

Grassland Birds Guild

Barn Owl *Tyto alba*

Common Ground-dove *Columbina passerina*

Eastern Meadowlark *Sturnella magna*

Field Sparrow *Spizella pusilla*

Grasshopper Sparrow *Ammodramus savannarum*

Loggerhead Shrike *Lanius ludovicianus*

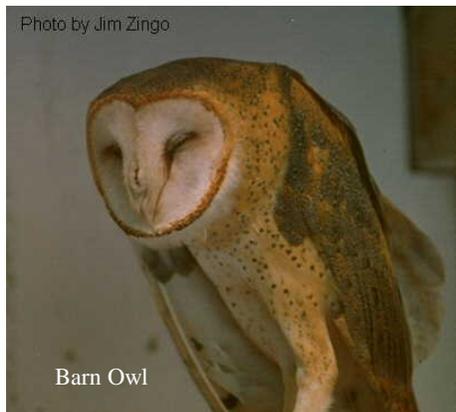
NOTE: The Northern Bobwhite has a separate species account.

Contributors (2005): John E. Cely and Laurel Moore
Barnhill [SCDNR]

Reviewed and Edited (2012): Paige Koon (SCDNR)

DESCRIPTION

Taxonomy and Basic Description



The Barn Owl is generally pale with a rusty-brown back and wings and underparts that vary from white to cinnamon. Their dark eyes are set in a heart-shaped face, (NGS 1999). The average weight of Barn Owls is 460 g (16.2 oz.), and they are approximately 41 cm (16.1 in.) in height (Sibley 2000).

The Loggerhead Shrike is a predatory songbird with a strong, hooked bill used to kill and dismember prey (Sibley 2000). Its head and back are bluish-gray with underparts that are white with faint barring. A broad mask of black extends above the eye and thinly across the top of the bill (NGS 1999). This species is approximately 23 cm (9.1 in.) long and weighs 48 g (1.69 oz.) (Sibley 2003). Linnaeus first described the Loggerhead Shrike in 1766.



The Common Ground-dove is one of the smallest doves, measuring roughly 17 cm (0.39 in.) and weighing 30 g (1.06 oz.) (Sibley 2000). Typically, this is a stocky dove with a scaled effect on its head and breast and a short tail. Bright chestnut primaries and wing linings are visible in flight (NGS 1999). Linnaeus first described the Common Ground-dove in 1758 (NatureServe 2005).

Scopoli, in 1769, first described the Barn Owl (NatureServe 2005). Barn Owls are generally pale with a rusty-brown back and wings and underparts that vary from white to





The Field Sparrow is in the genus *Spizella* which represents small, long-tailed sparrows. Field Sparrows have a gray face with a reddish crown, a distinct whitish eye ring, and a bright pink bill (NGS 1999). The overall size of field sparrows is 15 cm (5.9 in.) in length and 12.5 g (0.44 oz.) in weight (Sibley 2000). Wilson first described Field Sparrows in 1810 (NatureServe 2005).



Gmelin first described the Grasshopper sparrow in 1789 (NatureServe 2005). This ground-dwelling species is very secretive. It has a buff-colored breast and sides, usually without streaking; a white eye-ring; and a dark crown with a pale central stripe (NGS 1999). Overall, this sparrow is small and chunky with

a length of 13 cm (5.1 in.) and weight of 13 g (0.46 oz.). Grasshopper Sparrows have short tails, long bills and a flat head (Sibley 2000).

Linnaeus, in 1758, first described the Eastern Meadowlark (NatureServe 2005). This distinctive species has a black, V-shaped breast band on yellow underparts. The upperparts are dark brown with dusky brown feather tips (NGS 1999). This species is 24 cm (9.45 in.) in length and 90 g (3.17 oz.) in weight (Sibley 2000).



Status

Birds that use grasslands have shown some of the steepest population declines of any bird group in North America (Price et al. 1995). Partners in Flight (PIF) considers the Common Ground-dove, the Loggerhead Shrike, the Field Sparrow, the Grasshopper Sparrow and the Eastern Meadowlark as species of high regional priority that are of moderate continental priority. Although these species are not one of the 100 species listed on PIF's Watch List, they are important to consider for conservation within the bird conservation region (Rosenberg 2004). The PIF Watch List is comprised of species that have multiple reasons for conservation concern across their entire range and species are selected according to the PIF scoring process (Rich et al. 2004).

In a 2010 collaborative effort among biologists in the United States, Canada, and Mexico, PIF produced a conservation assessment of landbird conservation in the 3 nations composing the North American continent. Loggerhead Shrike and Field Sparrow are endemic to the tri-national area and were listed among the 42 common birds in steep decline, having lost an estimated 79% and 68% of their populations, respectively. Grasshopper Sparrow and Eastern Meadowlark,

although not endemic to North America, were also listed as common birds in steep decline (Berlanga et al. 2010).

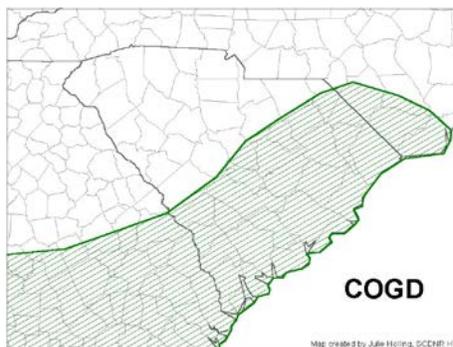
The grasshopper sparrow merits special attention at the continental level as a stewardship species because its range only encompasses the Eastern avifaunal biome (Rich et al. 2004). PIF indicates that this species exhibits high vulnerability. The objective of the stewardship species list is to attain the PIF goal of keeping common birds common. The entire population of Grasshopper Sparrows has declined by 50% or more over the past 30 years; therefore, management actions within the core of this species' range are needed to reverse these long-term declines.

At the physiographic regional scale, the Common Ground-dove, the Loggerhead Shrike, the Field Sparrow and the Grasshopper Sparrow have high area importance scores that translate to high to moderate priority levels of concern. At the state level, the common ground-dove is also listed as a threatened species in need of management.

The Barn Owl is generally thought to be declining over much of its extensive range (Marti 1992). In the mid-1980s, this species was listed as endangered by 6 Midwestern states and by 9 other states as a species of special concern. The Barn Owl is not listed by PIF as a species of concern but is considered in SC's SWAP due to concerns over the guild as a whole.

POPULATION SIZE AND DISTRIBUTION

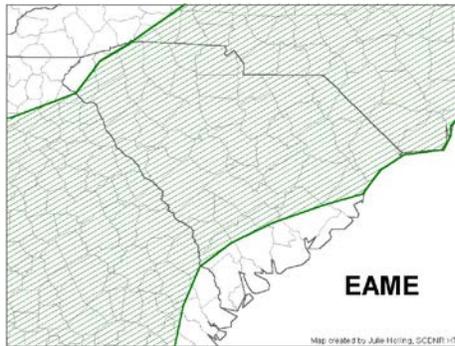
The Barn Owl is a permanent resident in South Carolina and is found throughout the State. Little information is available on the distribution or population size of Barn Owls in South Carolina (Cely 2003). However, breeding bird survey (BBS) trends indicate a 2.3% decline in population from 1966 to 2003 across the entire BBS survey area (Sauer et al. 2004).



The Common Ground-dove is also a permanent state resident of South Carolina; most individuals are concentrated along the Outer Coastal Plain. This bird is present in smaller numbers as far inland as the Fall Line within the Sandhills Ecoregion. Data for South Carolina indicates an increase of 1.5% in the population of Common Ground-doves from 1966 to 2003; however, long-term declines are indicated by the BBS for the Southeast (Sauer et al. 2004). The current state population estimate for Common Ground-doves is 5,000 birds (Rosenberg 2004).

The Loggerhead Shrike is a permanent resident found statewide, except at higher elevations. It is most abundant in the Coastal Plain, especially within the "farm belt" of the Inner Coastal Plain. BBS data has demonstrated declines over significant portions of its range in the East, especially within the Piedmont Bird Conservation Region (BCR). South Carolina has experienced an

annual rate of decline of 3.6% from 1966 through 2003 (Sauer et al. 2004). To date, the current estimated state population is 46,500 individuals (Rosenberg 2004).



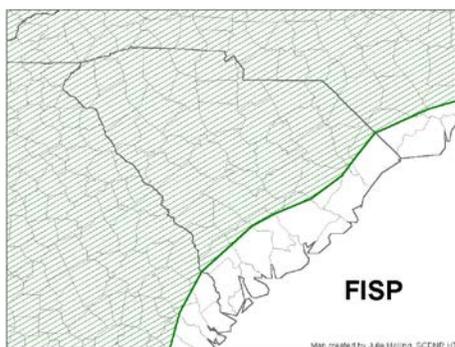
The Eastern Meadowlark is another permanent resident of South Carolina. Most individuals of this

species are concentrated in the Piedmont BCR. The Eastern Meadowlark is also exhibiting long-term population declines throughout much of its range; in South Carolina, it has experienced a 3.2% annual rate of decrease from 1966

through 2003 (Sauer et al. 2004). The current estimated state population is 53,000 birds (Rosenberg 2004).



The Grasshopper Sparrow is a summer resident of South Carolina; it also winters in this state, but is fewer in number than in the summer. Although breeding occurs throughout the Piedmont and within the Southeastern Coastal Plain, most breeding Grasshopper Sparrows are located in the “orchard-pasture belt” of the Upper Piedmont (Cely 2003). The current population within South Carolina is estimated at 62,000 birds (Rosenberg 2004). Long-term declines are evident across the State and entire BBS survey area (Sauer et al. 2004).



The Field Sparrow has a similar distribution to that of the Grasshopper Sparrow, but it is more abundant in South Carolina. The current estimated population of Field Sparrows within the State is 209,000 birds (Rosenberg 2004). However, data from the BBS indicates a long-term annual decline of 1.6% in South Carolina for the period from 1966 through 2003 (Sauer et al. 2004).

Rosenberg (2004) has suggested population sizes and objectives in South Carolina for 5 of the 6 priority grassland species based upon continental-level population estimates (Table 1). Population targets are based on population size and trends and a historical baseline to compare current populations. For Watch List species, the objective is to increase populations to a historical baseline as recorded in the 1960's. For stewardship species, the objective is to increase or maintain populations to 1990s levels (Rich et al. 2004). No population goals are available for the Barn Owl due to inadequate monitoring techniques. Projected population goals are based on a 30-year period with a target to double populations that have experienced severe declines of 50% or more

for the past 30 years. For species experiencing moderate declines, the goal is to increase the population by 50% in the next 30 years.

Species	Population Estimate	Continental Objective	SE Coastal Plain BCR	Appalachian Mountain BCR	Piedmont BCR
Common ground-dove	5000	increase by 50%	7,500	N/A	N/A
Loggerhead shrike	46,500	double	80,000	N/A	13,000
Grasshopper sparrow	62,100	double	12,000	2,600	110,000
Field sparrow	212,900	double	140,000	9,800	280,000
Eastern meadowlark	53,100	double	28,000	2,200	76,000

Table 1: Population estimates and target 30-year population goals expressed as individual number of birds for South Carolina's priority grassland bird species (Rosenberg 2004).

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Common Ground-doves are found at greatest densities within coastal scrub/dune fields. This bird feeds heavily on weed seeds and requires a mix of bare ground and grassy areas for foraging but favors sandy soil. Common Ground-doves will nest on the ground; however, they more typically use shrubs or small trees along a woodland edge for nesting sites (Hamel 1992). These doves have also been seen nesting in the crowns of palmettos (*Sabal* spp.). Inner Coastal Plain habitats utilized by ground doves consist of recent clearcuts, peach orchards and farmland (Hamel 1992).

The Barn Owl can be found in such disparate habitats as overgrown weedy urban lots, pastureland, fields, and other open, rural landscapes as well as in both fresh and salt marshes. This owl nests in outbuildings, grain silos, duck blinds, deer stands, and tree cavities. Barn Owls have readily accepted nest boxes erected in coastal marshes (M. Spinks, SCDNR, pers. comm.) Barn Owls feed at night and prey almost exclusively on rodents that are typically found in marshes and grasslands. Breeding occurs during all months of the year, but peaks from March to May (Hamel 1992).

Loggerhead Shrikes use open lands consisting of expanses of short grass, old fields, orchards, grassy roadsides, cultivated fields, and pasture. This bird nests in hedgerows, shrubs, and trees—notably red cedar (*Juniperus virginiana*)—but also loblolly pine (*Pinus taeda*) and live oak (*Quercus virginiana*). Nest trees and shrubs are typically in the open. Loggerhead Shrikes hunt from powerlines, exposed tree limbs, fence posts, and other conspicuous perches. Thorn trees, barbed wire, or other sharp objects are necessary within the habitat as the Loggerhead Shrike uses these to impale and cache prey. The Loggerhead Shrike feeds mainly on large insects and small rodents though it will, at times, take smaller birds.

Eastern Meadowlarks create well-concealed nests on the ground in clumps of grass 0.6 m (1.97 ft.) in height (Hamel 1992). Typically, this species nests and forages for insects or seeds in fields, orchards, pastures, roadsides and golf course roughs. Eastern Meadowlarks may require landscapes dominated by agriculture and grasslands to maintain long-term population viability (Lanyon 1995)

The Grasshopper Sparrow favors grassy fields for nesting; it is less numerous in weedy fields, pastures, and grain fields (Hamel 1992). Nest sites are usually found in vegetation approximately 0.3 m (0.98 ft.) high (Hamel 1992). Grasshopper Sparrow wintering habitat is composed of broomsedge (*Andropogon* spp.) fields, other open fields, and open Pine Savannas. The diet of this bird consists of primarily insects but can include seeds.

The Field Sparrow is more tolerant of brush, hedgerows, briar tangles, plum thickets, and generally thicker stands of grass and herbaceous material than the Grasshopper Sparrow. Field sparrow nests are typically placed on the ground, but shrubs and small trees will also sometimes be used. This species forages by gleaning seeds from the ground, but its diet can also include insects (Hamel 1992). Field Sparrows benefit from management of grasslands and scrub/shrub habitats.

The following species are PIF species on the continental watchlist and/or of regional concern that will benefit from increased amounts of grassland habitat on the landscape: Short-eared Owl (*Asio flammeus*), Eastern Kingbird (*Tyrannus tyrannus*), Henslow's Sparrow (*Ammodramus henslowii*), Le Conte's Sparrow (*Ammodramus leconteii*), and Dickcissel (*Spiza americana*).

CHALLENGES

Vegetative succession and permanent loss of early-successional habitat through urban development and intensified agriculture are primary factors resulting in the long-term population declines experienced by these 6 species (Lanyon 1995; Ehrlich 1992; Colvin 1985). Although habitat protection will assist in protecting these early-successional species, that alone is not expected to increase populations of the birds included in the grassland guild. In order to increase populations, active management of early-successional habitat, such as burning, grazing, mowing, disking, and other means to retard plant succession, must be emphasized. Currently, ~90% of the property in South Carolina is privately owned and of this figure, small landowners own ~68%.

In general, intensive agricultural practices may reduce habitat suitability for grassland bird species. Mowing and haying, as well as the timing of these activities, undoubtedly destroy many nests. The use of pesticides may result in lower insect and rodent availability, thereby reducing foraging opportunities for these birds. Also, in some cases, existing Farm Bill programs may create sinks for wildlife. For example, planting sod-farming grass can preclude nesting and foraging activities for these species, as well as Northern Bobwhite quail. Active management for early-successional habitat is necessary to reverse population declines for grassland birds. The positive side of this problem is that early-successional management is straightforward; it can be accomplished in a short period compared to growing a 60-year old forest from seed; and the response time for grassland bird populations should be short. Monitoring and documenting the response of grassland birds to Farm Bill programs will allow for improving landowner recommendations (Hunter et al. 2001).

Barn Owls have declined due to a loss and alteration of habitat, including older cavity trees used for nest sites as well as barns, silos and outbuildings associated with agriculture. Additionally, the lack of specific monitoring programs for Barn Owls has complicated determination of

accurate population estimates and trends for this species (Hands et al. 1989). Barn Owls will readily inhabit properly designed and placed nest boxes; an expanded nest box program, with adequate monitoring and follow-up, could benefit this species in areas with adequate foraging habitat but a shortage of nest sites.

The decline of Common Ground-doves could be due to several factors in addition to habitat alteration and loss, especially excess predation by cats, raccoons, and other predators on developed barrier islands and inland habitats (NatureServe 2005). In some states, declines are also attributed to loss of birds due to misidentification during Mourning Dove (*Zenaida macroura*) hunting seasons (NatureServe 2005)

There are other, apparently less significant problems for grassland bird species. Birds are killed by flying into communication towers and turbines on wind farms. In a report reviewing studies of bird mortality at communication towers in the eastern portion of the US, 230 species of birds (184,797 individuals) were killed. Of these, 17.8% were warblers, 10% were sparrows, and 9.5% were waterfowl (Shire et al. 2000). Also, nest parasitism by Brown-headed Cowbirds is common; rates for this type of predation vary geographically. However, nest predation is a major cause of grassland bird population declines (NatureServe 2005; Carey et al. 1994). In some areas, roadsides may represent the best quality and highest quantity of nesting habitat, but the potential for vehicle collisions and invasion by exotic plant species may be high. For example, kudzu (*Pueraria lobota*) grows at an average rate of one foot per day (18 m or 60 ft. during a growing season) enveloping and eventually killing all vegetation in its path, thus destroying nest and foraging sites (MSU 2005)

Additionally, lack of survey and monitoring programs to supplement BBS and other existing programs can result in inaccurate population estimates and trends. A number of specific protocols need to be developed for individuals in this suite of species in order to adequately determine population declines. Additional monitoring efforts and coordination will increase the efficacy of management actions in the future (CBM 2004).

CONSERVATION ACCOMPLISHMENTS

The development and implementation of agricultural incentive programs with focused environmental benefits for wildlife have provided significant benefits to said wildlife in the State and Nation. In fiscal year 2004, NRCS and its partners invested \$2.8 billion in conservation nationally (Knight 2005). Implementation of conservation and monitoring objectives developed for the popular Northern Bobwhite quail (*Colinus virginianus*) will positively impact the suite of grassland species (Dimmick et al. 2002). [NOTE: See the species account for the Northern Bobwhite for specific details of the NBCI's guidance document.]

A number of contributions have occurred at the state and species level: A two-year study of Loggerhead Shrike habitat and nesting productivity was conducted in the Coastal Plain (Cely and Corontzes 1988); and a one-season survey to determine locations of significant Common Ground-dove populations was conducted in the State (Cely and Glover 2000).

The placement of Barn Owl nest boxes at several coastal SCDNR Wildlife Management Areas has provided nesting structures where natural sites were limited (M. Spinks, pers. comm.). Since the program's inception in 2002, nest boxes now total 29 along the central coast on state, federal, and private lands. Of these 29 boxes, 21 have been used (a 72% occupancy rate). These boxes were placed solely over rice field impoundments. At Donnelly/Bear Island WMA, 3 out of 11 nest boxes have been used (a 27% occupancy rate). These boxes are relatively new, being established since the 2010 nesting season, and are located in both rice impoundments and upland fields. In 2012, 3 nest boxes were placed within upland fields in Berkley County. None have been used yet. In all, there are 43 Barn Owl nest boxes across the Lowcountry that are being monitored by SCDNR staff and partners.

CONSERVATION RECOMMENDATIONS

- Research the possible creation of cost-share or incentive-based programs to promote the retention of early-successional habitats. Identify potential partners such as the Natural Resources Conservation Service to help assess the efficacy of such measures.
- Continue to participate in existing efforts to develop and implement agricultural incentives that are beneficial for wildlife. Integrate monitoring objectives and funding mechanisms to support such programs where appropriate. Also, continue to develop program delivery mechanisms.
- Develop partnerships and infrastructure to integrate bird conservation efforts into private land management activities. Pursue private and federal grant programs to implement management objectives.
- Develop a Barn Owl nest box program and identify potential partners to assist with implementation of that program.
- Establish Loggerhead Shrike posts in locations where perch sites are limited.
- In grassland bird habitat devoid of site-appropriate herbaceous species or with depauperate seed banks, establish seed sources through propagation from local sources.
- Prevent the spread of existing invasive and non-native grasses in wild areas, eliminating them, where possible.
- Acquire more complete information on the habitat needs of each grassland bird species to determine the best management guidelines. Promote the development and dissemination of best management practices for grassland species utilizing agricultural lands.
- Educate landowners about the use of seed mixtures that benefit wildlife in early succession habitats.
- Identify habitat requirements and dispersal rates for Common Ground-doves.
- Develop and implement monitoring programs to better assess breeding and wintering bird population sizes. Assess management and surveillance monitoring techniques to quantify short- and long-term population responses. Develop measures to integrate state monitoring results into regional and national level databases.
- Continue using the Breeding Bird Survey as a surveillance monitoring technique, and consider modifications to make the survey more robust across the state.
- Derive quantitative population-based habitat objectives for priority grassland birds, and test assumptions (identify habitat-specific densities, limiting factors) in order to model habitat requirements necessary to meet population objectives.

- Continue participation in the Atlantic Coast Joint Venture at the management board and science committee levels.
- Continue participation in Partner's In Flight, other bird initiatives, and the North American Bird Conservation Initiative.
- Promote the participation of volunteers and employees to collect survey and monitoring data for grassland bird species.
- Reduce communication tower collisions through design modifications.

MEASURES OF SUCCESS

The landbirds featured here are high-priority representatives of this group for South Carolina and populations should respond positively to focused management practices. The recovery of priority species, primarily through habitat restoration and management, should benefit the many other lesser priority birds that also use grasslands. Monitoring programs with specific objectives should indicate if populations are responding to an increase in the quantity and quality of grassland habitat across the state.

Calculation of habitat objectives will indicate if population objectives determined at the continental level are attainable for the State, and if changes in objectives are necessary. In some cases, it may be unrealistic to achieve PIF continental population objectives due to significant and permanent habitat loss. In other cases, South Carolina will be a source for some populations and will contribute to overall continental population goals.

LITERATURE CITED

- Berlanga, H., Kennedy, J. A., Rich, T. D., Arizmendi, M. C., Beardmore, C. J., Blancher, P. J., Butcher, G. S., Couturier, A. R., Dayer, A. A., Demarest, D. W., Easton, W. E., Gustafson, M., Inigo-Elias, E., Krebs, E. A., Panjabi, A. O., Rodriguez Contreras, V., Rosenberg, K. V., Ruth, J. M., Santana Castellon, E., Vidal, R. Ma., and T. Will. 2010. Saving Our Shared Birds: Partners in Flight Tri-National Vision for Landbird Conservation. Cornell Lab of Ornithology: Ithaca, NY. Available: http://www.savingoursharedbirds.org/final_reports_pdfs/PIF2010_English_Final.pdf.
- Carey, M., D.E. Burhans and D.A. Nelson. 1994. Field Sparrow (*Spizella pusilla*). No. 103. In: A. Poole and F. Gill, editors. The Birds of North America, A. Poole and F. Gill, editors. The Academy of Natural Sciences. Philadelphia, Pennsylvania and The American Ornithologists Union, Washington, D.C.
- Cely, J.E. and Z. Corontzes. 1988. Loggerhead Shrike investigations, central South Carolina, 1986-1988. South Carolina Wildlife and Marine Resources Dept. Columbia, South Carolina. 33 pp.
- Cely, J.E. and L. Glover. 2000. Status and distribution of the common ground-dove in South Carolina. Chat. 64(2):37-46.

- Cely, J. 2003. The South Carolina Breeding Bird Atlas 1988-1995. South Carolina Department of Natural Resources. Columbia, South Carolina. 305 pp.
- Colvin, B.A. 1985. Common barn owl population decline in Ohio and the relationship to agricultural trends. *Journal of Field Ornithology*. 56:224-35.
- Coordinated Bird Monitoring Working Group of the International Association of Fish and Wildlife Agencies (CBMWG). 2004. Monitoring Avian Conservation: Rationale, Design, and Coordination. Available: www.iafwa.org/bird_conservation/bird_monitoring.htm
- Ehrlich, P.R., D.S. Dobkin and D. Wheye. 1992. *Birds in Jeopardy: the Imperiled and Extinct Birds of the United States and Canada, Including Hawaii and Puerto Rico*. Stanford University Press. Palo Alto, California. 259 pp.
- Hamel, P. 1992. *Land Manager's Guide to the Birds of the South*. The Nature Conservancy, Southeastern Region. Chapel Hill, North Carolina. 437 pp.
- Hands, H.M., R.D. Drobney and M.R. Ryan. 1989. Status of the common barn-owl in the North central United States. *Missouri Coop. Fish Wildl. Res. Unit Rep.* 19 pp.
- Hunter, W.C., L. Peoples and J. Collazo. 2001. *Partners In Flight Bird Conservation Plan for the South Atlantic Coastal Plain (Physiographic Area 3)*. 158 pp. Available http://www.blm.gov/wildlife/pl_03sum.htm.
- Lanyon, W.E. 1995. Eastern Meadowlark; *The Birds of North America*. Vol. 4, No. 160. American Ornithologists' Union. The Academy of Natural Sciences of Philadelphia. Philadelphia, Pennsylvania.
- Knight, B. 2005. Looking to the Future of Conservation. Remarks at the National Association of Conservation Districts Spring Legislative Conference. Washington, D.C. Available <http://www.nrcs.usda.gov/news/speeches05/futureconservation.html>
- Marti, C.D. 1992. Barn Owl. *In: The Birds of North America*, No.1, A.Poole, P. Stettenheim and F.Gill, Editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania.
- Mississippi State University Extension Service. 2005. Effective Kudzu Control. Coordinated Access to the Research and Extension System. Available <http://msucares.com/forestry/management/kudzu.html>
- National Geographic Society (NGS). 1999. *Field Guide to the Birds of North America*, Third Edition. National Geographic Society. Washington, D.C. 480 pp.

- NatureServe. 2005. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
- North American Bird Conservation Initiative (NABCI). 2005. Bird Conservation Regions. Available <http://www.nabci-us.org/bcrs.html>.
- Price, J., S. Droege and A. Price. 1995. The summer atlas of North American birds. Academic Press. 364 pp.
- Rich, T., C. Beardmore, H. Berlanga, P. Blancher, M. Bradstreet, G. Butcher, D. Demarest, E. Dunn, W. Hunter, E. Inigo-Elias, J. Kennedy, A. Martell, A. Panjabi, D. Pashley, K. Rosenberg C. Rustay, J. Wendt and T. Will. 2004. Partners In Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, New York. 84 pp.
- Rosenberg, K. 2004. Partners In Flight Continental Priorities and Objectives Defined at the State and Bird Conservation Region Level: South Carolina. Cornell Lab of Ornithology. Ithaca, New York. 29 pp. Available http://www.iafwa.org/bird_conservation/landbird_reports.htm
- Sauer, J.R., J.E. Hines and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966 - 2003. Version 2004.1. [USGS Patuxent Wildlife Research Center](#), Laurel, Maryland.
- Shire, G., K. Brown and G. Winegrad. 2000. Communication Towers: A Deadly Hazard to Birds. American Bird Conservancy, Washington D. C. 23 pp. Available <http://www.abcbirds.org/policy/towerkillweb.PDF>
- Sibley, D. 2000. The Sibley Guide to Birds. National Audubon Society. New York, New York. 544 pp.