth. Then gradually withdraw water as shorebirds migrate through. Disk if necessary and reflood for incoming waterfowl. These are general guidelines and can be modified depending on geographic location of management area, relative salinity of water, vegetational succession patterns, and logistical ability to move water around (Howe 1990). If several or more impoundments are available, specific habitat conditions for the full variety of shorebirds can be rotated among impoundments. Specific techniques and flooding - withdrawal schedules can be fine tuned through experimentation.

4. Passage of spring migrant shorebirds peaks in April and May. Gradual drawdown of impoundments to 6 inches should occur by late March for late migratory dabbling ducks. By mid-April, withdraw water so that shallowest depth is 2 inches. Assuming gently sloping basin, continue to withdraw water about 1 inch/week to provide maximum interface between open mudflat and water, with open mudflat eventually succeeding to emergent vegetation supporting marshbirds remaining to breed.

5. Unique opportunities exist to manage for shorebirds at sewage treatment ponds as many communities are recognizing the value of using natural wetland vegetation to treat sewage. Some government agencies (such as Tennessee Valley Authority) are researching how to benefit wetlands and associated wildlife through the use of sewage effluent. Contact with community sewage treatment centers is encouraged and management advice should include that at least some ponds maintain exposed mudflat areas during peak migration periods.

6. It is important to provide protected islands for roosting to avoid excessive terrestrial depredation. Such islands can be constructed within the impoundment and as water withdrawal occurs these expanding islands could provide both foraging and roosting habitat.

C. Key references.

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D. Fish and Wildlife Service Contacts.

1. Patuxent Wildlife Research Center.

2. National Ecology Research Center.

E. Other contacts.

1. Western Hemisphere Shorebird Reserve Network, 550 S. Bay Avenue, Islip, NY 11751. Nominations for important shorebird stopover points.

III. Interior mudflats (including sewage ponds, natural ponds and lakes, and moist soil impoundments)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Merlin		Winter Coastal Plain, Miss. Valley, Caribbean migrant elsewhere	Feeds primarily on small shorebirds	For entire group, maintain or rotate ponds and impoundments at various water levels during peak migration (Mid July-Oct. and Mid Apr.-May) so that some shoreline (moist soil) exists at all times. Should not have all ponds either filled to capacity or completely drained
Peregrine falcon	E	Migrant throughout; winter FL, Caribbean	Feeds primarily on larger shorebirds	
Black-bellied plover *Pluvialis squatarola*		Mid March-mid May, mid Aug.-mid Nov.	Exposed moist soil with some standing water present during these periods.	
Lesser golden-plover *Pluvialis dominica*		Early Mar.-late May, mid Aug.-late Nov.	Dry to moist soil, little standing water, grassy fields	Primarily migrates off Atlantic Coast in fall, through interior in spring
Semipalmated plover *Charadrius semipalmatus*		Mid Mar.-early June mid July-mid Oct.	Exposed moist soil with some standing water present	
Piping plover *Charadrius melodus*	T	Mid Mar.-late May, Mid July-early Oct.	Exposed moist soil with some standing water present	Rarely found inland during migration but should be looked for
Killdeer *Charadrius vociferus*		Resident	Dry to moist soil, grass to bare fields	
Black-necked stilt *Himantopus mexicanus*		Resident S. LA peninsula FL; Summer Caribbean	Shallow standing water with some moist soil exposed	
Greater yellowlegs *Tringa melanoleuca*		Early Feb.-late May, early July-mid Nov.	Shallow standing water with some moist soil exposed	
Lesser yellowlegs *Tringa flavipes*		Early Feb.-late May, early July-mid Nov.	Shallow standing water with some moist soil exposed	

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Solitary sandpiper *Tringa solitaria*		Late Feb.-early June, late June-mid Nov.	Exposed moist soil with standing water present	
Spotted sandpiper *Actitis macularia*		Late Mar.-early June, early July-early Nov.; Winter lower Coastal Plain	Exposed moist soil with standing water present	
Upland sandpiper *Bartramia longicauda*		Early Mar.-mid May, late July-late Sept.	Dry to moist soil, little standing water, grassy fields	
Hudsonian godwit *Limosa haemastica*		Mid Apr.-late May July-Oct.; LA	Shallow standing water with some moist soil exposed	Primarily migrates off Atlantic Coast in fall, through interior in spring
Marbled godwit *Limosa fedoa*		Mid Mar.-late May late July-early Oct.	Shallow to deep standing water must be present	
Sanderling *Calidris alba*		Mid July-early Nov.	Exposed moist soil with some standing water present	
Semipalmated sandpiper *Calidris pusilla*		Early Apr.-early June, mid July-late Oct.	Exposed moist soil with some standing water present	
Western sandpiper *Calidris mauri*		Early March-early June, early July-late Oct.	Exposed moist soil with some standing water present	
Least sandpiper *Calidris minutilla*		Winter Coastal Plain; migrant elsewhere	Exposed moist soil with some standing water present	
White-rumped sandpiper *Calidris fuscicollis*		Early Apr.-mid June, early Aug.-late Oct.	Exposed moist soil with some standing water present in spring	Primarily migrates off Atlantic Coast in fall, through interior

III. Interior mudflats (including sewage ponds, natural ponds and lakes, and moist soil impoundments)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Baird's sandpiper *Calidris bairdii*		Mid Mar.-late May, mid July-mid Oct.	Dry to moist soil, little standing water, grassy fields	Primarily migrates through interior in both spring and fall
Pectoral sandpiper *Calidris melanotos*		Late Feb.-early June, early July-late Nov.	Exposed moist soil with some standing water present	
Dunlin *Calidris alpina*		Early Oct.-late Nov.	Shallow standing water must be present	
Stilt sandpiper *Calidris himantopus*		Late Mar.-late May, early July-early Nov.	Shallow standing water must be present	
Buff-breasted sandpiper *Tryngitis subruficollis*		Mid Mar.-late May, mid July-mid Oct.	Dry to moist soil, little standing water, grassy fields	Primarily migrates through interior in both spring and fall
Short-billed dowitcher *Limnodromus griseus*		Late Feb.-early May, early July-early Oct.	Shallow standing water must be present	
Long-billed dowitcher *Limnodromus scolopaceus*		Early July-early Dec.; winters inland of coastlines	Shallow standing water must be present	
Wilson's phalarope		Late Mar.-early June, late July-mid Nov.	Shallow to deep standing water must be present	Primarily migrates through interior in both spring and fall
American pipit *Anthus rubescens*		Winter mainland	Moist soil, grassy to bare fields	

IV. Coastal flats and sand islands (including inlets, beaches, spoil islands, and estuaries).

A. Primary management problems.

1. Loss of exposed flats through dredging that takes spoil offshore, hard-structures (jetties, groins) that cause accelerated erosion in some areas while accretion in others, among other activities.

2. Coastal development and associated intensity of recreation that may include off-road vehicle use and increased predation/ disturbance from domestic dogs.

3. Protection of beach and insular nesting species, especially those that are colonial, from habitat loss, increasing depredation from both native and exotic species, and human disturbance.

B. Management opportunities and suggestions.

1. Effective use of Fish and Wildlife Coordination Act, Clean Water Act, Rivers and Harbors Act, Coastal Barrier Resources Act, and Endangered Species Act should provide for protection of coastal flats and beaches and the systems that support them. Special designation of important nesting and shorebird migration stopover sites may be included within national wildlife refuges, national seashores and parks, state and commonwealth parks and preserves, and selected private lands. Special designations may include "resource category 1 sites" (unique and irreplaceable resources, according to the Service's mitigation policy) such as at Cabo Rojo Salt Flats, PR.

2. Work with local landowners/governments to restrict vehicular use and other disturbance along upper beach zones at least during the nesting season (Mid-March to Mid-August) where known concentrations of beach nesting birds occur. Other areas, especially near inlets and passes, where waves and currents revitalize upper beaches also should be restricted from overuse by humans, vehicles, and pets.

3. Most beach nesting species, especially colonial ones, select open nest sites largely devoid of vegetation cover. However, where a variety of ground and aerial predators are numerous, and include exotic species, an equally diverse response in nest site selection from beach nesting species may be found, such as at Culebra, Puerto Rico. An understanding of the response to local conditions to include local depredation pressure by each beach nesting species is essential to maintaining the habitat quality necessary for successful reproduction throughout each species distribution (Burger and Gochfield 1988, Saliva and Burger 1989).

4. Opportunities exist to provide for and maintain insular breeding habitat by revitalizing spoil islands with new dredge material annually and during the nonbreeding season (late August to early March). Vegetation encroachment on these spoil islands must be minimized and human disturbance eliminated if at all possible for most species that would use such situations.

5. Maintain shallow pannes (very shallow, sparsely vegetated zones that are often dry) in high marsh, particularly as feeding sites for shorebird broods. The benefits of high marsh pannes for foraging and roosting shorebirds may be substantial (Howe 1990). Open marsh water management programs for mosquito control can be modified to minimize adverse alteration of these pannes. Also shorebird chicks hatched on beaches or upland sites may require unrestricted access to marsh pannes. Eliminate potential barriers to terrestrial dispersal by shorebird chicks to these marsh pannes.

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D. Fish and Wildlife Contacts.

1. Patuxent National Research Center.

E. Other contacts.

1. Western Hemisphere Shoreline Reserve Network, 550 S. Bay Avenue, Islip, New York 11751. Nominations for important shoreline stopover points.

IV. Coastal Flats (including estuary flats, beaches, spoil and natural sand islands)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Brown booby		Resident Caribbean	Colonial, nests on protected islands	Protect nesting areas from excessive human disturbance
Reddish egret	HTC	Resident LA and S. FL, local	Mangroves and coastal scrub for nesting	Protect rookeries from excessive human disturbance
Merlin		Winter	Feeds primarily on small shorebirds	
Peregrine falcon	E	Winter	Feeds primarily on large shorebirds	
Black-bellied plover		Winter	Forages from moist substrates	High marsh pannes important for roosting
Snowy plover *Charadrius alexandrinus*	HTC	Resident Gulf Coast, except winter only LA, locally Caribbean	Nests upper beach oftens near grass tufts, forages on sandflats	Protect from excessive human disturbance during nesting, will use spoil for nesting
Wilson's plover *Charadrius wilsonia*		Resident S. FL, Caribbean; breeds elsewhere	Nests upper beach and dune area near vegetation	Protect from excessive human disturbance during nesting, will use spoil for nesting; high marsh pannes important for brood-rearing
Semipalmated plover		Winter	Forages primarily on mudflats	High marsh pannes important for roosting
Piping Plover	T	Breeds NC local; winters throughout	Nests on upper beach forages on sandy mudflats	See recovery plan

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
American Oystercatcher *Haematopus palliatus*		Resident	Often nests on protected islands, forages oysterbeds	Will use spoil for nesting; high marsh pannes important for brood-rearing
Black-necked stilt		Resident S. FL, LA; summers throughout	Nests in marshy areas, forages on estuarine flats	High marsh pannes important for brood-rearing
American avocet *Recurvirostra americana*		Summer NC, SC; winter elsewhere on mainland	Nests in marshy areas, forages on estuarine flats	High marsh pannes important for roosting
Greater yellowlegs		Winter	Forages on estuarine flats	High marsh pannes important for roosting
Lesser yellowlegs		Winter	Forages on estuarine flats	High marsh pannes important for roosting
Willet *Catotrophorus semipalmatus*		Resident	Forages open beach and estuarine flats	High marsh pannes important for brood-roosting
Spotted sandpiper		Winter	Forages on estuarine flats and hard structures	
Eskimo curlew *Numenius borealis*	E	Spring migrant LA (mid Apr.?)	Forages on estuarine flats moist pastures, and grassy fields	Near extinction, however a few birds may be nesting in Canada, should be looked for during spring migration along LA and TX coasts
Whimbrel *Numenius phaeopus*		Winter	Forages primarily on estuarine and marine intertidal flats	
Long-billed curlew *Numenius americanus*		Winter, mostly in SW. LA	Forages on estuarine and marine flats, lower beach	

IV. Coastal Flats (including estuary flats, beaches, spoil and natural sand islands)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Marbled godwit *Limosa fedoa*		Winter	Forages primarily on estuarine and marine intertidal flats	High marsh pannes important for roosting
Ruddy turnstone *Arenaria interpres*		Winter	Forages along wrack line and hard structures	High marsh pannes important for roosting
Red Knot *Calidris canutus*		Winter	Forages along lower beach	High marsh pannes important for roosting
Sanderling		Winter	Forages on both lower and upper beach	
Semipalmated sandpiper		Mid July-late Oct., mid Mar.-early June	Forages primarily estuarine flats, also lower beach	High marsh pannes important for roosting
Western sandpiper		Winter	Forages primarily estuarine flats, also lower beach	High marsh pannes important for roosting
Least sandpiper		Winter	Forages primarily estuarine flats	High marsh pannes important for roosting
White-rumped sandpiper		Early Aug.-late Sept., early Apr.-early June	Forages primarily estuarine flats	Primarily migrates off Atlantic Coast in fall, through interior in spring; high marsh pannes important for roosting
Baird's sandpiper		Mid March-late May, mid July-mid Oct.	Forages primarily on dry edges of lagoons and impoundments	Primarily migrates through interior in spring and fall
Purple sandpiper *Calidris maritima*		Winter NC to N. FL	Rocky shoreline and jetties	

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Dunlin		Winter mainland	Forages in shallow water, estuarine, and marine intertidal	High marsh pannes important for roosting
Stilt sandpiper		Late Mar.-late May, early July-early Nov.; winter Caribbean	Forages in shallow water, estuarine	High marsh pannes important for roosting
Short-billed dowitcher		Winter	Forages in shallow water, usually estuarine	High marsh pannes important for roosting
Long-billed dowitcher		Winter	Favors freshwater ponds near coast for foraging	
All gulls *Larus* spp.		Winter	Resting on beaches, forages in all habitats	
Laughing gull *Larus atricilla*		Resident	Colonial, often nests on protected islands	Depredates eggs and young of other beach nesting birds
Gull-billed tern	HTC	Summer, local; winter LA, FL	Colonial, often nests on protected islands	Protect nesting areas from excessive human disturbance
Caspian tern		Resident	Colonial, often nests on protected islands	Protect nesting areas from excessive human disturbance
Royal tern *Sterna maxima*		Resident	Colonial, often nests on protected islands	Protect nesting areas from excessive human disturbance
Sandwich tern *Sterna sandvicensis*		Resident	Colonial, often nests on protected islands	Protect nesting areas from excessive human disturbance

IV. Coastal Flats (including estuary flats, beaches, spoil and natural sand islands)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Roseate tern	T	Summer FL lower keys, Caribbean, NC (local)	Colonial, often nests on protected islands	Protect nesting areas from excessive human disturbance
Common tern		Summer NC; Mar.-May Sept.-Nov. elsewhere	Resting during migration	
Forster's tern		Winter throughout; summers NC, LA	Resting during winter	
Least tern	MOC	Summer	Loosely colonial, nests on upper beaches, islands	Protect nesting areas from excessive human disturbance; will use soil for nesting
Bridled tern		Summer Caribbean	Highly colonial, nests on protected islands among rock crevices	Protect nesting areas from excessive human disturbance
Sooty tern		Summer FL lower keys, local LA, Caribbean	Highly colonial, nests on protected islands often under vegetation	Protect nesting areas from excessive human disturbance
Black tern	MOC	Migrant	Resting during migration	
Black skimmer		Resident	Loosely colonial, nests on islands, spoil and dunes	Protect nesting areas from excessive human disturbance; will use spoil for nesting

V. Deciduous dominated woodlands: forested wetlands (to include southern riverine hardwood forests, baldcypress, pocosin, Carolina bays, Appalachian (northern) riverine forest); upland broadleaf (oak-hickory, southern hardwoods, Appalachian cove); and mixed broadleaf-needleleaf (pine-oak, pine-white cedar, red cedar-hemlock-eastern white pine-mixed deciduous, red spruce-beech-maple).

A. Primary management problems.

1. Persistent losses to and fragmentation of woodlands directly through forestry activity, mining activity, development pressure, and clearing for agricultural purposes.

2. Indirect and direct losses occur from disruption of natural waterflow by way of dredging and filling, drainage and diversion, construction of levees and dikes, and creation of reservoirs and water impoundments.

3. Secondary impacts include increased parasitism and predation in smaller stands and for many neotropical migrants, cumulative effects from non-breeding season habitat losses.

4. Removal of snags.

B. Management opportunities and suggestions.

1. Prevention of large-scale losses to woodlands and as many small-scale (<10 acres) as possible should be gained through effective use of Fish and Wildlife Coordination Act, National Environmental Policy Act, Clean Water Act, Rivers and Harbors Act, Sikes Act, Farm Bill, and National Forest Management Act. Although there are more upland relative to bottomland woodlands, there are fewer legislative means to regulate losses and fragmentation of upland habitats. Enhancement and restoration activities can occur through Pittman-Robertson Act.

2. Although isolated and small stands may not have as high a value as larger stands, strategic management of these habitat "islands" relative to larger tracts can be beneficial from an individual as well as a cumulative basis. Such habitat islands should be evaluated in all regulatory review activities, especially those concerning Farm Bill. Each of these smaller stands support dispersal corridors for migrants and may present future opportunities for reconnection through habitat restoration.

3. A set of criteria should be established to use during regulatory review for determining the potential value of various stands to nongame birds. Among the criteria suggested are the size of the tract, whether the tract is within a large system, the distance the tract is from a larger tract, the potential for restoration and reconnection to a larger system, and actual and potential use of the tract by nongame birds.

4. When reviewing forestry actions it is important to keep in mind minimum area requirements for many species, what constitutes maximizing biodiversity, and the potential for adversely affecting many forest-interior nongame species when over-applying the concept of edge (Harris 1988, Temple and Cary 1988). This does not mean standard forestry techniques cannot be employed, but it does suggest that the creation of many small patches to maximize spatial "habitat" diversity (i.e. edge) may work against maximizing biodiversity. Therefore, it may be better to maintain larger tracts of contiguous forest as a core with small open areas close to the natural edge of the core than to have frequent patches of open habitat alternating with patches of forested habitat. If forestry management dictates large volumes of timber cutting it may be better to operate in larger units rather than in many narrow strips or a random scattering of small cuts. In this way sufficiently large tracts of undisturbed habitat can be maintained at all successional stages while minimizing edge throughout (Harris 1984, Robbins 1988).

5. Robbins et al. (1989) included both upland and bottomland forest-interior species in their study of area requirements and found that the most area-sensitive species required at least 2,800 acres of contiguous forest to be present. For many area-sensitive species, the amount of contiguous forest area in which probability of occurrence was reduced by 50 percent was about 1,300 acres; this area is considered the most realistic minimum level for preserving the gene pool for all but the most area-sensitive species. The areas in which the probability of occurrence peaked for almost all forest-interior species was at or above 7,500 acres. All this argues for adroit and large-scale forest management when population maintenance of forest-interior nongame birds is a management objective.

6. Effects of parasitism and predation appear to be major problems facing forest-interior species occurring within smaller tracts of forest. As a general rule, forest-interior species cannot maintain their populations within 330-660 feet of forest edge due to depredation and nest parasitism (Robbins 1988). Control of brood parasites (principally brown-headed cowbird (Molothrus ater)) has been shown to halt declines of some species but depredation remains a potentially serious problem to birds in small habitat patches. Predators include both native and exotic species (feral cats, rats, dogs, etc.) and these, like brood parasites, may be able to more efficiently search for nests and eggs where the relative availability of nest sites is limited. Increasing habitat patch size may be the only way to moderate or eliminate the devastating effects of parasitism and predation.

7. Although active management within the Southeast Region for neotropical migrant forest-interior species can principally occur only during the breeding season (except in South Florida and the

Caribbean), potential effects during the non-breeding season should be understood. Approximately two-thirds of the species breeding in the eastern United States winter in the tropical areas of the Greater Antilles, Mexico, Central America, and northern South America (Gradwohl and Greenberg 1989). The full effect of tropical deforestation on neotropical migrants is not fully understood and is a controversial topic. However, some species at least are known to become regionally rare or absent in the tropics when the primary forest is cleared. Without new primary forest to replace what is lost, many neotropical migrants may be lost during the non-breeding season resulting in the overall declines we are seeing in breeding areas. An alternative explanation to depredation for explaining population declines and absences of neotropical migrants in smaller forest tracts is that there no longer is a surplus of "floating" individuals that serve as buffers against total population collapse even in larger stands. Even if smaller forest tracts are being subjected to heavier depredation, there still should be surplus individuals occurring in these "sink" habitats that are structurally similar to "source" habitats. The surplus may no longer exist due to rapid deforestation in the tropics. Thus, corrective measures to habitat loss in the tropics should occur simultaneously with preserving and enhancing breeding habitats (Morton and Greenberg 1989).

8. Maintenance of snags in forests is essential to provide nesting habitat for the many cavity using species present.

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D. Fish and Wildlife Service contacts.

1. Patuxent Wildlife Research Center.

2. Office of Migratory Bird Management.

3. National Ecology Research Center.

E. Other contacts.

1. Department of Zoological Research National Zoological Park, Smithsonian Institution, Washington, D.C. 20008.

2. National Park Service, Great Smoky National Park.

V. Deciduous dominated woodlands: Forested Wetlands (including southern riverine forests, southern mixed hardwood swamp forests, baldcypress, pocosin, Carolina bays, Appalachian riverine forests); upland broadleaf woodlands (oak-hickory, southern hardwoods at low elevations, and Appalachian Cove forest at mid elevations); and mixed broadleaf-needleleaf woodlands (pine-oak and pine-white cedar at low elevations, red cedar-hemlock-eastern white pine-mixed deciduous at (mid elevations and red spruce-beech-maple at high elevations). Area requirements are from Robbins et al. (1989).

		Ecology and Management		
Species	Management Status	Distribution/ Residency	Habitat notes	Management tips
Anhingas, herons, ibis, storks		Summer Coastal Plain and Peninsular FL	Roost and nest in trees primarily within forested wetlands	Protect from clearing and human disturbance
Green-backed heron		Summer	Foraging cover provided by limbs overhanging open water	
Wood duck		Resident	Cavities for nesting within forested wetlands, open water for foraging	Will use nest boxes
American black duck		Resident east NC, winter north latitudes	Nests in areas with mast production within forested wetlands	
Mottled duck		Resident FL, coastal LA	Nests in areas with mast production within forested wetlands	
Black vulture *Coragyps atratus*		Summer throughout; resident Piedmont, Coastal Plain, Peninsular FL	Primarily in forested wetlands	
Turkey vulture *Cathartes aura*		Resident	Roosts and nests in woodlands, forages in open country	

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Am. swallow-tailed kite *Elanoides forficatus*	MOC	Summer lower Coastal Plain and Peninsular FL	Primarily in forested wetlands	
Mississippi kite *Ictinia mississippiensis*	MOC	Summer Coastal Plain, Miss. Valley	Primarily in forested wetlands	
Sharp-shinned hawk *Accipiter striatus*	MOC	Winter Coastal Plain, FL, Miss. Valley; Resident Appalachia	All woodlands	
Cooper's hawk *Accipiter cooper*	MOC	Resident, most numerous in winter	All woodlands	
Red-shouldered hawk *Buteo lineatus*	HC	Resident	Primary habitat forested wetlands in lowlands	Prob. of occurrence peaks at 7500 acres, one-half peak 562
Broad-winged hawk *Buteo platypterus*		Summer except Peninsular FL	Densely vegetated woodlands at low and mid elev.	
Short-tailed hawk *Buteo brachyurus*	MOC	Summer Peninsular FL; resident S. FL	Nests in dense bald cypress, forages over savannah	Protect bald cypress and other woodlands from clearing
Ruffed grouse *Bonasa umbellus*		Resident Appalachia	High elev. mixed woodlands	
Purple gallinule		Summer lower Coastal Plain; resident Peninsular FL	Nests under wooded cover in forested wetlands, open water for foraging	

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Common moorhen		Summer except Appalachia; resident Coastal Plain	Nests under wooded cover in forested wetlands, open water for foraging	
Limpkin		Resident FL, local	Nests on ground in forested wetlands, forages on snails	
American woodcock *Scolopax minor*		Resident	Forages on moist ground primarily on earthworms	
Black-billed cuckoo *Coccyzus erythropthalmus*		Summer Appalachia and Cumberland Plateau	Mid elev. upland and mixed woodlands often near streams	Steep decline in 1980's
Yellow-billed cuckoo *Coccyzus americanus*	HC	Summer	Primary habitat forested wetlands at low elev.	Steep decline in 1980's
Eastern screech-owl *Otus asio*		Resident	Cavities for nesting	Will use nest boxes
Great horned owl *Bubo virginanus*		Resident	Often forages in open areas, often uses old hawk nests	
Barred owl *Strix varia*		Resident	Covered, elevated nests, often in hollow stumps; primary habitat is forested wetlands	
Long-eared owl *Asio otus*		Winter northern latitudes	Usually, mixed woodlands, especially as day roosts	

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Chuck-will's-widow *Caprimulgus carolinensis*	MOC	Summer	Most common in southern latitudes in pine-oak mixed woodlands	
Whip-poor-will *Caprimulgus vociferus*	HC	Summer except southern latitudes	Often near open areas, especially in low and mid elev. upland and mixed woodlands	
Ruby-throated hummingbird *Archilochus colubris*	HC	Summer	Forages in small forested openings with tubular flowers	Responds to sugar water feeders
Belted kingfisher		Resident	Breeds in vertical banks along rivers and streams	
Red-headed woodpecker *Melanerpes erythrocephalus*	MOC	Resident woodlands at low elev.	Most numerous in open	Will use nest boxes
Red-bellied woodpecker *Melanerpes carolinus*		Resident	Most numerous at low elev. in all woodland types	
Yellow-bellied sapsucker *Sphyrapicus varius*		Winter low and mid elev.; summer high elev. (Appalachia)	All woodlands in winter; mixed woodlands at high elev.	
Downy woodpecker *Picoides pubescens*		Resident	All woodlands	

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Hairy woodpecker *Picoides villosus*		Resident	Primarily in upland and mixed woodlands, most numerous at northern latitudes	
Northern flicker *Colaptes auratus*	MOC	Resident	Primarily low and mid elev. open woodlands, normally feeds on ground	Will use nest boxes
Pileated woodpecker *Dryocopus pileatus*		Resident	Primarily low and mid elev., prefers forested wetlands and woodlands near streams	Prob. of occurrence peaks above 7500 acres, one-half peak 400
Ivory-billed woodpecker *Campephilus principalis*	E	Resident Coastal Plain, Peninsular FL, extinct?	Sensitive to loss of primary forested wetlands	May persist in LA, MS, FL
Eastern wood-pewee *Contopus virens*	MOC	Summer except S. FL	All woodland types at low and mid elev.	Widespread declines
Acadian flycatcher *Empidonax virescens*		Summer except S. FL	Requires shady areas, moist dense vegetation at low and mid elev.	Prob. of occurrence peaks above 7500 acres, decline in 1980's
Willow flycatcher *Empidonax traillii*		Summer Appalachia	Nests in mid to high elev., streamside willow thickets	
Eastern phoebe *Sayornis phoebe*		Summer Appalachia; resident Piedmont; winter Coastal Plain and Peninsular FL	Usually found near water at low and mid elev., especially when nesting	

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Great crested flycatcher *Myiarchus crinitus*		Summer	Secondary cavity nester in all woodlands at low and mid elev.	Prob. of occurrence peaks at 180 acres
Fish crow		Resident Piedmont, Coastal Plain, Peninsular FL; Summer Miss. Valley	Forested wetlands primarily for roosting and nesting	Depredates young and eggs of colonially nesting birds as well as marsh and land birds
Black-capped chickadee *Parus atricapillus*		Resident Appalachia at high elev.	Mixed woodlands above 4500 ft elev., primary cavity nester	
Red-breasted nuthatch *Sitta canadensis*		Winter except Gulf Coast and FL; resident Appalachia at high elev.	Primarily mixed woodlands, primary cavity nester only at high elev.	
White-breasted nuthatch *Sitta carolinensis*		Resident except peninsular FL	Primary cavity nester, primarily upland and mixed woodlands	
Brown-headed nuthatch *Sitta pusilla*		Resident Piedmont, Coastal Plain and Peninsular FL	Primary cavity nester in pine within mixed woodland at low elev.	
Brown creeper *Certhia americana*		Winter; resident Appalachia at high elev.	All woodlands at low and mid elev., nests only at high elev.	
Blue-gray gnatcatcher *Polioptila caerulea*		Summer; resident lower Coastal Plain, Peninsular FL	All woodlands under moist conditions at low and mid elev.	Prob. of occurrence peaks above 7500 acres

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Golden-crowned kinglet *Regulus satrapa*		Winter except Gulf Coast; resident Appalachia	Most frequent when some conifers present, nests at high elev. in mixed woodlands	
Ruby-crowned kinglet *Regulus calendula*		Winter Coastal Plain, Peninsular FL, Piedmont; migrant throughout	All woodlands	
Veery *Catharus fuscescens*		Summer Appalachia	Nests in woodlands above 3500 ft elev., forages on ground in shaded areas	
Hermit thrush *Catharus guttatus*		Winter except in Appalachia	Forages on ground in shaded areas	
Wood thrush *Hylocichla mustelina*	MOC	Summer except peninsular FL	Nests and forages in shaded, moist, and vegetationally dense areas	Prob. of occurrence peaks at 1250 acres, widespread declines
Cedar waxwing *Bombycilla cedrorum*		Winter; resident Appalachia and Cumberland Plateau	All woodlands with berry producing plants in winter; nests in mixed woodlands at mid and high elev.	
Bell's vireo *Vireo bellii*	MOC	Summer primarily west of Miss. River, n of LA	Nests in riparian scrub thickets (willow), low elev.	

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Solitary vireo *Vireo solitarius*		Winter Coastal Plain and Peninsular FL; summer Appalachia	Winter all woodlands; nests in mixed woodlands at mid and high elev.	
Yellow-throated vireo *Vireo flavifrons*		Summer	All woodlands, open canopy and moist conditions at low and mid elev.	
Warbling vireo *Vireo gilvus*		Summer Miss. Alluvial Valley, Highland Rim, Ozark-Ouachita, Lexington Plain	Open mature woodlands at low and mid elev., usually along streams and rivers	
Red-eyed vireo *Vireo olivaceaus*		Summer except peninsular FL	Dense canopy in all woodlands, primarily moist broadleaf, at low and mid elev.	Prob. of occurrence peaks above 7500 acres
Bachman's warbler *Vermivora bachmanii*	E	Summer Coastal Plain, near extinction ?	Possibly associated with extensive canebrakes	Winters in Cuba, several recent unconfirmed sightings
Northern parula *Parula americana*		Summer except S. FL	Nests in bald cypress or in other trees with Spanish moss or lichens (low elev.) and mixed woodlands near streams (mid elev.)	Prob. of occurrence peaks above 7500 acres, one-half peak 1300
Yellow warbler *Dendroica petechia*		Summer except lower Coastal Plain and Peninsular FL	Nests in willow and alder thickets, open woodlands near orchards	

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Black-throated blue warbler *Dendroica caerulescens*		Summer Appalachian	Mixed woodlands at mid and high elev. with dense undergrowth, especially rhododendron; shrub nester	Prob. of occurrence peaks above 7500 acres, one-half peak 2500
Black-throated green warbler *Dendroica virens*		Summer Appalachia, lower Coastal Plain (local) NC, SC	Mixed woodlands at mid elev. (Appalachia) and in low elev. (Coastal Plain)	
Blackburian warbler *Dendroica fusca*		Summer Appalachia	Mixed woodlands at high elev.	
Yellow-rumped warbler *Dendroica coronata*		Winter except Appalachia	Open woodlands	
Yellow-throated warbler *Dendroica dominica*		Summer (local Piedmont) except S. FL; resident FL	Nests in bald cypress, sycamore, and oaks in forested wetlands and mixed woodlands at low and mid elev.	
Pine warbler *Dendroica pinus*		Summer; resident Piedmont, Coastal Plain, Peninsular FL	Primarily low elev. mixed woodlands where pines occur	
Cerulean warbler *Dendroica cerulea*	HTC	Summer (local) Cumberland Plateau, Highland Rim, Appalachia, Miss. Valley N. of LA, Roanoke River NC	Nests in mature and open broadleaf woodlands, colonial	Prob. of occurrence peaks above 7500 acres, one-half 1750 acres

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Black-and-white warbler *Mniotilta varia*		Summer except lower Coastal Plain and Peninsula FL, where it winters only	Primarily densely vegetated upland (mid elev.) and bottomland broadleaf (low elev.); ground nester; winter in densely vegetated woodlands	Prob. of occurrence peaks above 7500 acres, one-half peak 550
American redstart *Setophaga ruticilla*		Summer except peninsular FL	Nests in maturing riparian second growth (low elev.) and open woodlands near streams (mid elev.)	
Prothonotary warbler *Protonotaria citrea*		Summer except Appalachia	Nests in cavities, usually near water in forested wetlands, esp. bald cypress	
Worm-eating warbler *Helmitheros vermivorus*		Summer except Atlantic upper Coastal Plain, lower Coastal Plain, outside of NC, and Peninsular FL	Ravines and densely vegetated hillsides (mid elev.) and bottomland broadleaf with dense understory (low elev.); ground nester	Prob. of occurrence peaks above 7500 acres, one-half peak 375
Swainson's warbler *Limnothlypis swainsonii*		Summer except peninsular FL, local	Nests in canebrakes (bottomland) and rhododendron thickets (Appalachia)	

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Ovenbird *Seiurus aurocapillus*	MOC	Summer northern latitudes	Moderately dense and dry woodlands at low and mid elev.; ground nester	Prob. of occurrence peaks at 1125 acres
Louisiana waterthrush *Seiurus motacilla*		Summer except peninsular FL and Gulf Coast	Nests on ground along streams, ponds, swamps at low and mid elev.	Prob. of occurrence peaks above 7500 acres, one-half 875 acres
Kentucky warbler *Oporonis formosus*	MOC	Summer except peninsular FL	Nests on ground in dense moist understory of broadleaf woodlands at low and mid elev.	Prob. of occurrence peaks at 750 acres, widespread declines
Hooded warbler *Wilsonia citrina*		Summer except peninsular FL	Nests in shrubs in dense moist understory of all woodlands at low and mid elev.	
Canada warbler *Wilsonia canadensis*		Summer Appalachia	Nests in shrubs in dense mid and high elev. streamside rhododendron	Prob. of occurrence peaks above 7500 acres, one-half 1000 acres
Summer tanager *Piranga rubra*		Summer	Nests in all woodlands with well developed canopy primarily at low elev.	Prob. of occurrence peaks above 7500 acres
Scarlet tanager *Piranga olivacea*		Summer northern latitudes	Favors upland broadleaf woodlands with well developed canopy at low and mid elev.	

V. Deciduous dominated woodlands: (including forested wetlands, upland broadleaf, and mixed broadleaf-needleleaf) (con't)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Rose-breasted grosbeak *Pheucticus ludovicianus*		Summer Appalachia	Upland broadleaf woodlands primarily above 3500 ft. elev.	Prob. of occurrence peaks above 7500 acres
Chipping sparrow *Spizella passerina*		Summer except lower Coastal Plain and Peninsula FL	Mixed open woodlands at all elev.	
Dark-eyed junco *Junco hyemalis*		Summer Appalachia	Mixed woodlands at high elev.	
Rusty blackbird *Euphagus carolinus*		Winter except S. FL	Forested wetlands primarily at low elev.	
Common grackle *Quiscalis quiscula*		Resident	Roosts in forested wetlands at low and mid elev.	Depredates eggs and young of forest-interior species
Brown-headed cowbird *Molothrus ater*		Summer except S. FL	Associated with fragmentated forests with extensive edge at low and mid elev.	Parasitizes nests of many forest interior species
Northern oriole *Icterus galbula*		Summer except Coastal Plain and Peninsula FL	Nests in open riparian woodlands at low and mid elev.	
Migrant flycatchers, thrushes, vireos, and warblers		Aug.-Oct., Apr.-May	Funnel along forested habitats and woodlands at base of mountains	

VI. Southeastern spruce-fir needleleaf woodlands.

A. Primary management problems.

1. Persistent losses and fragmentation of spruce-fir woodland stands directly through forestry activities, introduced balsam woolly aphid (Adelges piceae) infestation, and acid precipitation.

B. Management opportunities and suggestions.

1. Recent dramatic losses to high elevation Fraser fir (Abies fraseri) during the last two decades appears to have been caused by the cumulative effects of the introduced balsam woolly aphid, increasing pH in precipitation, and the naturally harsh cold and windy environment. The death of most mature Fraser fir at the highest elevations has secondarily exposed most red spruce (Picea rubens) to harsher climatic conditions. It is not clear what can be done to maintain existing forests except to continue research on aphid control and to replant deforested areas.

C. Key references.

1. Dickerman, R. W. 1987. The "Old Northeastern" subspecies of red crossbill. Am. Birds 41:189-194.

2. Rabenold, K. N. 1978. Foraging strategies, diversity, and seasonality in bird communities of Appalachian spruce-fir forests. Ecological Monogr. 48:397-424.

D. Other contacts.

1. National Park Service, Great Smoky National Park and Blue Ridge Parkway.

2. National Forest Service, Regional Forester, Atlanta, GA and Pisgah National Forest, NC.

VI. Southeastern spruce-fir woodland.

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Ruffed grouse		Resident	Feeds and nests on and near ground, roosts in canopy	Small openings with patches of secondary growth and shrubs important
Northern saw-whet owl *Aegolius acadicus*		Resident	Secondary cavity nester	Restricted to spruce-fir for breeding
Hairy woodpecker		Resident	Primary cavity nester	
Olive-sided flycatcher *Contopus borealis*	MOC	Summer	Hawks for insects from tops of snags	Restricted to spruce-fir for breeding
Common raven *Corvus corax*		Resident	Nests in rock outcrops	
Black-capped chickadee		Resident	Primary cavity nester	
Red-breasted nuthatch		Resident	Primary cavity nester	Restricted to spruce-fir for breeding
Brown creeper		Resident	Nests under loose bark	Primarily breeds in spruce-fir zone
Winter wren *Troglodytes troglodytes*		Summer	Cool, moist, and shaded understory; nests on or near ground, well-concealed	Primarily breeds in spruce-fir zone
Veery		Summer	Cool, moist, and shaded understory; nests on or near ground, well-concealed	

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Golden-crowned kinglet		Resident	Nests and forages high in canopy	Primarily breeds in spruce-fir zone
Cedar waxwing		Summer	Nests high in trees, prefers edges	
Solitary vireo		Summer	Nests and forages in midstory and canopy	
Black-throated blue warbler		Summer	Prefers moderate to dense understory, especially rhododendron and mountain laurel	
Black-throated green warbler		Summer	Nests and forages in canopy	
Blackburian warbler		Summer	Nests and forages in canopy	
Canada warbler		Summer	Nests and forages in dense understory, especially in rhododendron and mountain laurel	
Dark-eyed junco		Resident	Nests and forages on ground	
Red crossbill *Loxia curvirostra*		Resident (erratic)	Nests in spruce-fir; forages in spruce-fir, white pine, and hemlock almost exclusively on on conifer seeds	Complex status for Appalachian population, may be affected by loss of spruce-fir to aphids (acid rain?)

VII. Pine woodlands.

A. Primary management problems.

1. Losses of old-growth (≥80 years) pine forests through direct forestry activity and development pressure, among other activities.

2. Removal of snags and live trees with cavities.

B. Management opportunities and suggestions.

1. Effective use of the Sikes Act, National Environmental Policy Act, National Forest Management Act, and Endangered Species Act should provide for sound pine forest management. Enhancement and habitat rehabilitation can also occur through Pittman-Robertson Act.

2. Presently, the greatest tool to provide for sound pine forest management centers around management for the endangered red-cockaded woodpecker (Picoides borealis). Specific prescriptions in the red-cockaded woodpecker recovery plan represent sound techniques to effectively manage many pine woodlands (Lennartz and Henry 1985, Henry 1989). Basic components are to provide habitat within 1/2 mile each woodpecker colony site that includes pine or pine-hardwood stands at least 30 years of age. These stands in total should provide ≥ 8,490 square feet of pine basal area and ≥ 6,350 pine stems ≥ 10 inches diameter at breast height contiguous to the colony site. The colony sites themselves must have pine stands ≥ 60 years of age or younger stands containing scattered or clumped relict trees that provide suitable cavity trees. Cutting that does occur within 1/2 mile of a colony site should not allow habitat requirements to fall below the values necessary to support a viable clan. Similar management to 3/4 miles of colony sites may allow for new colony formation. Rotation age should be no less than 120 years, with up to 150 years for longleaf pine when feasible. Recommended size of cuts (to include modified shelterwood, leaving 30-40 square feet per acre in shelterwood) should average no more than 25 acres and should not be adjacent to a regeneration cut that is less than 20 percent of the expected height of the mature forest. Other details on woodpecker requirements can be found in the recovery plan.

3. Outside of woodpecker nesting and foraging habitat a number of similar recommendations can be given. In essence, protect large tracts of unbroken forest from excessive large-scale even-aged management, except when replacing introduced slash pine with appropriate native species (longleaf, loblolly, or shortleaf pine). Instead, recommend smaller-scale even-aged management,

on at least a 60-80 year rotation (including clear-cutting and modified shelterwood) or uneven-aged management (including single-tree or group select cutting) cutting techniques, depending on site conditions and the management objectives. Small-scale even-aged management is acceptable to most pine woodland nongame birds, and may be preferable to some species preferring uniform patches of early to mid successional shrub-scrub growth.

4. In most areas, in order to benefit woodpeckers as well as some other pine woodland nongame birds, as well as Northern bobwhite (Colinus virginianus), instituting a cycle of removing encroaching hardwood in the understory is necessary. Mechanical removal and prescribed fire are the two most important techniques. Summer prescribed fires are most similar to the natural condition (from lightning strikes) and is recommend where and when feasible on a 2 to 3 year cycle.

5. Discussion of fragmentation, edge effects, and maximizing biodiversity is as applicable to pine forests as it is to deciduous dominated woodlands.

6. In addition to live cavity trees, snags should be maintained to provide for primary and secondary cavity nesters throughout pine woodlands.

7. Development pressure is impacting the integrity of contiguous pine woodlands outside of national forests and military reservations. When red-cockaded woodpeckers are present, and no Federal funding is involved, no development can remove habitat that would result in "take" of any woodpecker without a Section 10(a)(1)(B) permit sanctioned through the Endangered Species Act. Such a permit requires the developer to produce a habitat conservation plan that will affirmatively manage for woodpeckers, subject to public review. The term take is defined in the Endangered Species Act to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." "Harm" is further defined as an act that "may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering." A finding of "harm" does not require documentation or mortality nor of habitat degradation ultimately resulting in loss of individuals (Sidle and Bowman 1988). Habitat loss that prevents the recovery of a species is affecting essential behavior patterns, which is evidence of "causing actual injury to the species and effects a taking under Section 9 of the Act" (Bean 1987). It is stressed here that woodpeckers must be

present and that any interaction with developers only should be to address potential impact to the woodpecker and its specific habitat needs. The "take" provision would apply to all private lands and any action where woodpeckers occur should be closely coordinated with State or local officials. Developments and woodpeckers can be compatible and any interaction with developers should stress this fact.

C. Key references.

1. Bean, M. J. 1987. The Federal Endangered Species Program. Pp. 147-160 in Audubon Wildlife Report 1987. R. L. DiSilvestro (ed.) National Audubon Society. New York, NY.

2. Engstrom, R. T., R. L. Crawford, and W. W. Baker. 1984. Breeding bird populations in relation to changing forest structure following fire exclusion: a 15-year study. Wilson Bull. 96:437-450.

3. Henry, V. G. 1989. Guidelines for preparation of biological assessments and evaluations for the red-cockaded woodpecker. U.S. Fish and Wildlife Service, Atlanta, GA. 13pp. plus 8 appendices.

4. Lennartz, M. R., and V. G. Henry. 1985. Red-cockaded Woodpecker Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, Georgia. 88pp.

5. Sidle, J. G. and D. B. Bowman. 1988. Habitat protection under the Endangered Species Act. Conservation Biology 2:116-118.

D. Fish and Wildlife contacts.

1. Ecological Services, Field Office, Asheville, NC.

2. Ecological Services, Field Office, Jacksonville, FL.

3. Ecological Services, Field Office, Jackson, MS.

E. Other contacts.

1. USDA Forest Service, Southeastern Forest Experiment Station, Clemson, SC.

VII. Pine woodlands (Peninsular FL, Coastal Plain, and Piedmont, longleaf-slash, loblolly-shortleaf); Piedmont, Ridge and Valley, Highland Rim, and Cumberland Plateau (virginia pine, shortleaf pine); Appalachia (Virginia-pitch).

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Southeastern American kestrel *Falco sparverius paulus*	HTC	Resident Lower Coastal Plain and Peninsular FL	Open pinewoods, secondary cavity nester	Maintain pine snags; responds to nest boxes
Ruffed grouse		Resident Appalachia	Feeds and nests on and near ground; roosts in canopy	Small openings with patches of secondary growth and shrubs important
Northern bobwhite *Colinus virginianus*		Resident	Feeds and nests on ground; well-developed grass ground cover, little or no midstory	Burn every 2-3 years to keep midstory down and maintain grass ground cover
Eastern screech-owl		Resident	Secondary cavity nester	
Great horned owl		Resident	Prefers open situations, uses old hawk nests	
Chuck-will's-widow	MOC	Summer Coastal Plain and Piedmont	Primarily in loblolly-shortleaf, near openings	
Whip-poor-will	HC	Summer Piedmont, Appalachia; winter lower Coastal Plain and Peninsular FL	Breeding in virginia, pitch, loblolly, shortleaf; winter longleaf, slash; near openings	
Red-headed woodpecker	MOC	Resident	Prefers open situations, primary cavity nester	
Red-bellied woodpecker		Resident	Primary cavity nester	

VII. Pine woodlands (Peninsular FL, Coastal Plain, and Piedmont, longleaf-slash, loblolly-shortleaf); Piedmont, Ridge and Valley, Highland Rim, and Cumberland Plateau (virginia pine, shortleaf pine); Appalachia (Virginia-pitch).

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Downey woodpecker		Resident	Primary cavity nester	
Hairy woodpecker		Resident	Primary cavity nester	
Red-cockaded woodpecker *Picoides borealis*	E	Resident Carolina Sandhills, Piedmont, Coastal Plain, Peninsular FL	Requires live pine trees red heart disease for nest and roost sites	See Recovery Plan
Northern flicker	MOC	Resident	Primary cavity nester, ground forager	
Eastern wood pewee	MOC	Summer except Peninsular FL	Prefers moderately open situations	
Great crested flycatcher		Summer	Secondary cavity nester	
Red-breasted nuthatch		Winter except Peninsular FL,	Bark gleaning	
Brown-headed nuthatch		Resident Piedmont, Coastal Plain, Peninsular FL	Primary cavity nester, bark-gleaner	
Brown creeper		Winter	Bark gleaner	
Hermit Thrush		Winter Piedmont and Coastal Plain	Prefers loblolly-shortleaf; moist, shaded sites	
Wood Thrush	MOC	Summer Piedmont and Coastal Plain	Prefers loblolly-shortleaf; moist, shaded sites	

VII. Pine woodlands (Peninsular FL, Coastal Plain, and Piedmont, longleaf-slash, loblolly-shortleaf); Piedmont, Ridge and Valley, Highland Rim, and Cumberland Plateau (virginia pine, shortleaf pine); Appalachia (Virginia-pitch).

Species	Management Status	Distribution/ Residency	Habitat notes	Ecology and Management: Management tips
Eastern bluebird *Sialia sialis*		Resident	Prefers open situations, secondary cavity nests	Maintain snags, responds to nest boxes
Blue-gray gnatcatcher		Winter Coastal Plain	Prefers loblolly short-leaf; forages in understory	
Golden-crowned kinglet		Winter except Gulf Coastal Plain, Peninsular FL	All pine types, most abundant outside of coastal plain, forages from trees	
Ruby-crowned kinglet		Winter Coastal Plain, Piedmont, Peninsular FL	All pine types, most abundant in coastal plain, forages from trees	
Solitary vireo		Summer Piedmont, Appalachia; Winter Coastal Plain, Peninsular FL	Breeds virginia, pitch, loblolly, shortleaf; winters loblolly, shortleaf, longleaf, slash	
Yellow-rumped warbler		Winter except Appalachian; most abundant Coastal Plain, Peninsular FL	Forages from all substrates	
Yellow-throated warbler		Summer except S. FL (uncommon Piedmont); winter S. GA, FL	Nests and forages primarily in canopy	
Pine warbler		Summer; resident Piedmont, Coastal Plain Peninsular FL	Nests in canopy, forages from all substrates	

VII. Pine woodlands (Peninsular FL, Coastal Plain, and Piedmont, longleaf-slash, loblolly-shortleaf); Piedmont, Ridge and Valley, Highland Rim, and Cumberland Plateau (virginia pine, shortleaf pine); Appalachia (Virginia-pitch).

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Prairie warbler *Dendroica discolor*		Summer except FL, S. LA	Primarily loblolly-shortleaf, especially open patches with well-developed shrub layer	
Palm warbler		Winter lower Coastal Plain, Peninsular FL; migrant elsewhere	Open woodlands, forages on the ground	
Summer tanager		Summer	Mostly loblolly and longleaf dominated stands in Piedmont and Coastal Plain	
Bachman's sparrow *Aimophila aestivalis*	HTC	Summer (rare in north); resident coastal plain, Peninsular FL	Moderately or poorly stocked pine overstory with open understory	Burning every 2-3 years to maintain low palmetto or wiregrass ground cover
Grasshopper sparrow *Ammodramus savannarum*	HC	Winter Piedmont, Coastal Plain, Peninsular FL	Open woodlands in dryish grassy patches	Burning every 2-3 years to maintain wiregrass ground cover
Henslow's sparrow	HTC	Winter, Coastal Plain, Peninsular FL	Open woodlands in moist grassy patches	Burning every 2-3 years to maintain wiregrass ground cover
Le Conte's sparrow		Winter Gulf Coastal Plain, Atlantic Coastal Plain of GA and SC	Open woodlands in grassy patches	Burning every 2-3 years to maintain wiregrass ground cover
Dark-eyed junco		Winter except Peninsular FL	Open woodlands, ground forager	
Brown-headed cowbird		Summer except Peninsular FL	Mostly near edges and farmlands	Parasitizes open nesting birds

VIII. Scrub and secondary growth (including Florida scrublands, coastal scrublands, early successional hardwoods, and dense thickets with or without canopy cover).

A. Primary management problems.

1. Development pressure, especially in clearing Florida scrubland and coastal scrublands throughout the Region.

2. Early successional hardwood development after clearing in most areas is not maintained for any long period of time (i.e. regularly treated) before development or successional growth to secondary or primary growth occurs.

B. Management opportunities and suggestions.

1. Effective use of Sikes Act, National Environmental Policy Act, National Forest Management Act, Coastal Barrier Resources Act, and Endangered Species Act should provide for sound scrubland and successional habitat management. Enhancement and habitat rehabilitation can also occur through Endangered Species Act and Pittman-Robertson Act funding.

2. Presently, Florida scrubland (both coastal and interior) is being lost to development pressures at an accelerating rate. Most of this habitat is on private lands and so opportunities to protect and enhance these habitats is primarily through cooperation with State and local agencies. Also, notifying landowners of their obligations under Section 9 of the Endangered Species Act is appropriate to avoid taking any endangered or threatened species without a Section 10(a)(1)(B) permit (as described in VIII B.6.). Among the listed species in Florida scrublands for which landowners have responsibility to avoid take are Florida scrub jay (Aphelocoma coerulescens coerulescens), Florida grasshopper sparrow (Ammodromus savannarum floridanus), blue-tailed mole skink (Eumeces egregius lividus), and sand sink (Neoseps reynolds). In addition, efforts to recover eleven listed central Florida scrub plants would indirectly benefit scrubland nongame bird (Martin 1990).

3. Coastal scrublands throughout the Region, in addition to supporting resident nongame birds, are essential habitats for trans-Gulf and trans-Caribbean migrants as staging areas in fall and as landfall in spring (Moore and Simons in press). These areas, along with even more important coastal woodlands, are under tremendous development pressure and their loss may result in increased mortality rates for neotropical migrants. Lands presently protected within the Coastal Barrier Resource System, national seashores, and national wildlife refuges are

the best means to manage coastal scrublands. Additional efforts to protect other such areas are strongly encouraged. Cooperation with State and local agencies is essential to allow only developments that are compatible with protecting coastal scrublands and woodlands.

4. In areas where clearing of woodlands does occur, few tracts are managed for long-term maintenance or a rotating supply of early successional growth. Some areas on national forests or other public lands are conducive to such management on a small scale. Maintenance of early successional patches are encouraged (each at about 25-40 acres) within the conceptual framework of maximizing biodiversity as long as surrounding forested land does not become fragmented or reduced in size to the extent that forest-interior area-sensitive species begin to disappear (DeGraaf 1987).

C. Key references.

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D. Fish and Wildlife Service contacts.

1. Ecological Services, Field Office, Jacksonville, FL.

2. Ecological Services, Field Office, Vero Beach, FL.

F. Other contacts.

1. Archbold Biological Station, Highlands Co., FL.

2. National Park Service, Gulf Islands National Seashore, 3500 Park Road, Ocean Springs, MS 29564.

VIII. Scrub and secondary-growth (including coastal scrublands, early successional hardwoods, dense thickets with or without cover, and Florida scrublands, including sand pine)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Brown pelican	E(LA,MS, Caribbean)	Resident Coastal	Colonially nests and roosts on coastal scrub, often on islands	Protect nest colonies from human disturbance
Double-crested cormorant		Resident Coastal	Colonially nests and roosts on coastal scrub, often on islands	Protect nest colonies from human disturbance
Reddish egret	HTC	Resident Coastal LA, S. FL	Colonially nests and roosts on coastal scrub, often on islands	Protect nest colonies from human disturbance
Roseate spoonbill		Resident Coastal LA, S. FL	Colonially nests and roosts on coastal scrub, often on islands	Protect nest colonies from human disturbance
Other herons, egrets, ibis		Resident Coastal	Colonially nests and roosts on coastal scrub, often on islands	Protect nest colonies from human disturbance
Northern bobwhite		Resident mainland, introduced Caribbean	Scrub and brushlands, extensive cover and seed plants	
Zenaida dove *Zenaida aurita*		Resident Caribbean	Tropical second-growth and arid scrub	
Common ground-dove *Columbina passerina*		Resident lower Coastal Plain and Caribbean	Open scrubland, often sandy substrate	

VIII. Scrub and secondary-growth (including coastal scrublands, early successional hardwoods, dense thickets with or without cover, and Florida scrublands, including sand pine)

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Key West quail-dove *Geotrygon chrysia*		Resident Caribbean	Semi-arid scrub	
Smooth-billed ani *Crotophaga ani*		Resident S. Fl and Caribbean	Open scrub and brushlands	
Antillean mango *Anthracothorax dominicus*		Resident Caribbean	Arid scrubland along Coastal Plain	
Green-throated carib *Eulampis holosericeus*		Resident Caribbean	Lowland second-growth	
Antillean crested hummingbird *Orthorhynchus cristatus*		Resident Caribbean	Lowland second-growth, also forest edges	
Caribbean elaenia *Elaenia martinica*		Resident Caribbean	Arid scrubland, open woodland	
Least flycatcher *Empidonax minimus*		Summer Appalachia	Open woodland and brushy areas, deciduous scrub, orchards, open parks and gardens	
Gray kingbird *Tyrannus dominicensis*		Resident Caribbean, summer FL Coast	Open scrubland, hawks from exposed perches	
Florida scrub jay *Aphelocoma coerulescens coerulescens*	T	Resident central FL	Thick scrublands in sandy situations; also sand pine mixed with scrub	See recovery plan

VIII. Scrub and secondary-growth (including coastal scrublands, early successional hardwoods, dense thickets with or without cover, and Florida scrublands, including sand pine)

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Bewick's wren	HTC	Summer Appalachia, Highland Rim, Ozarks; winter Gulf Coastal Plain	Scrub and brushlands, usually near extensive forest	May respond to nest boxes placed near ground
House wren		Summer north latitudes, winter south latitudes mainland	Open brushlands with or without some woodland cover	
Winter wren		Winter mainland except Appalachia (spruce-fir) and Peninsular FL	Dense tangles and thickets under a wide variety of woodlands and hedgerows	
Blue-gray gnatcatcher		Winter lower Coastal Plain and Peninsular FL	Scrub and second-growth hardwoods	
Gray catbird *Dumetella carolinensis*	MOC	Summer except Gulf Coast and Peninsular FL Caribbean; Winter lower Coastal Plain and FL	Dense thickets, brushlands, hedgerows, woodland understory	
Northern mockingbird *Mimus polyglottos*		Resident	All areas of scrub and brushland, thickets, gardens, rural and suburban areas	
Brown thrasher *Toxostoma rufum*		Resident mainland, except Appalachia, Highland Rim, where summer only	Dense brushlands, woodland understory, second-growth	

VIII. Scrub and secondary-growth (including coastal scrublands, early successional hardwoods, dense thickets with or without cover, and Florida scrublands, including sand pine)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
White-eyed vireo *Vireo griseus*		Summer mainland; winter Gulf Coastal Plain, FL	Dense scrub and brushland, woodland understory, usually in moist areas	
Puerto Rican vireo *Vireo latimeri*		Resident PR	Coastal scrub, coffee plantation and woodland understory	Endemic to PR
Bell's vireo	MOC	Summer primarily nest of Miss. River, N. of Louisiana	Nests in shrub thickets and mid-successional second-growth	Occasional cutting of large trees and shrubs to maintain some mid-successional habitat
Blue-winged warbler *Vermivora pinus*		Summer Ridge and Valley, Cumberland Plateau, Highland Rim, Ozark and Ouchita	Brushy overgrown fields and thickets, mid-successional second-growth, often open	Occasional cutting of large trees and shrub to maintain some mid-successional habitat
Golden-winged warbler *Vermivora chrysoptera*	MOC	Summer Appalachia	Early successional hillside second-growth (up to 25 feet high) in abandoned fields at mid elevations; usually near forest edge	Occasional cutting of large trees and shrubs to maintain early successional habitat
Orange-crowned warbler *Vermivora celata*		Winter Coastal Plain and Peninsular FL	Brushy and shrubby areas, open woodland, wax myrtle thickets; forages from dead leaves	

VIII. Scrub and secondary-growth (including coastal scrublands, early successional hardwoods, dense thickets with or without cover, and Florida scrublands, including sand pine)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Chestnut-sided warbler *Dendroica pensylvanica*		Summer Appalachia	Early successional second-growth and overgrown fields at mid to high elevations	
Yellow-rumped warbler		Winter except Appalachia	second-growth, scrub-shrub, wax myrtle thickets	
Kirtland's warbler *Dendroica kirtlandii*	E	Winter Bahamas; migrants possible mainland, especially FL	Low scrub, thickets, less than 5 feet tall	
Prairie warbler	MOC	Summer except Peninsular FL, S. LA, Caribbean; resident Coastal Peninsular FL; winter Peninsular FL and Caribbean	Scrublands, overgrown fields, coastal scrub	
Palm warbler		Winter Coastal Plain, Peninsular FL	Second-growth, scrubland, usually mixed with some open ground	
Common yellowthroat		Resident Piedmont, Coastal Plain, Peninsular FL; summer nest of mainland; winter Caribbean	Brushy overgrown fields, swamp edges, riparian scrub-shrub thickets, often moist conditions	
Yellow-breasted chat *Icteria virens*		Summer except Peninsular FL and Caribbean	Brushy overgrown fields, hedgerows, riparian scrub-shrub thickets	

VIII. Scrub and secondary-growth (including coastal scrublands, early successional hardwoods, dense thickets with or without cover, and Florida scrublands, including sand pine)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Bananaquit *Coereba flaveola*		Resident Caribbean	All shrub-scrub, and second-growth habitats	
Stripe-headed tanager *Spindalis zena*		Resident PR	Second-growth, shrub-scrub, especially in hill country	
Puerto Rican tanager *Nesospingus speculiferus*		Resident PR	Highland second-growth	Endemic to PR
Blue grosbeak *Guiraca caerulea*		Summer mainland except S. FL	Brushy overgrown fields, scrub-shrub thickets with scattered trees, second-growth at low elev.	
Indigo bunting *Passerina cyanea*		Summer, except S. FL and Caribbean where it winters	Scrub-shrub and second-growth at all elev., usually near woodland edges	
Painted bunting *Passerina ciris*	MOC	Summer Lower Atlantic Coastal Plain and Upper Gulf Coastal Plain, Ozark-Ouchita; winter S. FL	Open areas with scattered brush and trees, riparian scrub-shrub thickets	
Rufous-sided towhee *Pipilo erythrophthalmus*		Resident mainland except S.W. AK and W. LA where it winters	Dense forest undergrowth, riparian scrub-shrub thickets	
Black-faced grassquit *Tiaris bicolor*		Resident Caribbean	Brushy areas, arid scrub, second-growth	

VIII. Scrub and secondary-growth (including coastal scrublands, early successional hardwoods, dense thickets with or without cover, and Florida scrublands, including sand pine)

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Puerto Rican bullfinch *Loxigilla portoricensis*	MOC	Resident PR	Dry coastal thickets, arid scrub	Endemic to PR
Lesser Antillean bullfinch *Loxigilla noctis*		Resident VI	Dry coastal thickets, arid scrub	
Field sparrow *Spizella pusilla*	MOC	Resident except Peninsular FL and S. LA where it winters	Open brushy woodlands, overgrown fields, hedgerows, sparse second-growth	
Florida grasshopper sparrow *Ammodramus savannarum floridanus*	E	Resident South-central FL, Kissimmee Prairie	Open areas with a predominance of saw palmetto, shrubs, dwarf trees (oaks) 1-2 feet high	See recovery plan
Fox sparrow *Passerina iliaca*		Winter except Caribbean, Gulf Coast, Peninsular FL	Dense forest understory, riparian scrub-shrub thickets	
Song sparrow		Winter mainland except S. FL, resident N. latitudes	Riparian and coastal brushy and shrubby areas; also thickets and hedgerows for breeding	
Lincoln's sparrow *Melospiza lincolnii*		Winter Piedmont, Coastal Plain, Peninsular Florida	Moist brushy overgrown fields, riparian scrub-shrub thickets	
Swamp sparrow		Winter mainland	Moist brushy overgrown fields, riparian scrub-shrub thickets	

VIII. Scrub and secondary-growth (including coastal scrublands, early successional hardwoods, dense thickets with or without cover, and Florida scrublands, including sand pine)

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
White-throated sparrow *Zonotrichia albicollis*		Winter mainland	Dense forest understory, riparian scrub-shrub thickets, often near openings	
White-crowned sparrow *Zonotrichia leucophrys*		Winter mainland except Atlantic Coastal Plain and FL	Open brushy overgrown fields, hedgerows, briar thickets	
Orchard oriole *Icterus spurius*	MOC	Summer mainland except Peninsular FL	Brushy hillsides, scrub, second-growth, partly open areas with scattered trees, orchards	
Migrants		Trans Gulf and Trans Atlantic	Coastal scrublands and woodlots	Critical areas for fall staging and spring fall-out

IX. Habitat edge between mature forest and open habitat (including powerline corridors, restored strip-mined areas, savanna, grassland, agriculture, and pastureland).

A. Primary management problems.

1. Edges do provide benefits to a large number of species and some species prefer edges over other habitats. However, the level of edge proportional to the size of forested habitats can work to decrease many forest-interior species that are area-sensitive and susceptible to brood parasitism and nest depredation.

2. Indirect effects on species along edges include attracting many forest birds into areas where pesticides and other chemicals are heavily applied.

B. Management opportunities and suggestions.

1. Management suggestions for edges were largely treated under deciduous dominated woodlands. Almost all birds species that prefer edge are widespread in other habitats and are not area-sensitive. Thus, providing edge while maintaining a relatively intact forest core in relation to forest tract size, can benefit both edge bird species and some forest-interior species while not harming other forest-interior species.

2. Studies assessing contaminant effects on birds along edges should be conducted and recommendations should be made to reduce any adverse effects that are found.

C. Key references.

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2. Kroodsma, R. L. 1984. Ecological factors associated with degree of edge effect in breeding birds. J. Wildl. Manage. 48:418-425.

IX. Habitat edge between mature forest and open habitat (including powerline corridors, restored strip-mined areas, savannas, grassland, agriculture, pastureland, and fragmented forest)

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Mississippi kite	MOC	Summer Coastal Plain, Miss. Valley	Forested wetlands for nesting, forages over open country	
American kestrel *Falco sparverius*	HTC(SE)	Resident, except S. FL where it winters	Forested wetlands for nesting, forages over open country, especially in winter; cavity nesters	Responds to nest boxes, possibly susceptible to pesticides
Common ground-dove		Resident lower Coastal Plain and Caribbean	Wide variety of open woodlands and open country, especially in sandy areas	
Eastern phoebe		Primarily winter mainland except Appalachia	Wide variety of open woodlands and open country, often near water	
Eastern kingbird *Tyrannus tyrannus*		Summer mainland	Wide variety of open woodlands and open country, especially along roadsides	
House wren		Summer north latitudes; winter south latitudes mainland	Forest edge with well developed understory, hedgerows, and brushy areas in farmlands	

IX. Habitat edge between mature forest and open habitat (including powerline corridors, restored strip-mined areas, savannas, grassland, agriculture, pastureland, and fragmented forest)

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Eastern bluebird		Resident mainland	Wide variety of open woodlands and open country, roadsides; secondary cavity nester	Responsds to nest boxes
Northern mockingbird		Resident	Wide variety of open areas along woodland edge, hedgerows, especially along roadsides	
Loggerhead shrike *Lanius ludovicianus*	HTC	Resident mainland except Appalachia	Open country adjacent to woodland edge, hedgerows, especially along roadsides	Possibly susceptible to pesticides
Blue grosbeak		Summer mainland except S. FL	Forest edge with well developed understory, hedgerows, and brushy areas in farmlands, low elev.	
Indigo bunting		Summer mainland except S. FL	Forest edge with well developed understory, all elev.	
Chipping sparrow		Winter Piedmont, Coastal Plain, Peninsular FL	Feeds on ground in open, seeks cover in forest understory	

IX. Habitat edge between mature forest and open habitat (including powerline corridors, restored strip-mined areas, savannas, grassland, agriculture, pastureland, and fragmented forest)

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Henslow's sparrow	HTC	Winter lower Coastal Plain and Peninsular FL	Powerline corridors with moist broomsedge	Mow every 3-5 years to maintain broomsedge successional stage
Dark-eyed junco		Winter except S. FL	Feeds on ground in open, seeks cover in forest understory	
Song sparrow		Winter mainland except S. FL	Forest edge with well developed understory, hedgerows, and brushy areas in farmlands	
Lincoln's sparrow		Winter Piedmont, Coastal Plain, and Peninsular FL	Forest edge with well developed understory, hedgerows, and brushy areas in farmlands	
Common grackle		Resident mainland	Roosts and nests in woodlands forages along edges and in open country	Depredates eggs and young of forest-interior species
Brown-headed cowbird		Resident mainland except Peninsular Fl where it winters	Roosts and nests in woodland forages along edges and in open country	Parasitizes nests of forest-interior and open country species

IX. Habitat edge between mature forest and open habitat (including powerline corridors, restored strip-mined areas, savannas, grassland, agriculture, pastureland, and fragmented forest)

Species	Management Status	Ecology and Management		
		Distribution/ Residency	Habitat notes	Management tips
Shiny cowbird *Molothrus bonariensis*		Resident Caribbean; recently FL, lower Atlantic Coastal Plain, and LA	Open woodlands edges near extensive open country	Parasitizes nests of mangrove and open country nesting species
Northern oriole		Summer except Caribbean, Coastal Plain, and Peninsular FL where it winters	Forest edges, humid forest edge in winter	
Black-cowled oriole *Icterus dominicensis*		Resident PR	Forest edges, especially when palms are available for nest sites	

X. Savanna, grassland, pastureland, powerline corridors, and surface mined areas (to include both dry and wet prairies).

A. Primary management problems.

1. Loss of savanna and prairie in South-central Florida has accelerated in recent decades as development and intensive agricultural uses intensify.

2. Potential problems with grazing of cattle and excessive mining activity.

3. In some areas, excessive cabbage palmetto and woodland encroachment can result in loss of savanna and prairie.

B. Management opportunities and suggestions.

1. Most savanna, prairie, and grassland occurs on private land, thus there are few opportunities for direct Service involvement. Most effective management must be through State and local agencies. Where these habitats do occur on public lands (military and aerospace installations, national forests, national seashores, and national wildlife refuges) effective use of Sikes Act and National Forest Management Act can provide management opportunities to regulate pesticide use, road building, clearings, among other activities. Indirect opportunities do exist through effective use of the Pittman-Robertson Act for grant-in-aid funding and Endangered Species Act where listed species are found. In addition, the Soil Conservation Service and the Agricultural Stabilization and Conservation Service both provide technical services to landowners. Management suggestions to landowners can include effective management of these habitats, including maintenance of natural grassland instead of conversion to pastureland.

2. The State of Florida and the U.S. Army Corps of Engineers' efforts to restore the Kissimmee River floodplain by dismantling channelization structures should restore much prairie habitat.

3. In South-central Florida, the most effective management of savannas, drier prairies, and pastureland centers on protection of the threatened Florida population of the Audubon's crested caracara (Polyborus plancus audubonii). Much caracara habitat has been lost to citrus groves, tree plantations, "improved" pastures, an array of other agricultural uses, and development (U.S. Fish and Wildlife Service 1989). Expansion of these activities in known caracara areas must be compatible with this species' nesting and foraging requirements. If the proposed action is not compatible, the landowner then must obtain a permit through development of a habitat conservation plan in order to

conduct the proposed action (as described in VII B.6.). In addition, any action that may affect caracara and involves Federal assistance through the Soil Conservation Service or the Agricultural Stabilization Conservation Service would require interagency consultation, through Section 7 of the Endangered Species Act, to minimize or avoid adverse impacts.

4. Grazing in native habitats, especially in South-central Florida, should be monitored to determine if habitat deteoration may be due to overgrazing.

5. Surface mining activities, principally in Kentucky, Tennessee, and Florida have resulted in clearing of both bottomland and upland woodlands. However, restoration and erosion control are required and often involve revegetation with grasses. These habitats may benefit some grassland species (at the expense of forest-interior species) that are local or declining within the Southeast Region (Allaire 1978, Whitmore and Hall 1978, Whitmore 1980). In addition, power-like corridors may provide limited habitat for some open-country species, especially sparrows, but excessive corridor cuts through forested tracts will also lead to declines in forest-interior species (Anderson 1979).

6. Maintenance of savannas and prairies often depend on controlling excessive encroachment of woody plants by using roller choppers, and prescribed fire (to mimic lightning strikes), and other rangeland improvement techniques. However, maintenance of scattered clumps of trees (or cabbage palmettos in South-central Florida) is necessary to support many species requiring cavities or platform supported nests.

C. Key references.

1. Allaire, P. N. 1978. Reclaimed surface mines: new potential for some North American birds. Am. Birds 32:3-5.

2. Anderson, S. H. 1979. Changes in forest bird species composition caused by transmission-line corridor cuts. Am. Birds 33:3-6.

3. Kroodsma, R. L. 1982. Effects of power-line corridors on the density and diversity of bird communities in forested areas. Oak Ridge Natl. Lab (Tenn.) CONF-820215-3. 221 pp.

4. Maehr, D. S. 1984. Status of birds using phosphate-mined lands in Florida. Am. Bird 38:28-31.

5. U.S. Fish and Wildlife Service. 1989. Recovery Plan for the Florida population of Audubon's crested caracara. Atlanta, GA.

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8. Yahner, R. H., and J. C. Howell. 1975. Habitat use and species composition of breeding avifauna in a deciduous forest altered by strip mining. J. of the Tennessee Academy of Science 50:142-147.

D. Fish and Wildlife Service contacts.

1. National Ecology Research Center.

2. Patuxent Wildlife Research Center.

3. National Wetlands Research Center.

X. Savanna, grassland, pastureland, restored strip-mined areas.

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Cattle egret *Bubulcus ibis*		Resident Coastal Plain, Peninsular FL, Caribbean; winter Miss. Valley	Pastureland, associated closely with hoofstock	
Black vulture		Summer throughout; resident Piedmont, Coastal Plain, Peninsular FL	Roosts and nests in woodlands, often forages in open habitats	
Turkey vulture		Resident, except VI	Roosts and nests in woodlands, often forages in open habitats	
Mississippi kite	MOC	Summer Coastal Plain, Miss. Valley	Roosts and nests in woodlands, often forages in open habitats	
Red-tailed hawk *Buteo jamaicensis*		Resident	Wide variety of open habitats	
Rough-legged hawk *Buteo lagopus*		Winter northern latitudes	Wide variety of open habitats	
Short-tailed hawk	MOC	Summer Peninsular FL; resident S. FL	Roosts and nests in woodlands, forages over savanna, wetlands	

X. Savanna, grassland, pastureland, restored strip-mined areas.

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Audubon's crested caracara *Polyborus plancus audubonii*	T(FL)	Resident South-central FL, Kissimmee Valley	Forages in savanna, requires scattered cabbage palmettos or small trees for nests	See recovery plan
American kestrel	HTC (SE)	Winter	Wide variety of open habitats, especially in winter	
Merlin		Winter lower Coastal Plain, Miss. Valley Peninsular FL, Caribbean	Wide variety of open habitats, especially in winter	
Northern bobwhite		Resident mainland, introduced Caribbean	Tall grass	
Sandhill crane	E(MS)	Resident and local S. MS, S. AL, S. GA, Peninsular FL	Open grasslands and pine savanna	Habitats may need vegetation management, such as regular prescribed burning
Common snipe		Winter except Appalachia	Wide variety of open habitat with moist soil	
Barn owl	HTC	Resident except Caribbean	Forages in a wide variety of open country	Requires elevated, covered nests; responds to nest boxes
Florida burrowing owl *Athene cunicularia floridana*	MOC(FL)	Resident central FL	A wide variety of open habitats, including airports	Increasing dependence on temporary temporary artificial habitats subject this species to intense development pressure

X. Savanna, grassland, pastureland, restored strip-mined areas.

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Short-eared owl	MOC	Resident PR; winter mainland	A wide variety of open habitats, including airports	
Horned lark *Eremophila alpestris*		Resident mainland except Coastal Plain, FL; winters, Coastal Plain	A wide variety of open habitats, including airports	
Brown-headed cowbird		Resident mainland, except Peninsular FL where it winters	Pastureland and grassland closely associated with hoofstock	Increases in pastureland and grazed grassland has enhanced overwinter survival of this nest parasite
Sedge wren		Winter Coastal Plain, Peninsular FL	Wet grassy meadows, short grass	
Eastern bluebird		Resident	Forages in a wide variety of open habitats	Requires cavity nests as in pines in savannas; responds to artificial nest boxes
American pipit	HTC	Winter mainland except Appalachia, Lexington Plain	Wide variety of open habitat with moist soil	
Loggerhead shrike	HTC	Resident mainland except Appalachia	Wide variety of open habitats	Requires dense hedgerows for nesting
Palm warbler		Winter Coastal Plain, Peninsular FL, Caribbean	Wide variety of open habitats	

X. Savanna, grassland, pastureland, restored strip-mined areas.

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Common yellowthroat		Resident Piedmont Coastal Plain, Peninsular FL; summer nest of mainland; winter Caribbean	Short, dense, moist grassy habitats	
Dickcissel *Spiza americana*		Summer mainland except Appalachia, Coastal Plain, Peninsular FL	Open weedy fields, grasslands	Highly erratic in abundance
Yellow-faced grassquit *Tiaris olivacea*		Resident PR	Open grassy habitats	
Black-faced grassquit		Resident PR	Open grassy habitats	
Vesper sparrow *Pooecetes gramineus*		Winter mainland except Highland Rim, S. FL	Savanna, weedy pastures, grasslands	
Lark sparrow *Chondestes grammacus*		Summer Miss. Valley, Highland Rim, Ozark-Ouchita	Savanna, weedy pastures, grasslands	
Savannah sparrow *Passerculus sandwichensis*		Winter mainland, resident Lexington Plain	Savanna, weedy pastures, grasslands	
Grasshopper sparrow *Ammodramus savannarum*	HC	Summer mainland northern latitudes; winter mainland southern latitudes; resident PR	Savanna, reclaimed strip-mines, open grasslands with tall grass	

X. Savanna, grassland, pastureland, restored strip-mined areas.

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Henslow's sparrow	HTC	Summer E. NC and North-central KY; winter Coastal Plain, Peninsular FL	Moist open fields and meadows with grass (broomsedge) mixed with with weeds or small shrubs	
Le Conte's sparrow		Winter Gulf Coastal Plain, Atlantic Coastal Plain of GA and SC	Moist or dry, tall, rank grass, weedy fields, broomsedge, and moist short grass	
Bobolink *Dolichoryx oryzivorus*		Migrant throughout; local breeding Appalachia	Extensive areas with tall grass, meadows, pastures, weedy fields	
Eastern meadowlark *Sturna magna*		Resident mainland	Wide variety of open habitats	
Western meadowlark *Sturna neglecta*		Winter Miss. Valley, AL; resident NW. LA, SW. AR	Wide variety of open habitats	
Greater Antillean grackle *Quiscalis niger*		Resident PR	Lowland open areas including pastuers	Depredates eggs and young of other species

XI. Agriculture.

A. Primary management problems.

1. Encroachment of agriculture upon other habitats, both wetland and upland, causing fragmentation and excessive edge.

2. Agricultural areas of themselves have potential to provide important habitats for many species, depending on the intensity of farming. However, "efficient" farming practices that involve high uses of chemicals, no hedgerows, and leaving little waste grain after harvest, all work against high wildlife use.

3. Effects of chemical use within as well as beyond the confines of cropland, are responsible for much potential non-point environmental contamination.

4. Some bird species favored by agricultural practices including cowbirds, blackbirds, and grackles, and European starlings (Stunus vulgaris) are the same species that adversely affect forest-interior species through brood parasitism, depredation, and completion for limited nesting cavities, respectively.

5. Feral animals (rats, cats, and dogs), attracted to agricultural areas, provide additional depredation problems to forest species.

B. Management opportunities and suggestions.

1. Many opportunities exist to minimize impacts and even provide enhancement to wetlands (including forested) by effective use of Farm Bill provisions. Fee title transfer from Farmer's Home Administration to the Service or another wildlife agency, placing conservation easements on farmland property, and entering farmland into the Conservation Reserve Program all contribute to protecting and enhancing wetlands. Benefits to upland habitats on farmlands could probably come through close coordination between wildlife agencies, Soil Conservation Service, and Agriculture Stabilization Conservation Service in what advice these latter agencies give to farmers.

2. Advice to farmers to benefit nongame birds and all other wildlife should include "inefficient" farming methods, such as using integrated pest management (minimizing use of chemicals), providing hedgerows using native plants (also provides protection from wind erosion), and leaving waste grain after harvest. Allowing some fields, left fallow 3-5 years, to develop dense stands of broomsedge (Andropogon virginicus) can benefit several uncommon sparrows wintering principally in the Southeast Region. In addition, irrigation of pasture, rice

fields, and recently plowed farmland is known to provide important habitat during shorebird migration in southern Louisiana and central Florida, and should also do so elsewhere (Cardiff and Smalley 1989).

3. Chemical use (insecticides, fungicides, and herbicides) in agriculture and effects on wildlife is a major focus of the Service's Environmental Contaminants program and of the Environmental Protection Agency. Present chemical use should be closely monitored to determine existing point and non-point contaminant sources and to determine effects on the survival and reproduction of nongame birds. Such studies should include migrating shorebirds, breeding rails (in rice cropland in the lower Mississippi River Valley), wading and other fish-eating birds downstream of irrigation runoff, and forest-interior breeding species potentially affected by aerial spraying that overshoots croplands.

4. Maximizing total contiguous area of forest adjacent to agricultural areas is probably the most effective means to minimize parasitism, depredation, and nest cavity competition pressure on forest-interior breeding species.

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D. Fish and Wildlife Service contacts.

1. Environmental Contaminant Specialist, Atlanta, GA.

E. Other contacts.

1. Environmental Protection Agency, Atlanta, GA.

XI. Agriculture (cropland, feedlots, and associated borders)

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Herons, egrets, ibis		Resident Coastal Plain, Peninsular FL, Caribbean	Forage in irrigated cropland for invertebrates	Close attention to irrigation schedules can benefit these species year-round
Northern harrier	MOC	Winter	Forages over cropland for small mammals	Susceptible to pesticides
American kestrel	HTC(SE)	Winter S. FL, SW. LA, resident elsewhere	Forages principally for insects along cropland margins	Susceptible to pesticides
Shorebirds		Migrants throughout	Forage in irrigated cropland for invertebrates	Close attention to irrigation schedules can benefit these species
Barn owl	HTC	Resident mainland	Forages over cropland for small mammals	Susceptible to pesticides; responds to farm buildings for nesting
Short-eared owl	MOC	Winter mainland; resident Caribbean	Forages over cropland for small mammals	
Cliff swallow		Summer TN, KY, AR	Aerially forages for insects over cropland	Colonial with nests built under bridges, on sides of Farm buildings
Cave swallow *Hirundo fulva*		Summer Caribbean, S. FL (local)	Aerially forages for insects over cropland	Nests built in caves, inside farm buildings and under bridges

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Barn swallow *Hirundo rustica*		Summer mainland except Atlantic Coastal Plain and FL	Aerially forages for insects over cropland	Nests built in caves inside farm buildings and under bridges
Loggerhead shrike	HTC	Resident mainland except Appalachia	Forages principally for insects along cropland margins	Susceptible of pesticides; require dense hedgerows for nesting
European starling		Resident mainland, recently found in Caribbean	Forages principally for insects along cropland margins and in feedlots	Ag use has enhanced over-wintering survival of this intense competitor with native cavity nesters
Dickcissel		Summer Miss. Alluvial Valley, Highland Rim	Forages and nests in tall grain fields	Highly erratic in abundance
Henslow's sparrow	HTC	Summer E. NC and North-central KY; winter Coastal	Old fallow fields with broomsedge, usually moist	Fallow fields may require 3-5 years to develop
Blackbirds, grackles		Resident	Large flocks feed on waste grain and at feedlots	Ag use has enhanced over-wintering survival
Brown-headed cowbird		Resident Caribbean; recently FL, lower Atlantic Coastal Plain, and LA	Large flocks feed on waste grain and at feedlots nest parasites	Ag use has enhanced over-wintering survival for these
Shiny cowbird		Resident mainland	Large flocks feed on waste grain and at feedlots	Ag use has enhanced overwintering survival for these nest parasites

XII. Suburban (including rural housing projects).

A. Primary management problems.

1. Excessive development pressure results in wetland loss, fragmentation of forests, and increasing populations of predators and parasites that affects forest-interior species.

2. Maintaining habitat quality in suburban areas is important for the bird species that do use such habitats.

B. Management opportunities and suggestions.

1. Effective use of Fish and Wildlife Coordination Act (when U.S. Army Corps of Engineers permit for dredging or filling wetlands are required) and Endangered Species Act (through Section 10 process if no Federal support is involved, Section 7 when Federal monies are involved) can allow developments to become compatible habitats for use by nongame birds. Familiarity with State and local agencies and ordinances that regulate development can also be extremely beneficial to managing habitats within proposed developments.

2. Urban wildlife programs can both educate the public on problems nongame birds face and also assist the public with means to provide food, protective cover, and nesting subtrate for nongame birds.

3. Nectar, suet, and seed feeders have been associated with increasing numbers of hummingbirds, permanent resident insectivorous, and wintering granivores, respectively, found using suburban habitat. Using native plantings to provide cover and nest boxes for cavity nesting species has also been instrumental in stabilizing many native species in suburban areas. However, feeding in heavily disturbed areas may increase overwinter survival of species more likely to depredate or parasitize the nests of forest-interior species.

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D. Fish and Wildlife Service contacts.

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2. Patuxent Wildlife Research Center.

XII. Suburban (includes woodland generalists using suburban habitats).

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Common nighthawk *Chordeiles minor*	HC	Summer mainland	Aerial forager, nests on a wide variety of substrates from roofs to gravel pits	
Chimney swift *Chaetura pelagica*		Summer mainland	Aerial forager, nests in chimneys and other protected sites	
Purple martin *Progne subis*		Summer mainland	Aerial forager, secondary cavity nester	Use of gourds and "houses" for artificial nests has greatly enhanced this species
Blue jay *Cyanocitta cristata*		Resident mainland	Habitat generalist	Suburban feeders have greatly enhanced overwintering survival for this species, which preys on eggs and young of other woodland birds
American crow *Corvus brachyrhynchos*		Resident mainland	Habitat generalist	Garbage dumps and suburban feeders have greatly enhanced overwintering survival for this species, which preys on eggs and young of other woodland birds
Carolina chickadee *Parus carolinensis*		Resident mainland	Habitat generalist, cavity nester, omnivorous	Suburban feeders have enhanced overwintering survival; readily use nest boxes

XII. Suburban (includes woodland generalists using suburban habitats).

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Tufted titmouse *Parus bicolor*		Resident mainland	Habitat generalist, cavity nester, omnivorous	Suburban feeders have enhanced overwintering survival; readily use nest boxes
Carolina wren *Thryothorus ludovicianus*		Resident mainland	Habitat generalist, usually with dense understory, cavity nester, insectivorous	
American robin *Turdus migratorius*		Resident mainland	Habitat generalist, insectivorous and frugivorous	
European starling		Resident mainland	Habitat generalist, cavity nester insectivorous	Overwintering success in suburban habitats has helped this exotic become an intense competitor with native cavity nesters
Northern cardinal *Cardinalis cardinalis*		Resident mainland	Habitat generalist, omnivorous	Suburban feeders have enhanced overwintering survival
Common grackle		Resident mainland	Habitat generalist, omnivorous	Overwintering success in suburban habitats has enhanced this species ability to be a serious predator of eggs and young of other species

XII. Suburban (includes woodland generalists using suburban habitats).

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Brown-headed cowbird		Summer except Peninsular FL, Caribbean	Habitat generalist, granivorous	Suburban feeders during spring and summer enhances this species ability to penetrate further into forests where it parasitizes the nests of other species
Purple finch *Carpodacus purpureus*		Winter except Peninsular FL and Caribbean	Granivorous, strongly associated with feeders	
House finch *Carpodacus mexicanus*		Winter east of Miss. River except FL; resident from GA north	Granivorous, strongly associated with feeders	
Pine Siskin *Carduelis pinus*		Winter mainland	Granivorous, strongly associated with feeders	
American goldfinch *Carduelis tristis*		Winter mainland	Granivorous, strongly associated with feeders	
House sparrow *Passer domesticus*		Resident except VI	Strictly associated with human environments, granivorous	Nests primarily in and around houses and buildings

XIII. Subtropical and tropical woodlands (including mangroves).

A. Primary management problems.

1. Losses and fragmentation of woodland stands (low to high elevations) directly through forestry activity, development pressure, and clearing for agricultural purposes has been extremely intense in Florida and in the Caribbean.

2. Most of Puerto Rico's extinct, extirpated, endangered, and threatened upland species were affected largely by deforestation and fragmentation. The Culebra race of the Puerto Rican parrot (Amazona vittata gracilipes) is now extinct and the white-necked crow (Corvus leucognaphalus) is extirpated from Puerto Rico as precipitated by forest destruction early during the twentieth century. Losses in woodland habitat has been a significant factor in the endangered status of Puerto Rican parrot (Amazona vittata vittata) in montane woodlands, yellow-shouldered blackbird (Agelaius xanthomus) in mangroves, Puerto Rican nightjar (Comprimulgus noetitherus) in xeric woodlands, and plain pigeon (Columba inornata) in mesic woodlands.

3. Losses to mangrove woodlands through dredging and filling activities, as well as direct clearing for development along coastline is intense throughout the Southeast Region. Mangroves provide essential cavity and elevated nesting structures for colonially nesting waterbirds, as well as landbirds. Mangroves also provide essential nutrients and nursery beds for many invertebrates and fish that in turn are important food items for colonial waders and sea birds.

4. Habitat disturbance and landscape conversions have undoubtedly influenced the establishment of many exotic plants, fish reptiles, birds, and mammals. Many of the animal species have become important competitors, predators, and parasites on the native fauna and flara. Also, the widespread establishment of habitats dominated by exotic plant species is usually at the expense of native plant communities, which also directly affects the native fauna.

B. Management opportunities and suggestions.

1. Effective use of the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act, National Forest Management Act, and Endangered Species Act should moderate losses to subtropical and tropical woodland habitats.

2. Although most non-mangrove woodlands were cleared in the Caribbean by the 1800's and early 1900's, these losses were moderated at least in lower elevations, by the spread of "inefficiently" managed coffee plantations, which often

retained many native trees (for shade) and shrubs. These coffee plantations, along with recovering secondary woodland served as essential refugia for native birds until extensive woodland developed during the mid to late 1900's (Brash 1987, Lugo 1988). Coffee plantations still serve as important woodland habitats.

3. Most subtropical and tropical woodlands outside of designated preserves have been cleared in Florida and are presently threatened by clearing in the Caribbean for development. Supplantation from exotic tree species, such as Honduran pine (Pinus caribaea), various Eucalyptus, and Australian pine (Casuarina equisetifolia), is occurring throughout the Southeast Region. Presently, the use of suburban and exotic dominated habitats by native birds is not well known but use is undoubtedly poor in large monocultures. Research is urgently needed to delineate actual bird use of exotic woodland and how to most effectively plan land management practices for conservation of native bird species (Lugo 1988, Cruz 1988).

4. The center of abundance for a number of neotropical migrants includes the Caribbean. Present land use patterns there, with an overall increase in second-growth cover this century in Puerto Rico, should have been beneficial to these species. However, the data that do exist suggest some neotropical migrants are declining, at least at Guanica Commonwealth Forest, despite stable or increasing habitat (Faaborg and Arendt 1989). These patterns may indicate that species showing declines on their Caribbean wintering grounds may be having greater difficulty on their breeding grounds. Much more data are required to determine the importance of Caribbean habitats to Neotropical migrants relative to breeding habitats. Use of habitats by neotropical migrants in the Caribbean was the topic of many papers presented in December 1989, during a symposium held at Woods Hole, Massachusetts, entitled "Ecology and Conservation of Neotropical Migrant Landbirds."

5. The extent of agriculture and suburban development earlier this century has provided extensive habitat for the establishment of a number of exotic bird species to the detriment of some native birds (Collazo 1990). The shiny cowbird (Molothrus bonariensis) apparently spread by natural means from South American to the Caribbean and most recently to South Florida; this brood parasite presents a serious threat to the endangered yellow-shouldered blackbird in southwestern Puerto Rico and is also affecting other hosts even into the island's interior. Ironically, one of the exotic species introduced 50 years or more ago into Puerto Rico, the red siskin (Carduelis cucullata), is now listed as federally endangered within its native range of northern South America.

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D. Fish and Wildlife Service Contacts.

1. Caribbean Field Office, Boqueron, Puerto Rico.

2. North Carolina State Cooperative Fish and Wildlife Research Unit, North Carolina State University.

E. Other Contacts.

1. U.S. Forest Service, Institute of Tropical Forestry, Southern Forest Experimental Station, Rio Piedras, PR.

2. U.S. Forest Service, Caribbean National Forest, PR.

3. National Park Service, Virgin Islands National Park, St. Thomas, U.S. VI.

XIII. Tropical and subtropical (including mangroves and terrestrial Caribbean habitats)

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Boobies, pelican, cormorant, anhinga, frigatebird, herons, egrets, ibis		Resident	Roost and nest in mangroves	Susceptible to human disturbance from boats to development
West Indian whistling-duck	HC	Resident Caribbean	Roosts and nests in hilly woodlands, mangroves	Nests in cavities and in bromeliads; now occurs in much reduced numbers
American swallow-tailed kite	MOC	Summer FL	Aerial forager, nests and roosts in mangroves and other subtropical woodlands	
Puerto Rican sharp-shinned hawk *Accipiter bicolor venator*	MOC	Resident PR	Heavily forested montane areas	Endemic to PR
Red-shouldered hawk	HC	Resident FL	Mangroves and other subtropical woodlands	
Broad-winged hawk	HC	Winter FL	Mangroves and other subtropical woodlands	
Puerto Rican broad-winged hawk *Buteo platypterus brunnescens*	MOC	Resident PR	Heavily forested montane areas	Endemic to PR

XIII. Tropical and subtropical (including mangroves and terrestrial Caribbean habitats)

Species	Management Status	Ecology and Management: Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Short-tailed hawk	MOC	Resident FL (local)	Subtropical woodland hammocks, mangroves, most concentrated in winter	Woodlands used outside of protected areas are susceptible to clearing
Brown noddy		Summer Dry Tortugas and Caribbean	Nests in mangroves	Requires protected islands; susceptible to human disturbance
Mangrove clapper rail *Rallus longirostris insularum*	HC	Resident FL Keys	Mangroves	Rapid development in the keys is a serious threat to mangrove habitat
Scaly-naped pigeon *Columba squamosa*		Resident Caribbean	Montane forests	
White-crowned pigeon *Columba leucocephala*	HC	Resident extreme S. FL (local winter), Caribbean	Primarily mangroves, also some other lowland woodland	Rapid development in mangrove habitat and overhunting (Caribbean) are serious threats
Puerto Rican plain pigeon *Columba inornata wetmorei*	E	Resident Lake Cidra, PR	Forested ravines and bamboo clumps	Endemic to PR; see recovery plan
Bridled quail-dove *Geotrygon mystacea*		Resident VI and PR (very local)	Densely forested hills, with thick understory	

XIII. Tropical and subtropical (including mangroves and terrestrial Caribbean habitats)

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Ruddy quail-dove *Geotrygon montana*		Resident PR	Heavily forested hills and mountains; require dense understory	
Puerto Rican parrot *Amazona vittata*	E	Resident, Luguillo Mountains, PR	Montane forests, secondary cavity nesters	Endemic to PR; see recovery plan
Yellow-billed cuckoo	HC	Summer FL and PR	Subtropical and lowland tropical hammocks, including arid woodlands in PR	
Mangrove cuckoo *Coccyzus minor*		Resident SW. FL and Caribbean	Primarily mangroves FL, broad range of tropical woodlands in Caribbean	
Puerto Rican lizard cuckoo *Saurothera vieilloti*		Resident PR	Montane forests, coffee plantations, haystack hills, Guanica arid woodlands	Endemic to PR
Puerto Rican screech-owl *Otus nudipes*		Resident Caribbean	All wooded habitats	Endemic to PR and VI
Virgin Islands screech-owl *Otus nudipes newtoni*	HC	VI (extirpated?)	All wooded habitats	Endemic to VI
Barred owl		Resident FL	Mangrove and subtropical hammocks	

XIII. Tropical and subtropical (including mangroves and terrestrial Caribbean habitats)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Antillen nighthawk *Chordeiles gundlachii*		Summer Caribbean	Aerial forager; roosts and nests under vegetation cover	
Chuck-wills-widow	MOC	Resident FL; winter Caribbean	Roosts and nests under dense woodland cover	
Whip-poor-will	HC	Winter FL	Roosts under dense woodland cover	
Puerto Rican nightjar *Caprimulgus noctitherus*	E	Resident PR; most numerous at Guanica St. Forest	Mature arid woodlands with open understory and dense leaf litter	Endemic to PR, see recovery plan
Black swift *Cypseloides niger*		Summer PR	Aerial forager; roosts and nests(?) in montane areas	
Green mango *Anthracothorax viridis*		Resident primarily central and west PR	Coffee plantations and open montane woodlands	Endemic to PR
Puerto Rican emerald *Chlorostilbon maugaeus*		Resident PR	Primarily open montane woodlands, also arid and mangrove woodlands	Endemic to PR
Ruby-throated hummingbird	MOC	Winter S. FL	Subtropical woodlands	

XIII. Tropical and subtropical (including mangroves and terrestrial Caribbean habitats)

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Puerto Rican tody *Todus mexicanus*		Resident PR	Dense understory in montane and hillside woodlands, coffee plantations, Guanica arid woodlands; nests in burrows	Endemic to PR
Puerto Rican woodpecker *Melanerpes portoricensis*		Resident PR	Mangroves, coconut plantations, montane woodlands	Endemic to PR
Red-bellied woodpecker		Resident FL	All subtropical woodlands	
Pileated woodpecker		Resident FL	All mature subtropical woodland except mangroves	
Lesser Antillen pewee *Contopus latirostris*		Resident PR	Montane woodlands, coffee plantations; also local in haystack hills, arid woodlands, mangroves	
Great crested flycatcher		Resident FL	Subtropical woodlands; cavity nester	
Puerto Rican flycatcher *Myiarchus antillarum*		Resident PR and VI	All open wooded habitats, except at highest elev.	Endemic to PR and VI
Loggerhead kingbird *Tyrannus caudifasciatus*		Resident PR	Open hillside woodlands, coffee plantations, some mangroves woodlands	

XIII. Tropical and subtropical (including mangroves and terrestrial Caribbean habitats)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Caribbean martin *Progne dominicensis*		Summer Caribbean	Aerial forager, secondary cavity nester	
Blue-gray gnatcatcher		Winter FL	All subtropical woodlands	
Red-legged thrush *Turdus plumbeus*		Resident PR	All wooded habitats	
Pearly-eyed thrasher *Margarops fuscatus*		Resident Caribbean	All wooded habitats	Depredates eggs and young of other birds including yellow-shouldered blackbirds and Puerto Rican parrots
White-eyed vireo		Resident FL	All wooded habitats primarily associated with dense understory	
Puerto Rican vireo *Vireo latimeri*		Resident West and Central PR	Dense understory in haystack hills, forested valleys, coffee plantations, some mangrove woodlands	Endemic to PR
Solitary vireo		Winter FL	All subtropical woodlands	
Yellow-throated vireo		Winter extreme S. Fl	Mature open subtropical hammocks	
Black-whiskered vireo *Vireo altiloquus*		Summer FL and Caribbean	Primarily mangroves in FL; all lowland tropical woodlands in Caribbean	

XIII. Tropical and subtropical (including mangroves and terrestrial Caribbean habitats)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Northern parula		Winter S. FL and Caribbean	All subtropical and tropical woodlands	
Yellow warbler		Resident extreme S. FL and Caribbean	Mangroves; other subtropical and tropical woodlands in winter	
Cape may warbler *Dendroica tigrina*		Winter extreme S. FL, Caribbean	Coastal subtropical hammocks in FL; all woodlands in Caribbean with montane woodlands preferred	
Black-throated blue warbler		Winter extreme S. FL, Caribbean	Subtropical hammocks in FL; prefers dense mature hillside and montane woodlands (males), dense second-growth (females) in Caribbean	
Black-throated green warbler		Winter extreme S. FL	Subtropical hammocks	
Yellow-throated warbler		Winter S. FL and PR	Subtropical hammocks in FL, attracted specially to Spanish moss and bromeliads; palm groves in PR	
Adelaide's warbler *Dendroica adelaidae*		Resident PR	Primarily lowland woodlands, but also hillside and montane woodlands	

XIII. Tropical and subtropical (including mangroves and terrestrial Caribbean habitats)

Species	Management Status	Distribution/ Residency	Ecology and Management: Habitat notes	Ecology and Management: Management tips
Prairie warbler	MOC	Resident FL; winter Caribbean	Mangroves in FL, open woodlands; also in winter arid tropical woodlands in Caribbean	
Elfin Woods warbler *Denroica angelae*	HC	Resident PR (Luquillo Mountains and Maricao	Primarily restricted to dwarf forest on ridges and mountain summits	Endemic to PR
Black-and-white warbler		Winter	All wooded habitats	
American redstart		Winter S. FL and Caribbean	All wooded habitats	
Worm-eating warbler		Winter Caribbean	Prefers dense hillside and montane woodlands	
Ovenbird	MOC	Winter	All wooded habitat usually with moderate understory with thick leaf litter	
Northern waterthrush *Seiurus noveboracensis*		Winter S. FL and Caribbean	Primarily in mangroves; also along streams in VI	
Louisiana waterthrush		Winter PR	Primarily woodlands bordering mountain streams	
Bananaquit		Resident Caribbean	All wooded habitats	

XIII. Tropical and subtropical (including mangroves and terrestrial Caribbean habitats)

Species	Management Status	Ecology and Management: Distribution/ Residency	Habitat notes	Management tips
Antillean euphonia *Euphonia musica*		Resident PR	Prefers dense montane woodlands	
Stripe-headed tanager		Resident PR	All wooded habitats, most common in mountains	
Puerto Rican tanager		Resident PR	Higher montane woodlands	Endemic to PR
Puerto Rican bullfinch		Resident PR	All woodland habitats, most common in mountains	Endemic to PR
Shiny cowbird		Resident Caribbean; recently found in S. FL	Lowland woodlands, especially mangroves; increasing in montane montane	Parasitizes nests of other species, especially yellow-shouldered blackbird
Yellow-shouldered blackbird *Agelaius xanthomus*	E	Resident PR (very local), Mona Island	Nests in mangroves, forages principally in arid woodlands	Endemic to PR; see recovery plan
Black-cowled oriole		Resident PR	All lowland woodland habitats, especially if palms available for nest sites	
Troupial *Icterus icterus*		Introduced resident Caribbean (principally SW. PR)	All lowland woodlands	

THE ROLE OF THE SERVICE IN NONGAME BIRD MANAGEMENT

Background

The "1985 National Survey for Fishing, Hunting, and Wildlife Associated Recreation" was the second such survey to include nonconsumptive uses and the demographics of the users compared with hunting and fishing (U.S. Fish and Wildlife Service 1988b). Of the 140 million Americans, 16 years and older using wildlife resources, 96 percent were involved in nonconsumptive activities as compared with 33 percent in fishing and 12 percent in hunting (Table 1). In addition, about 90 percent of all sportsmen also conducted nonconsumptive activities. Many nonconsumptive users conducted activities within the vicinities of their homes (residential). However, 21 percent of all users travelled (nonresidential) with nonconsumptive activities as their primary purpose, while 64 percent of all users travelled with these activities as a secondary purpose. Overall nonresidential, nonconsumptive use was up by 5 percent over that reported with the 1980 survey. Number of user-days involved with wildlife associated recreation was dominated by nonconsumptive activities, including 54 percent of all travel related activities in 1985 (Table 1).

Birds were the most frequently sought nonconsumptive taxa for participants travelling primarily to observe, photograph, and feed wildlife, followed by land mammals (85 and 77 percent respectively; Table 2). Waterbirds (including waterfowl, waders, and shorebirds), songbirds, and birds of prey sequentially were the most popular bird groups for nonconsumptive participants. Thus, birds constitute a popular and obvious taxonomic group for initiating a nongame program.

Expenditures for all wildlife associated recreation was primarily for equipment and trip-related costs (Table 3). However, expenditures associated with licenses, stamps, tags, and permits were not similar among activities. Fishing and hunting users accounted for about $800,000 ($8/fishermen, $26/hunter) direct funding for wildlife and fishery management, while nonconsumptive users contributed no direct funding. Most funding for nongame management is through State income tax check-offs, surcharges, or license plate registration fees. Thus, until recently, there has been little direct federal involvement in nongame species management other than that incidental to other management priorities. This is despite the growing number of nonconsumptive participants that form a significant part of the American public using wildlife resources.

Without development of direct Federal funding sources for nongame management activities (e.g. authorizing full funding of the Fish and Wildlife Conservation Act), few long-term and far-reaching nongame management strategies are likely to be implemented. Presently, Federal agencies, and the Service in particular, must depend on State initiatives, maximization

Table 1. 1985 "National Survey of Fishing, Hunting, and Wildlife Associated" Recreation for Americans 16 years and older.

Activity	Number of participants (in millions)	Total number of days (in millions)
Fishing	46.4 (33%)	976.6 (3%)
Hunting	16.7 (12%)	334.0 (1%)
Nonconsumptive	134.7 (96%)	-
Residential	-	36,040.1 (92%)
Primary	104.6 (75%)	-
Secondary	117.4 (84%)	-
Nonresidential	-	1,576.6 (4%)
Primary	29.6 (21%)	-
Secondary	89.5 (64%)	-
Total	140.0	38,918.3

Table 2. Participation Among Primary Nonresidential, Nonconsumptive Activities

Wildlife observed, photographed or fed	Number of participants (in millions)	Percent of total participants (29.6)
Land Mammals	22.7	77
Marine Mammals	3.5	12
Reptiles and Amphibians	11.1	38
Insects and Spiders	11.4	39
Shellfish	3.6	12
Total Birds	25.0	85
Birds of Prey	11.1 (44%)	
Waterbirds	18.6 (74%)	
Upland Game Birds	7.9 (32%)	
Songbirds/General	13.0 (52%)	

Table 3. Expenditures for Wildlife Associated Recreation.

Expenditure Type	Total dollars expended (in millions) Fishing	Hunting	Nonconsumptive
Trip-related	13,281 (47%)	3,714 (37%)	4,431 (31%)
Equipment	13,536 (48%)	4,934 (49%)	9,356 (66%)
Licenses, Stamps Tags, Permits	379 (1.5%)	435 (4%)	-
Miscellaneous	950 (3.5%)	977 (10%)	480 (3%)
Total	28,146	10,059	14,267

of existing Federal programs, and limited Federal funding resources to actively manage nongame wildlife. With these thoughts in mind, the Service must lead in overseeing and encouraging nongame management among all Federal agencies and States, as mandated through the Fish and Wildlife Conservation Act. To accomplish this, Refuges and Wildlife and Fishery Resources must work towards development and implementation of best management plans for nongame species that are compatible with other refuge or hatchery priorities and that set examples for management of lands under other jurisdictions. Fish and Wildlife Enhancement must work closely with other Federal agencies, as mandated through a vast array of statutes, in implementing widespread management and protection of nongame species. Federal Aid must work closely with States to encourage effective nongame wildlife management when involved in actions that will use Federal reimbursable funds. Finally, other Service programs have long been active in nongame issues. Activities in research and law enforcement remain critical to advancing our biological knowledge of nongame species and their management as well as enforcing existing protective laws, especially for nongame migratory birds.

Past and Present Activities and Future Challenges

The evolution of the Service is closely tied to concern and management of migratory birds as outlined in the 1985 Audubon Wildlife Report (Eno and Di Silvestro 1985). The Division of Economic Ornithology and Mammology from 1886 to 1896, and the Bureau (Division) Biological Survey from 1896 to 1940, were agencies preceding the Service that were responsible for migratory bird management. This early Federal involvement was due to birds being traditionally at the center of conservation efforts in the United States. For example, the National Audubon Society was formed early this century largely to protect colonial waders and shorebirds from the millinery trade, the commercial harvest of wild bird feathers. Also, the Lacey Act of 1900, the Convention for the Protection of Migratory Birds of 1916, and the Migratory Bird Treaty Act of 1918, were attempts to halt the unregulated taking of migratory birds throughout the Americas. In addition, the first Federally owned national wildlife refuge, Pelican Island, Florida, was set aside in 1903 specifically to protect colonially nesting pelicans, cormorants, and waders. The Biological Survey was given management authority over Pelican Island National Wildlife Refuge and all other wildlife refuges.

Refuges. The National Wildlife Refuge System became the most important avenue to protect migratory bird habitat with the passage of the Migratory Bird Conservation Act of 1929. Financing land acquisitions for migratory birds was established principally with the Migratory Bird Hunting (Duck) Stamp Act of 1934, which has been renewed about every ten years to the present. The Fish and Wildlife Coordination Act of 1934, as amended, also resulted in establishing refuges to offset wetland losses resulting from Federal projects. The Land and Water Conservation Fund Act of 1965, established additional funding for wetland and upland acquisition. More recently, many wetlands are being transferred to the Service from the Farmers Home Administration by authority of the Food Security Act (Farm

Bill) of 1985 and Agricultural Credit Act of 1987. Many national wildlife refuges were developed primarily to conserve and manage habitat for waterfowl, but refuges have also become important habitat areas for nongame wildlife species. The challenge for refuge managers today is to fully understand how management activities affect nongame birds and how to provide benefits to a large variety of species while still fulfilling other priority management goals.

Monitoring. Several other early activities were undertaken by agencies preceding the Service to study and manage nongame birds. The Bureau of Biological Survey organized teams of well-trained ornithologists to document the status and distribution of birds throughout the United States during the late 1800's and early 1900's. Monitoring still constitutes an important research activity within the Service. Many Service monitoring activities are oriented toward determining temporal status changes but also include management and habitat use studies among species. Among the many methods now existing to monitor bird population trends, the Service has been extensively involved with Christmas Bird Counts and Breeding Bird Surveys. Thousands of amateur bird-watchers annually participate on Christmas Bird Counts, which began over eighty years ago; most national wildlife refuges conduct Christmas Bird Counts every year (Root 1988). The Service, together with the Canadian Wildlife Service, also has sponsored the Breeding Bird Survey for more than twenty-five years (Robbins et al. 1986). Thus, there exists long-term data to track population and distribution trends throughout the United States and Canada. These data serve to identify bird species undergoing long-term population declines and, therefore, requiring special management attention.

Law Enforcement. Law enforcement was also among the early management activities undertaken to protect and conserve all migratory birds through the Lacey and Migratory Bird Treaty Acts mentioned earlier. Today, there is other legislation that empowers the Service to enforce violations concerning migratory birds. These laws include the Endangered Species Act, the Duck Stamp Act, National Wildlife Refuge System Administration Act of 1966, the Bald Eagle Protection Act of 1940, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) of 1973 (Section 8A of the Endangered Species Act; enforced through Section 9). In addition, Service law enforcement personnel closely coordinate all permits involving research and take of migratory birds and other wildlife through the Endangered Species Act, CITES, Lacey Act, Migratory Bird Treaty Act, and Bald Eagle Protection Act. Bird-banding permits are regulated through the Bird Banding Laboratory within the Service's Office of Migratory Bird Management.

Enhancement. The Service expanded its role, in what is now Fish and Wildlife Enhancement, by focusing on biotic resources nationwide and more recently in the protection and recovery of endangered species. The Service addresses impacts to biotic resources by the actions of Federal agencies through the authority of the Fish and Wildlife Coordination Act and the National Environmental Policy Act of 1969. The Fish and Wildlife Coordination Act

dictates that fish and wildlife resources be given equal consideration to other resources when Federally supported water-related planning and construction activities are proposed such as through the Clean Water Act of 1977, Rivers and Harbors Act of 1899, Coastal Barriers Resources Act of 1982, and Electric Consumer's Protection Act of 1986 (establishing the Federal Energy Resource Commission). The National Environmental Policy Act allows the Service and all other interested parties to review and comment on any major activity that is in any way supported by Federal monies. Many States and some local governments also encourage the Service to provide comments on non-Federally supported activities. Although the Fish and Wildlife Coordination and National Environmental Policy Acts require only consideration of fish and wildlife resources, these laws do provide the greatest opportunity to advise beneficial management of nongame species nationwide for a variety of actions and through several levels of government. Yet another opportunity in providing benefits to nongame birds is coordination with the Farmers Home Administration, Agricultural Stabilization and Conservation Service, and the Soil Conservation Service through the Farm Bill to protect wetlands on both federal inventory property and private farmlands.

The fact that the most far-reaching nongame management activities would be through States and Federal agencies administering large tracts of land (such as the U.S. Forest Service, Department of Defense military installations, and the U.S. Bureau of Land Management) was not lost on the authors of the Fish and Wildlife Conservation Act. The purpose of this Act is to provide financial and technical assistance to States for developing and implementing nongame conservation programs and to encourage all Federal agencies to use their authority in promoting conservation of nongame to the maximum extent practical. These purposes were reemphasized specifically for migratory nongame birds with the 1988 Amendments to the Fish and Wildlife Conservation Act.

The "Federal Conservation of Migratory Nongame Birds" (Mitchell) amendment calls for undertaking research and conservation activities in coordination with all government and private organizations to assist in conserving migratory nongame birds as dictated under the Migratory Bird Treaty Act, Migratory Bird Conservation Act, and Section 2 of the Endangered Species Act invoking the Convention of Nature Protection and Wildlife Preservation in the Western Hemisphere of 1940. Among activities specified in the amendment include:

(1) monitor and assess population trends and status of all migratory nongame birds,

(2) identify effects of environmental changes and human activities,

(3) identify nongame birds that may become candidates for listing under the Endangered Species Act without corrective conservation actions, and

(4) identify conservation actions to assure nongame birds do not reach the point where they require listing for protection.

All of these activities will require that the Service provide all other organizations the best advice possible to conserve nongame birds as the Service alone cannot reverse the trends being found for most species with declining populations.

The challenge to Service personnel in Fish and Wildlife Enhancement is providing comments that urge Federal agencies to conduct beneficial nongame bird management through Fish and Wildlife Coordination Act Reports and environmental assessments and impact statements pursuant to the National Environmental Policy Act. These comments can include a list of candidate and management concern nongame species that may be adversely affected by the action. Also these comments should include, if applicable, the best management plans to moderate or eliminate adverse affects that would be compatible with the purpose of the action. Data generated through specialized Service activities such as Environmental Contaminants and National Wetland Inventory can provide important information for advising other organizations on effective nongame management. Further, it should be stated that there is a need to prevent further population declines least these species require Federal protection through the Endangered Species Act.

Indeed, the Endangered Species Act has led to an awareness of protecting and enhancing many species before they reach the status level requiring Federal listing as endangered or threatened. Although the Endangered Species Act provides direct protection only to listed species, it also provides for monitoring the status of candidates and provides indirect benefits to species closely associated with listed species. Procedures such as interagency consultation, through Section 7, and habitat conservation planning, through Section 10, can allow for affirmative management of not only the listed species involved but also for the health of the entire affected community of plants and animals. The Endangered Specials Act also encourages States to conduct studies and projects that benefit listed as well as candidate species through Section 6 funding.

Federal Aid. In addition to the Endangered Species Act, other monies provided to States administered by the Service are allocated through the Federal Aid in Wildlife Restoration Act (Pittman-Robertson) of 1938, and the Federal Aid in Fish Restoration Act (Dingell-Johnson) of 1950. Monies collected under the Pittman-Robertson and Dingell-Johnson Acts from Federal excise taxes on hunting and fishing equipment, respectively. Although most of these funds are used for the benefit of game and fish species they need not exclude benefits to nongame species, and the Pittman-Robertson Act does not allow direct funding of nongame activities. Many game and fish oriented activities may automatically benefit nongame species, but such benefits remain unclear as to whether they always represent optimum nongame management. The challenge to Service personnel in Federal Aid is to encourage, as much as possible through reimbursable funding, those State projects that clearly benefit nongame species as well as the targeted game and fish species.

Research. Much can be accomplished within existing Service programs to manage for nongame birds. However, both Service personnel and the public need to be better educated as to what constitutes sound nongame management. The Service remains the leading Federal agency in researching bird conservation through

the activities within the National Wildlife Refuge System, Service Research Centers, Office of Migratory Bird Management, Endangered Species program, and Cooperative Research Units at universities. Despite all the activities presently conducted within the Service, concern is growing within the nongame constituency that present management and research priorities may not be enough to avoid future population declines in many nongame bird species (Senner 1986, Gradwohl and Greenberg 1989, Myers 1989).

Many nongame species profit from present Service activities, especially for species with habitat requirements similar to those of targeted game and fish species and species listed as endangered or threatened. However, many nongame species appear to require additional attention and others may be harmed by some management prescriptions. Thus, the Service must determine how to improve management for a variety of bird species under its jurisdiction, as well as concentrating on actions that benefit "high priority" species. In addition, species specific management especially for endangered species, may protect some habitats. However, habitats (e.g. bottomland hardwoods) that support unlisted but declining species may go relatively unprotected.

These concerns and concepts can be addressed with better transfer of information. Service conservation priorities could then become more consistent with nongame bird needs. This in turn would lead to more effective coordination with States and Federal agencies for the benefit of nongame bird species through all levels of government and the private sector.

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NONGAME BIRD PROGRAM OUTLINE MANAGEMENT AND MONITORING OBJECTIVES

This outline is presented to list and briefly define objectives and tasks. These listings should not be considered complete nor the definitions and comments comprehensive. However, these listings should provide general guidance for Service personnel in developing specific management and monitoring objectives for nongame birds at both regional and field station levels. Task assignments among Service programs, divisions, and positions are suggestive and subject to further guidance.

I. Overall management and monitoring objectives.

A. Encourage and support literature surveys and field research on status, life-history characteristics, ecology, and potential management problems for each species of interest.

1. Research and Development (Region 8) will provide national coordination of research activities involving the Service's Research Centers, and Fish and Wildlife Cooperative Research Units at universities.

2. Southeast Regional research activities conducted through Regional programs and contacts.

a. Refuges and Wildlife - Regional Migratory Bird Coordinator.

b. Fish and Wildlife Enhancement - Division Chief of Technical Services and Regional Nongame Coordinator.

c. Fish and Wildlife Enhancement - Division Chief of Endangered Species (candidate status surveys and pre-listing recovery).

B. Implement coordinated efforts among all potentially involved agencies and organizations towards best management plans for each species of interest - Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

C. Encourage coordinated on-the-ground management efforts by all involved land managing agencies and organizations. Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

1. Refuges and Wildlife - develop state-of-the-art management techniques for nongame birds on national wildlife refuges. Work closely with Office of Migratory Bird Management to accomplish monitoring, research, and management studies throughout the Southeast Region. Regional Migratory Bird Coordinator.

2. Fish and Wildlife Enhancement - coordinate nongame bird programs with Federal agencies and with State, local, and private organizations. Enhancement field stations and Regional Nongame Coordinator.

3. Federal Aid - coordinate nongame bird management with States through Federal reimbursable funding programs. Regional Wildlife Section (Division of Federal Aid) and Regional Nongame Coordinator.

II. Perform specific task in accordance with "Nongame Bird Strategies" prepared by the Office of Migratory Bird Management (Office), Fish and Wildlife Service, May 1988. Recommended task assignments are noted by listing lead program(s) or position(s) for Washington, Research and Development, and Southeast Regions.

A. Coordinate with the Office on reviewing and updating List of Migratory Birds covered by international treaty in the Migratory Bird Treaty Act. Special emphasis on Southeast Region species, including those in U.S. Territories in the Caribbean Sea. Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

B. Prepare a prioritized nongame bird list for the Southeast Region to aid in coordinating with the Office, other Service Regions, State and local agencies, and private organization. Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

C. Coordinate programs, divisions and offices within the Service on species of mutual interest such as candidates for Federal listing and those of management concern. Regional Nongame Coordinator and Regional Migratory Bird Coordinator.

D. Prepare Regional status reports for each species of management concern targeted for FY 1991. Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

E. Conduct or oversee field investigations on population statuses of priority species where little or no information presently exists. Regional Nongame Coordinator, Regional Migratory Bird Coordinator, and Division Chief of Endangered Species.

F. Determine causes of observed trends and take appropriate action. Washington Office of Migratory Bird Management; Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

1. Identify environmental requirements and impact of land-use changes and human activity on populations. Washington Office of Migratory Bird Management; Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

2. Coordinate with the Office on activities and management goals for each species on management concern list; targeted for FY 1990. Washington Office of Migratory Bird Management; Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

3. Identify habitats/biogeographic areas essential for maintaining populations and rank according to importance/vulnerability. Washington Office of Migratory Bird Management; Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

4. Assess the adequacy of existing conservation lands to protect species of interest. Washington Office of Migratory Bird Management; Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

5. Manage habitats on Service lands to provide for conservation and enhancement of nongame species without compromising other important strategies. Regional Migratory Bird Coordinator.

    a. Identify where adjustments in management strategies are needed or where potential conflicts may exist between ongoing refuge management prescriptions and improving nongame bird management and search for resolution. Regional Migratory Bird Coordinator, Refuge Managers.

    b. Continue reviewing existing land acquisition proposals and evaluate projects specifically for nongame bird conservation. Rergional Projects Development Branch Chief (Division of Realty) in coordination with Division of Wildlife and Habitat Management and Division of Technical Services.

6. Identify the likely impact of significant land-use trends on nongame birds and provide information concerning actions that could alleviate negative impacts on these species. Washington Office of Migratory Bird Management and Research - Patuxent Wildlife Research Center; Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

    a. Develop state-of-the-art management techniques to best manage for nongame birds and their habitats. Regional Migratory Bird Coordinator and Refuge Managers.

    b. Encourage best management plans for nongame bird species through Federal interagency coordination (Fish and Wildlife Coordination Act, Coastal Barriers Resources Act, Food Security Act, National Environmental Policy Act, Sikes Act, etc.). Regional Nongame Coordinator and Enhancement Field Supervisors.

c. Encourage best management plans for nongame bird species through coordination with States (Pittman-Robertson Act, Dingell-Johnson, Section 6 Endangered Species Act, Sikes Act, etc., State regulations). Regional Nongame Coordinator, Wildlife Section (Federal Aid), and Enhancement Field Supervisors.

7. Strive to minimize or prevent disturbances to or destruction of nongame birds or degradation of habitats. Regional Nongame Coordinator and Regional Migratory Bird Coordinator.

a. Consider habitat needs for all regularly occurring nongame birds, with emphasis on those of management concern, when planning an action on Service lands and evaluate potential for habitat disturbance and degradation. Regional Migratory Bird Coordinator with Refuge Managers and Associate Manager of Fisheries with Hatchery Managers.

b. Provide comments that are as specific as possible to Federal agencies that reduces or eliminate impacts on nongame birds, with emphasis on those of management concern, and their habitats (see F.6). Enhancement Field supervisors.

c. Develop assessment criteria to identify grant-in-aid proposals that could significantly enhance nongame birds, with emphasis on those of management concern (Pittman-Robertson Act, Dingell-Johnson, Sikes Act, etc., State regulations). Regional Wildlife and Fisheries Sections (Federal Aid) and Enhancement Field Supervisors.

G. Encourage and coordinate scientific study of nongame birds and of human activities related to nongame birds and urban wildlife.

1. Continue to issue bird-banding permits and scientific collecting permits to qualified individuals. Washington Bird Banding Laboratory, Law Enforcement, and Office of Wildlife Permits; Regional Migratory Bird Coordinator, Wildlife Compliance Specialist (Division of Law Enforcement), Division of Endangered Species, and Division of Technical Services.

2. Establish a designated system of nongame bird research study areas on Service lands by developing and implementing a funding support effort. Washington Office of Migratory Management; Research; Regional Migratory Bird Coordinator and Regional Nongame Coordinator.

3. Continue to issue special-use permits for appropriate nongame bird study on Service lands. Regional Migratory Bird Coordinator and Refuge Managers.

4. Continue emphasis on nongame bird research through Cooperative Fish and Wildlife Research Units. Research; Regional Migratory Bird coordinator and Regional Nongame Coordinator.

5. Revise species lists for Service lands as necessary, based on accrued information. Regional Migratory Bird Coordinator, Refuge Managers, and Regional Nongame Coordinator.

6. Continue the National Survey of Fishing, Hunting, and Wildlife Associated Recreation at appropriate intervals and consider results in formulating education programs. Washington Federal Aid Program; Regional Nongame Coordinator and Division of Federal Aid.

7. Incorporate findings of surveys and studies conducted by others into Service guidance on nongame birds and urban wildlife. Washington Office of Migratory Bird Management and Research Center; Regional Nongame Coordinator and Regional Migratory Bird Coordinator.

H. Encourage private individuals to actively participate in management activities that promote conservation of selected species of that increase public understanding and appreciation of nongame birds and their habitats. Regional Nongame Coordinator and Public use manager.

1. Provide guidance on actions individuals can take to incorporate nongame bird needs effectively and economically at their residences, businesses, or other places. Regional Nongame Coordinator with Public Affairs Officer, Public Use Manager (Branch of Public Use Management), and Education Specialist (Federal Aid).

2. Continue and expand educational contacts and watchable wildlife opportunities with the public on national wildlife refuges and national fish hatcheries and share wildlife viewing ideas with other interested parties. Regional Public Use Manager with Education Specialist and Nongame Coordinator.

3. Make information on nongame birds available to agencies, organizations, interested individuals, and the media. Regional Nongame Coordinator with Public Affairs Officer, Public Use Manager, and Education Specialist.

4. Continue to support Project WILD and expand its use among Southeast Region State fish and wildlife agencies. Regional Public Use Manager and Education Specialist.

5. Develop volunteerism through Take Pride in America Program that includes habitat improvement projects for nongame birds. Regional Public Use Manager, Refuge Managers, and Enhancement Field Supervisors.

Attachment C

Summary of nongame bird activities conducted on national wildlife refuges within the Southeast Region during FY 1988. Songbird surveys include Breeding Bird Surveys, Breeding Bird Censuses, and mist-netting surveys. CBC = Christmas Bird Count.

Refuge	Surveys						Habitat Management					On-going Research	Target Species (including T + E's)
	Wader	Marsh	Shore	Raptor	Song-Birds	CBC	Moist Soil	Open Field	Shore Line	Hard Woods	Pine Woods		
Alabama													
Bon Secour	x			x	x	x						mist-netting surveys	osprey
Choctaw	x			x				x					bald eagle, wood stork
Eufuala	x			x		x	x	x				wood duck nestbox use by owls	bald eagle, eastern bluebird, osprey
Wheeler complex				x		x	x	x	x			DDE - monitoring	eastern bluebird
Arkansas													
Felsenthal -Overflow	x			x		x	x	x			x		red-cockaded woodpecker, bald eagle, wood stork
Holla Bend	x	x		x		x	x					raptor food habitats, lead ingestion (eagle)	bald eagle
Northeast Arkansas complex	x	x	x	x									Bachman's warbler, bald eagle, osprey, purple martin
White River				x		x	x	x		B	x	brown-headed cowbird parasitism; owl use of nestboxes	bald eagle
Florida													
Chassahowitzka complex	x		x						x	M		prescribed burning	
Florida Panther Thousand Islands*													
J.N. "Ding" Darling complex	x			x		x	x		x	M		human impacts on waders	red-shouldered hawk, osprey, black skimmer, least tern

B = Bottomlands; M = Mangrove; S = Shrub-scrub; T = Tropical

*No response

Refuge	Surveys						Habitat Management					On-going Research	Target Species (including T + E's)
	Wader	Marsh	Shore	Raptor	Song-Birds	CBC	Moist Soil	Open Field	Shore Line	Hard Woods	Pine Woods		
Lake Woodruff	x	x	x	x			x						osprey, bald eagle
Lower Suwannee -Cedar Keys	x			x	x	x	x			B	x	colonial nesters' breeding biology	wood stork, osprey American shallow-tailed kite, bald eagle
ARM Loxahatchee	x			x			x					water quality and quantity	Everglade snail kite, sandhill crane
Merritt Island complex	x	x	x	x	x	x	x		x	S	x	impoundment use, forest dynamics, prescribed burning	Florida scrub jay, bald eagle, osprey, wood stork, black-necked stilt
National Key Deer complex	x			x		x							great white heron, osprey magnificent frigatebird, bald eagle
St. Marks	x	x	x	x	x	x	x				x	studies on red-cockaded woodpecker	red-cockaded woodpecker, bald eagle, osprey, wood stork, least tern, eastern bluebird
St. Vincent	x	x	x	x	x	x	x			B	x	herbicide control of pest plants, prescribed burning of uplands and marsh	bald eagle, osprey, black rail
Georgia													
Okeefenokee						x				B	x	forest dynamics, prescribed burning	red-cockaded woodpecker, wood stork, osprey, sandhill crane, bald eagle

B = Bottomlands; M = Mangrove; S = Shrub-scrub; T = Tropical

*No response
**Casual Observations Of All Species

Refuge	Surveys						Habitat Management					On-going Research	Target Species (including T + E's)
	Wader	Marsh	Shore	Raptor	Song-Birds	CBC	Moist Soil	Open Field	Shore Line	Hard Woods	Pine Woods		
Piedmont				x		x					x	studies on red-cockaded	red-cockaded woodpecker, bald eagle
Savannah Coastal complex (SC)	x	x	x	x	x	x	x		x			marsh passerine use of salt vs. freshwater marshes	wood stork
Louisiana													
Boque Chitto complex*													
Cameron Prairie				x			x						
Catahoula	x		x	x		x	x	x					bald eagle, eastern bluebird
D'Arbonne - Upper Ouachita	x	x		x		x	x						bald eagle
Lacassine - Shell Keys**													
Lake Ophelia - Grand Cote							x	x		B			
Sabine					x	x		x		B			
Tensas River	x			x	x	x	x	x		B		bottomland bird use, neotropical migrants, forest dynamics	Bachman's warbler

B = Bottomlands; M = Mangrove; S = Shrub-scrub; T = Tropical

***Incidental Observation Of All Species

Refuge	Surveys						Habitat Management					On-going Research	Target Species (including T + E's)
	Wader	Marsh	Shore	Raptor	Song-Birds	CBC	Moist Soil	Open Field	Shore Line	Hard Woods	Pine Woods		
Mississippi													
Mississippi Sandhill Crane					x		x	x				studies on Mississippi sandhill crane	Mississippi sandhill crane, wood duck, eastern bluebird
Noxubee	x			x		x	x	x		B	x		bald eagle, eastern bluebird
Yazoo complex	x			x		x	x	x		B	x		bald eagle
North Carolina													
Mackay Island***													osprey
Mattamuskeet	x	x	x	x		x	x					osprey banding	osprey, bald eagle, songbird boxes
Pungo	x	x	x				x						songbird boxes
Cedar Island	x	x	x	x	x							banding royal and sandwich terns	black rail, piping plover, osprey
Swan Quarter	x		x	x								loon feeding	bald eagle
Pea Island - Alligator River	x	x	x	x		x	x						piping plover, osprey
Puerto Rico													
Cabo Rojo			x			x		x		T		shiny cowbird, yellow-shouldered blackbird, Puerto Rican flycatcher	yellow-shouldered blackbird
Culebra			x						x	M		brown noddy, sooty and roseate terns	all colonial breeding seabirds
Descheo			x										all colonial breeding seabirds

B = Bottomlands; M = Mangrove; S = Shrub-scrub; T = Tropical

Refuge	Surveys						Habitat Management					On-going Research	Target Species (including T + E's)
	Wader	Marsh	Shore	Raptor	Song-Birds	CBC	Moist Soil	Open Field	Shore Line	Hard Woods	Pine Woods		
South Carolina													
Camp Romain	x	x	x				x		x			shorebird feeding	all shorebirds and beach-nesters
Carolina Sandhills - Pee Dee						x	x				x		red-cockaded woodpecker, eastern bluebird
Santee				x		x	x						bald eagle
Tennessee													
Cross Creeks	x	x	x	x	x	x	x	x		B	x	moist-soil, contaminants (bald eagle)	bald eagle, eastern bluebird
Hatchie complex					x		x						eastern bluebird, wood duck, eastern screech-owl, Mississippi kite
Reelfoot - Lake Isom				x		x	x			B			bald eagle
Tennessee	x	x	x	x			x					documenting black rail occurrence	all shorebirds, black rail, bald eagle, osprey
Virgin Islands													
Buck Islands						x			x				beach-nester, colonial seabirds
Green Cay						x			x				beach-nester, colonial seabirds
Sandy Point			x			x			x			least tern nesting	least tern, other terns

B = Bottomlands; M = Mangrove; S = Shrub-scrub; T = Tropical

DATE DUE

APR 1 0 1993		Ret'd DEC 30 '98 APR 0 4 '98	APR 0 9 RECT
APR 1 1 1993 Ret'd. OCT 27 '98			
JUN 1 7 1994 Ret'd. JUN 2 7 '94			
SEP 0 9 1994			
JAN 1 2 1995 Ret'd. DEC 29 '94			
AUG 0 4 1998			
MAR 0 8 2002			