BULLETIN OF THE

TEXAS ORNITHOLOGICAL SOCIETY

Vol. 38, No. 1 February 2005 Pages 1–20

BLACK SKIMMERS AT ROCKPORT BEACH PARK, ROCKPORT, TEXAS

JOHN W. HUCKABEE[1]
1821 Corpus Christi Street, Rockport, Texas 78382

ABSTRACT.—The colony of Black Skimmers (*Ryncops niger*) nesting in suboptimum weedy habitat in Rockport Beach Park from 1998–2003 was censused periodically and management efforts instituted to control vegetation and reduce mortality at the nesting site. Application of herbicides was partially successful for vegetation control. Appearance of first egg, first chick, and first fledgling were variable year to year, as were the number of birds present in the colony day to day. One hundred eighty-seven fledglings were produced in 1998, zero in 1999 and 2000, 108 in 2001, 82 in 2002, and 16 in 2003. These numbers may be insufficient to maintain the colony. Reproductive failure was mainly because of vegetation growth, which induced site abandonment and predation by Laughing Gulls and possibly Black Rats.

Black Skimmers (*Ryncops niger*) have been nesting in the vicinity of Little Bay at Rockport Beach City Park (RBP) from at least the early 1970's (Blankenship 2001). RBP occupies a peninsula about 1.4 km long and averaging about 250 meters wide, with Little Bay to the west and Aransas Bay to the east, and connecting with mainland to the south. The nesting colony is popular with park visitors; since 1997 the colony has been obvious and accessible, with 200 to 400 birds present March through July.

Over the years, increased visitation and development of the Park has increased the level of disturbance, depriving the skimmers of their preferred habitat on or near the beach and driving them to select nesting sites in an adjacent area of upland vegetation in which skimmers don't ordinarily nest. Park staff mowed this area

Black Skimmer (*Ryncops niger*) Photo by Mark Lockwood

[1]E-mail: JHucka6675@aol.com

during the winter when the birds were elsewhere, presenting them with a site of very low vegetation when they returned each March. After the returning birds occupied the site, mowing was precluded and the vegetation grew unchecked.

Rainfall is erratic in the Rockport area, but in wet years (1999, 2000, and 2003), weed growth was so rapid that the skimmers abandoned their site in mid-season, leaving behind eggs and chicks. Nevertheless, they have persisted each year 1997 through 2003 in attempting to nest at this same site when they return each March.

The site chosen by the skimmers has other disadvantages. It is immediately adjacent the park road, a power line runs down the length of the east boundary of the nesting area, and fishermen frequent the shore of Little Bay 10 m from the west boundary of the nesting site. These negative factors may have had a detrimental effect on the skimmer population, but the status of the Rockport skimmer colony—increasing, stable, or decreasing—was unknown.

In 1997 the National Audubon Society organized a formal study to assess the colony over the nesting season. That study (conducted by the author) showed that there was mortality of chicks by Laughing Gull predation and road-kill as the chicks wandered out into the nearby park road, but that these losses were minor compared to the losses when the nesting adults abandoned the site because of weed growth. That year, re-nesting in a less vegetated spot produced a few new birds. However, it was clear that Black Skimmer nesting success at RBP was dependent on vegetation growth.

THE BLACK SKIMMER PROJECT

In 1998 the Aransas Bird and Nature Club (ABNC) of Rockport assumed responsibility for assessing and managing the Black Skimmer colony, under the auspices of the City of Rockport Parks and Leisure Services Department. The effort was organized as an ABNC project, with the objective of protecting and enhancing the reproduction of Black Skimmers in the RBP. ABNC members volunteered time and resources to manage the nesting site, census the birds, and assess the status of the colony. Censusing of skimmers begins in late March and ceases when the birds leave in July or August. Site management is a year-round activity.

Censusing the Black Skimmers provided the quantitative information needed to judge the status of the colony and to determine what management steps were needed for protection and enhancement of the birds. Several times per week from late March to late July or early August 1998 through 2003, ABNC volunteers counted all skimmers present in the vicinity of the nesting site.

The number of adult skimmers present over the nesting season, April through June, from 1999 to 2003 is shown in Fig. 1, along with the number of fledglings produced each year. The number of fledglings shown is the maximum number seen at any one time.

SITE MANAGEMENT

Vegetation Control. In 1998, a layer of crushed limestone was spread over the site to suppress weed growth. The birds accepted the limestone, and 1998 reproduction was successful. However, in 1998 vegetation growth was retarded because rainfall was low. In 1999, rain was plentiful, and vegetation grew robustly through the crushed limestone, driving the skimmers away before eggs hatched.

In 2000, a commercial weed-suppressing fabric was laid over the site, and crushed limestone was spread over the fabric. The skimmers again accepted the site; but only some of them nested on the limestone, most preferring the sandy area immediately adjacent to the limestone on the site boundary nearest the road and the beach. Rainfall was abundant in 2000, and large, robust forbs sprouted and grew through the seams of the over-lapped strips of fabric. The birds again deserted the site before any fledglings were produced.

It was not clear why most of the skimmers rejected the limestone in 2000. They had nested on limestone the previous two seasons. It was clear that in any case, herbicides would be required for vegetation control. The ineffective weed-block fabric was removed and the site graded in February of 2001, and most of the skimmers subsequently selected the sandy area off the limestone as in 2000. The contact herbicide Roundup® was sprayed on vegetation on the nesting site before the birds arrived. Rainfall in 2001 was moderate, and the skimmers successfully reproduced (Fig. 1); the herbicide treatment proving effective.

The 2002 season was much like 2001, with many new fledglings produced (Fig. 1). The herbicide was effective during these seasons of moderate rain, and the birds continued to occupy the sandy area more than the limestone.

2003 was a very wet year, and several herbicide treatments could not prevent weed growth so rapid and dense that the skimmers abandoned eggs and probably some chicks in mid-June and relocated to a closely-mown area 200 meters to the northwest. Here they produced about 16 fledglings. The contact herbicide treatment was proven insufficient for such wet years, since the vegetation could not be treated after nesting commenced.

Disturbance by Park Visitors. This study was not designed to test the effects of disturbance by people on nesting Black Skimmers, but our field notes contain numerous instances of such. The skimmers seemed to be habituated, tolerating approaches by pedestrians of 10 m or less (cars much closer), depending upon the stage of the nesting cycle. Instances of vandalism have been noted, but most human disturbance seems to stem from ignorance of the skimmer's needs and value to the community.

Pet dogs are of special concern because of the vulnerability of the skimmer chicks. Dogs are prohibited in the Park, but we have noted many instances of violation. Many of these dogs are not restrained, and we once found dog tracks near the nesting site during non-nesting season.

We noted mortality (at least five or six cases) in which skimmers became immobilized in fishing line and kite string brought into the nesting site by birds which had become entangled elsewhere. Four or five skimmers were killed by flying into the adjacent power lines between 1997 and 2003. The power company installed visibility-enhancing devices on the lines in 2003. This technique is known to reduce strikes (Brown, 1993), and we have not noted a skimmer line-strike since installation.

Another specific concern for nesting birds in Rockport Beach Park is the annual Fourth of July fireworks display. The detonations cause many birds in the Park to take flight and mill about in confusion; however, Black Skimmers seem less affected than herons, egrets, and gulls. We have monitored the skimmers before, during, and after the fireworks in collaboration with federal and state law enforcement agents, and our data do not show detrimental effects by the fireworks on Black Skimmers. However, this study would not disclose more subtle damage such as loss of fitness from stress.

Other Factors. Predation and site flooding are reported to be major causes of Black Skimmer nesting failure (Gochfeld and Burger 1994). The Rockport colony has not been flooded since at least 1997, and predation, with one possible exception, has apparently been minimal. A dramatic decline-50 percent-in the number of newly hatched chicks between June 16 and 21, 2002 may have been the work of Black Rats (*Rattus rattus*). Black rats were trapped on the site immediately after the last fledglings departed in July 2002. Gochfeld and Burger (1994) report skimmer colony destruction by rats. With the exception of rats and dogs, no mammalian predators have been observed near the nesting site.

There was an instance in 1998 of probable avian predation either by a Great Horned Owl or a falcon. The skimmers have been observed aggressively defending eggs and young against Laughing Gulls, although some losses to gulls have been noted.

Each season some chicks wandered into the park road and were killed by cars, despite a fence emplaced to contain them. This mortality was small compared to site abandonment and the 2002 predation.

CENSUS AND ASSESSMENT

The census data indicate considerable variation. Fig. 1 (error bars show one standard deviation) indicates an increase in birds at the nesting site early in the season, but a decrease during the nesting season for the three years of successful reproduction. It is not known how many of these individuals are old members of the colony, and how many are new recruits. The census data for adults, but not young of year, taken in 1998 are not statistically comparable to data collected during the remainder of the project, so they are not included in the analysis.

It has been suggested that a Black Skimmer colony will be maintained if it contributes one new bird per two nests annually to the local population (Gochfeld and Burger 1994). To make this determination, it is necessary to know the number of nests, which is difficult for Black Skimmers. All birds present are not nesting, and nests are simple scrapes. We elected to forgo nest marking because marking requires intrusion and disturbance.

Methods for estimating the number of nests were intricate, and a discussion would be more appropriate for a second publication. Our calculations based on these number-of-nest estimates showed that the Rockport Colony from 1999 through 2003 is not producing a sufficient number (about 75) annually of new fledglings to maintain itself, but is close. McFarlane (2004) analyzed the data of the Texas Colonial Waterbird Survey (2003) and found a statistically significant decline of Black Skimmer breeding pairs on the Texas Coast over the past 30 years.

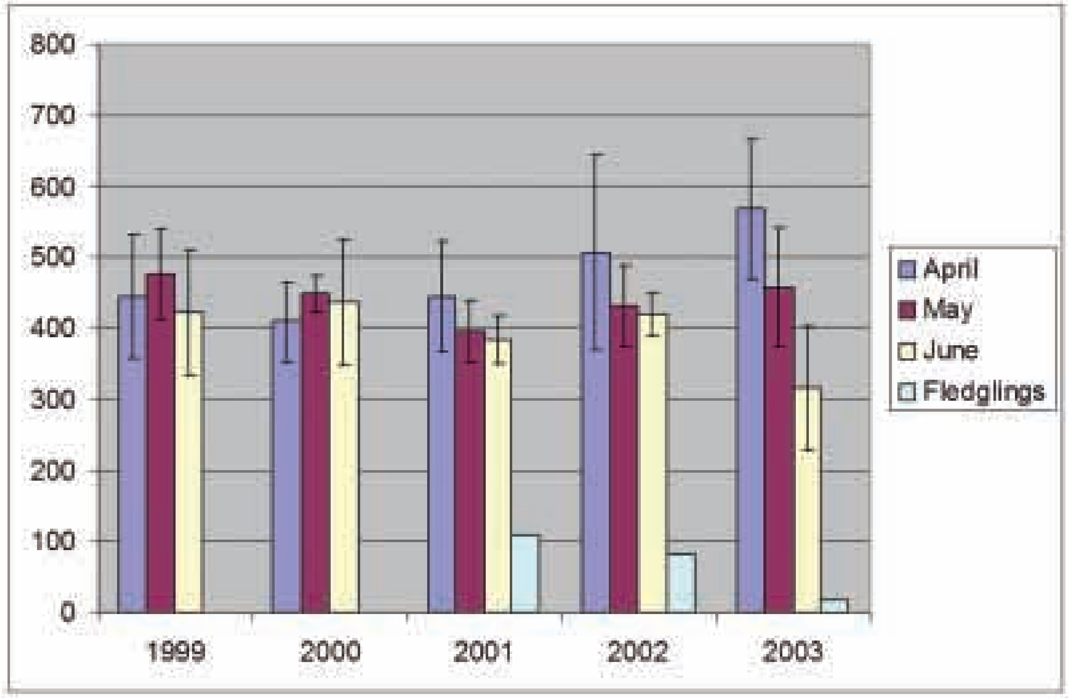


Figure 1: Number of Black Skimmer adults (monthly averages) during the nesting season April-June, 1999–2003, and number of fledglings at Rockport Beach Park. Error bars are 1 standard deviation.

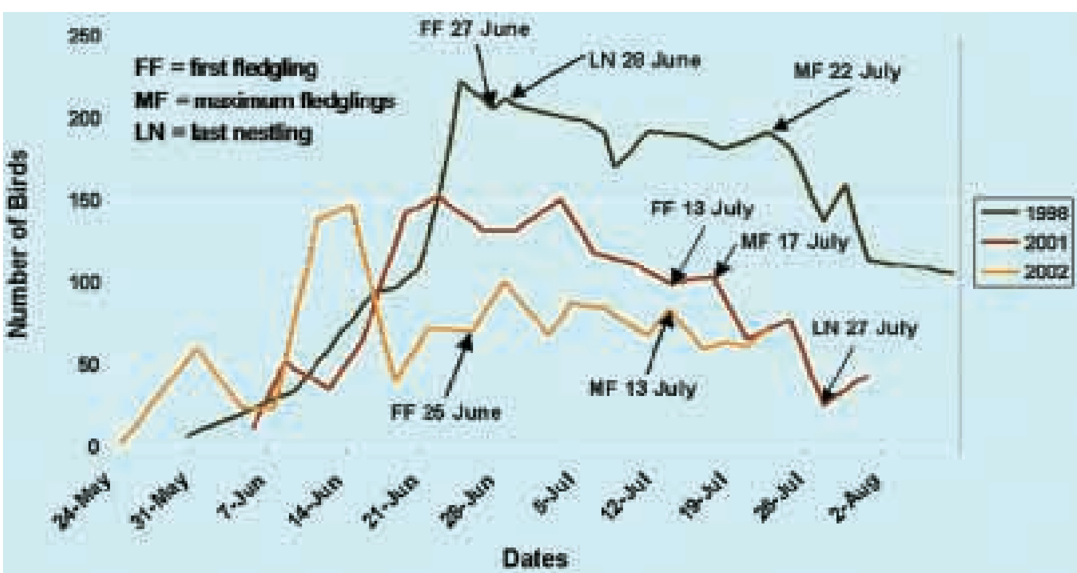


Figure 2: Number of Black Skimmer Young-of-Year at Rockport Beach Park, 1998, 2001, and 2002—date of appearance of first fledgling, maximum number of fledglings, and last nestling. Last nestling not noted in 2002 because of weed growth.

Fig. 2 shows the seasonal progression of young-of-year for the 3 years-1998, 2001, and 2002-in which sufficient young were produced for graphical comparison. The three curves show the number of young present from first hatchling to departure of last fledgling. The decline in numbers shown on the curves is the sum of mortality and dispersal as the fledglings fly away. First hatchling, first fledgling, and maximum number of fledglings vary from year to year as indicated on the curves. Incubation time and time to first flight depend on weather, food supply, and predation (Gochfeld and Burger 1994). Other factors may also be important.

CONCLUSIONS

The RBP Black Skimmer colony appears not to be reproducing itself, mostly because of nesting failure caused by weed growth in the nesting site. A prepared substrate such as crushed limestone was less important to nesting success than vegetation control, which requires the application of herbicides.

Nesting success was cut in half in 2002, possibly by Black Rats. Other mortality factors (e.g. gulls, vandalism, road kills) appear to have had less impact but are potentially limiting.

Accurate censuses of nesting Black Skimmers require multiple count-days because of the variability in the numbers of birds present. Statistical analysis of our census data may yield information useful for a more rigorous technical assessment of the status of Black Skimmers on the Texas Coast.

ACKNOWLEDGEMENTS

ABNC members who contributed the most time and effort include Francis Hicks, Peggy Holt, Ray Kirkwood, Michael Tarachow, Merce Dostale, Dinah Dyer, Herb Wisch, John Beree, Claudia Dorn, and Kris Kirkwood. Several other members helped significantly. Bob McFarlane, McFarlane and Associates, gave invaluable advice on data collecting and analysis. Tom Staley, Director of the Parks and Leisure Services Department, and Rick Martinez, Superintendent of Parks, City of Rockport, facilitated and encouraged our activities. We sought and received advice from several Black Skimmer experts, including James Heller, Brent Ortego, Gene Blacklock, Richard Gibbons, and Joanna Burger. Scott Hedges organized the original study. Special thanks are paid the Coastal Bend Bays and Estuaries Program, and to many members of the Texas Colonial Waterbird Society.

LITERATURE CITED

Blankenship, D. 2001. Personal Communication. DB participated directly in the early 1970's site preparation.

Brown, W. M. 1993. Avian Collisions with Utility Structures: Biological Perspectives. in *Proceedings: Avian Interactions with Utility Structures, EPRI TR–103268*. EPRI, Palo Alto, California.

Gochfeld, M., and J. Burger. 1994. Black Skimmer. in *The Birds of North America, No. 108* (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

McFarlane, R. W. 2004. Personal Communication RWM is a statistical consultant to the TCWS.

Texas Colonial Waterbird Society. 2003. Texas Colonial Waterbird Census Database, 1973–2003. U. S. Fish and Wildlife Service, Clear Lake, Texas Field Office. http://texascoastalprogram.fws.gov.

THE EFFECTS OF FIRE SUPPRESSION ON BACHMAN'S SPARROWS IN UPLAND PINE FORESTS OF EASTERN TEXAS

Richard N. Conner[1,3], Clifford E. Shackelford[2], Richard R. Schaefer[1], and Daniel Saenz[1]
[1]*Wildlife Habitat and Silviculture Lab (maintained in cooperation with the Arthur Temple College of Forestry, Stephen F. Austin State University), Southern Research Station, U.S. Forest Service, 506 Hayter Street, Nacogdoches, TX 75965–3556*
[2]*Texas Parks and Wildlife Department, 3000 IH-35 South, Suite 100, Austin, TX 78704*

ABSTRACT.—We studied the effects of 8 years of fire suppression on shrub-level vegetation, Bachman's Sparrows (*Aimophila aestivalis*), and selected forest bird species between 1995 and 2003 in eastern Texas. Woody shrub-level vegetation between ground level and 3 m above the ground, measured using a leaf area index, increased significantly in all sites ($n = 20$) previously managed for Red-cockaded Woodpeckers (*Picoides borealis*) in both longleaf pine (*Pinus palustris*) and loblolly- (*P. taeda*) shortleaf (*P. echinata*) pine habitats. Woody shrub-level vegetation between ground level and 3 m also increased significantly in one-half of control sites ($n = 20$). During the 8 years, Bachman's Sparrow abundance decreased significantly in habitat management areas previously managed for Red-cockaded Woodpeckers. Brown-headed Nuthatches (*Sitta pusilla*), Indigo Buntings (*Passerina cyanea*) and Red-cockaded Woodpeckers also decreased in abundance, but this decrease was not statistically significant. Slight increases or no changes were observed for Northern Cardinals (*Cardinalis cardinalis*), Carolina Wrens (*Thryothorus ludovicianus*), Hooded Warblers (*Wilsonia citrina*), Yellow-breasted Chats (*Icteria virens*), and White-eyed Vireos (*Vireo griseus*). These species generally are considered associates of woody shrub-level vegetation in both woodpecker and control sites.

Fire in the southeastern United States has been associated with upland pine ecosystems for multiple millennia. Fossil pollen records indicate that fire-maintained upland pine ecosystems spread from peninsular Florida approximately 12,000 years ago and arrived at the western extreme of their distribution in Texas about 4,000 years ago (Webb 1987). This expansion followed the retreat of the Wisconsin glaciation (Conner et al. 2001). Bartram (1791) described the original longleaf pine (*Pinus palustris*) forests as nearly unbroken expanses of widely spaced pines within a sea of grass. Fire, which occurred during dry periods throughout the year, was an integral part of the spread and maintenance of this ecosystem (Bonnicksen 2000). The frequent fires burned day and night meandering across the landscape until encountering barriers or sites too wet to burn (Frost 1993, Glitzenstein et al. 1995). The fires killed most hardwoods in the pine ecosystems, virtually eliminating any hardwood midstory and understory, but maintained an herbaceous ground cover consisting primarily of grasses and forbs (Jackson et al. 1986, Glitzenstein et al. 1995). Fallen pine needles and dried grasses served as fine fuel for the frequent ground fires in upland pine ecosystems, which may to have burned every 1 to 3+ years in southern pine forests (Mattoon 1922, Landers 1991, Glitzenstein et al. 1995, Bonnicksen 2000).

Well-burned, open-pine woodland provides habitat for several bird species in the South. Red-cockaded Woodpeckers (*Picoides borealis*), Brown-headed Nuthatches (*Sitta pusilla*), Pine Warblers (*Dendroica pinus*), Southeastern American Kestrels (*Falco sparverius paulus*), Northern Bobwhites (*Colinus virginianus*), and Bachman's Sparrows (*Aimophila aestivalis*) are well known associates of open pine habitat (Brennan et al. 1995, Wilson et al. 1995, Plentovich et al. 1998, Conner et al. 2002). Based on an analysis of information synthesized from the literature, Hunter et al. (1994) speculated that the use of fire in management for Red-cockaded Woodpeckers might have a negative stand-level impact on some Nearctic-Neotropical migrants, but such problems would likely dissolve at a larger landscape scale. Breeding Bird Surveys (BBS) indicated that 86 species of birds (excluding Nearctic-Neotropical migrants) are known to use longleaf pine forests where implemented management using selective harvesting and growing-season fire closely resembles Red-cockaded Woodpecker management (Engstrom 1993). Fire is also an essential component for the management of pitcher plant bogs (Folkerts 1982) and lepidopteran communities in the South (Rudolph and Ely 2000).

---

[3]E-mail: rconner@fs.fed.us

Bachman's Sparrow, a species of management concern, has become rare in many areas throughout the South where previously abundant (Dunning et al. 2000), and in Texas at the western extreme of its distribution, it is listed as a threatened species (Dunning 1993, Campbell 1995). Fire is an essential component of habitat management for Bachman's Sparrows throughout the South (Buckner and Landers 1979, Tucker et al. 1998, Shriver et al. 1999).

Some Neotropical migrants are positively associated with hardwood mid- and understory foliage (Conner and Adkisson 1975; Conner et al. 1979, 1983; Dickson et al. 1993). Thus, fire exclusion may increase the abundance of species that depend on hardwood foliage for nesting and foraging in both mid- and understory layers. Concern over declining populations of many Nearctic-Neotropical migrant birds has recently intensified and programs to determine causes and reverse declines have been sought (Keast and Morton 1980, Hagan and Johnston 1992, Finch and Stangel 1993).

Litigation against the U.S. Forest Service in Texas between 1996 and 1999 resulted in court injunctions that excluded fire and reduction of hardwood midstory from upland pine habitat management until summer 2003 (Conner et al. 2001). Thus, fire was not applied in habitat managed for Red-cockaded Woodpeckers in both longleaf (*Pinus palustris*) and loblolly- (*P. taeda*) shortleaf (*P. echinata*) pine habitats for 8 years (1995 to 2003).

We investigated the effects of 8 years of fire exclusion on upland pine habitat in eastern Texas. We were primarily interested in the effects of fire exclusion on Bachman's Sparrows. We also examined the abundance of other selected bird species associated with open savannah woodlands and selected species associated with shrub-layer foliage.

METHODS

We sampled avian communities using point, time-area counts (Reynolds et al. 1980) during the spring (1 May through 15 June) of 1995 and 2003. Birds were sampled in 20 Red-cockaded Woodpecker cavity tree clusters where management had been implemented recently in 1995 and in 20 control sites within 800 m of woodpecker clusters with no additional management and a hardwood midstory. Control sites were selected randomly by using a hand-held spinner to determine a direction to walk from the center of a woodpecker cluster area. If an appropriate mature forest stand of similar tree height to the cluster was not found within 800 m, a new random direction was selected. Within all 20 cavity tree clusters in 1995, all hardwoods $\leq$ 20 m from cavity trees had been removed, all midstory and understory hardwoods within the entire cluster area had been mulched, and clusters had been thinned (overstory pines) and prescribed burned within the past five years. Further management in cluster areas and control sites was not conducted over the next 8 years (through the 2003 bird breeding season) because of a federal court injunction prohibiting the use of fire and mechanical means to reduce hardwood vegetation. We evaluated habitat and birds during 1995 and 2003 in both longleaf pine and loblolly-shortleaf pine habitats. Longleaf pine study areas for woodpecker clusters and surrounding habitat were located in eastern Texas (31°15'N, 94°15'W) on the southern portion of the Angelina National Forest and loblolly-shortleaf pine study areas were located on the northern portion of that forest.

We established avian census points for time-area counts in the geometric center of woodpecker cluster areas and at randomly determined points in control areas. We selected census points in control areas by walking 100 m into the stand during our walk from cluster areas. We sampled birds weekly at each census point 6 times per season (Reynolds et al. 1980) and calculated a mean abundance value for each species at each point per season per year for subsequent analyses. Two observers sampled all points on each census day with each observer sampling 10 treatment and 10 control points per day. Bird detections were recorded upon entrance into the 50-m radius around the census point to account for birds that may flush and leave the area, and all birds seen or heard within the circular plot were recorded for a total of 5 min (Hutto et al. 1986). Birds flying above the forest canopy were not sampled. Sampling began at sunrise and ended prior to 3 h post sunrise. We did not sample birds during heavy or moderate rain or high wind (>19 kph), but did sample during mist and light drizzle (Conner and Dickson 1980).

We measured shrub-level vegetation foliage density between 0–1, 1–2, and 2–3 m above the ground within cavity tree clusters and control areas using a leaf area index method (MacArthur and MacArthur 1961). We used a *t*-test to compare shrub-level vegetation characteristics and the abundance of selected bird species between 1995 and 2003 (SAS Institute 1988).

RESULTS

Fire exclusion negatively affected Bachman's Sparrow abundance in both longleaf and loblolly-shortleaf pine habitats. During the 8 years that fire and mechanical vegetation control measures were prohibited by court injunction, Bachman's Sparrow abundance decreased significantly (*t*-test, $P < 0.05$) in habitat management areas that had been previously managed for Red-cockaded Woodpeckers (Table 1). Several other bird species generally considered associated with well-burned open pine ecosystems declined in abundance, although not significantly (Table 1), in both pine habitat types. These included Brown-headed Nuthatches (*Sitta pusilla*), Indigo Buntings (*Passerina cyanea*) and Red-cockaded Woodpeckers. The abundances of Northern Cardinals (*Cardinalis cardinalis*), Carolina Wrens (*Thryothorus ludovicianus*), Hooded Warblers (*Wilsonia citrina*), and White-eyed Vireos (*Vireo griseus*), which generally are associated with woody shrub-level vegetation, either increased slightly or remained stable in both woodpecker and control sites (Table 1). Yellow-breasted Chats (*Icteria virens*) decreased in longleaf pine sites but increased in loblolly-shortleaf pine sites; however, these changes were not statistically significant.

Shrub-level foliage of woody plants increased as a result of fire suppression. Foliage from shrub-level vegetation increased significantly at 0–1, 1–2, and 2–3 m over the 8 years fire was absent in Red-cockaded Woodpecker cluster sites in both longleaf and loblolly-shortleaf pine habitats (Table 2). Fire was also excluded at control sites but foliage increased significantly only at the 0–1 m height in longleaf pine habitat and the 1–3 m zones in loblolly-shortleaf pine habitat.

DISCUSSION

Our results indicate that litigation and advocating efforts to prevent the use of fire in the management of upland pine ecosystems of eastern Texas are misguided. The few species that may be negatively affected by fire are very abundant and associated with hardwood tree and shrub species (Conner et al. 2002). Fire does consume grasses used for nesting habitat by Bachman's Sparrows, but this temporary loss does not negatively affect the sparrow (Johnson and Landers 1982). The availability of fire-maintained open pine habitat throughout the South has dwindled dramatically over the past century and, as it declined, so have its associated avian species (Engstrom 1993, Frost 1993, Conner et al. 2001).

Fire is an essential component of upland pine management for Bachman's Sparrows in eastern Texas and throughout the rest of the South (Dunning 1993). Dunning and Watts (1990) noted that prescribed burning was a particularly important management tool to reduce shrubby vegetation and maintain the open habitat with grasses and forbs preferred by Bachman's Sparrows. Our results strongly support observations of previous researchers on the importance of fire as a management tool for Bachman's Sparrows (Buckner and Landers 1979, Dunning et al. 2000).

Bachman's Sparrows were more sensitive to the exclusion of fire from upland pine ecosystems than any of the other bird species we examined. Of the bird species associated with fire-maintained pine ecosystems, Bachman's Sparrow was the only species that declined significantly in abundance during the 8 year study. The decline in abundance of Red-cockaded Woodpeckers and Brown-headed Nuthatches was not of the magnitude observed for Bachman's Sparrows. Because Bachman's Sparrows are closely associated with grasses and forbs of herbaceous layer vegetation, the observed high sensitivity of this species is not surprising. Red-cockaded Woodpeckers and Brown-headed Nuthatches primarily use mature pines within pine savannah habitats maintained by frequent fires, and thus, would not be as sensitive as Bachman's Sparrows to fire exclusion.

In conclusion, we urge environmental groups to carefully consider the full impact of their management recommendations. The results they achieve may be the exact opposite of what they actually intended to accomplish, particularly if litigation is involved. In the current example, the Bachman's Sparrow, a sensitive species, suffered an apparent population decline in the area where fire and other woody vegetation control were excluded by a lengthy temporary restraining order.

ACKNOWLEDGEMENTS

We thank R. J. Allen, D. B. Burt, N. E. Koerth, and J. A. Neal for constructive comments on an early draft of the manuscript. Partial travel and logistical support in 2003 was graciously provided by Jeff Reid, U.S. Fish and Wildlife Service. Research conducted within Red-cockaded Woodpecker cluster areas was done under U.S. Fish and Wildlife permit TE832201–0 to Richard N. Conner.

Table 1. Changes in bird abundance (mean number of detections/5 min ± SE) over an 8-year period of fire exclusion in Red-cockaded Woodpecker cavity-tree cluster sites and control sites in loblolly-shortleaf and longleaf pine habitat on the Angelina National Forest in eastern Texas (n = 20/treatment).

	Red-cockaded Woodpecker cluster sites				**Control sites**			
	Longleaf pine		**Loblolly-shortleaf pine**		**Longleaf pine**		**Loblolly-shortleaf pine**	
Bird species	**1995**	**2003**	**1995**	**2003**	**1995**	**2003**	**1995**	**2003**
Bachman's Sparrow	1.8 (0.55)*	0.4 (0.40)*	0.8 (0.25)*	0.1 (0.10)*	0.0	0.4	0.0	0.0
Brown-headed Nuthatch	3.9 (1.30)	1.4 (0.79)	2.9 (0.57)	1.4 (0.62)	0.0	0.1 (0.10)	0.2 (0.20)	0.0
Carolina Wren	0.8 (0.42)	0.7 (0.40)	1.3 (0.40)	1.0 (0.49)	1.6 (0.37)	0.9 (0.28)	1.6 (0.45)	1.5 (0.34)
Hooded Warbler	0.2 (0.20)	0.5 (0.34)	0.0	1.1 (0.41)	0.6 (0.43)	0.3 (0.21)	0.1 (0.10)	0.5 (0.40)
Indigo Bunting	2.8 (0.85)	0.9 (0.41)	2.8 (0.65)	2.6 (0.52)	0.3 (0.15)	0.0	0.1 (0.10)	1.0 (0.47)
Northern Cardinal	0.4 (0.16)	1.3 (0.47)	2.3 (0.82)	2.1 (0.84)	1.6 (1.18)	0.8 (0.29)	2.5 (0.48)	1.3 (0.21)
Red-cockaded Woodpecker	2.1 (0.81)	1.3 (0.75)	2.8 (0.89)	1.6 (0.93)	0.0	0.0	0.0	0.0
Yellow-breasted Chat	0.7 (0.33)	0.1 (0.10)	1.6 (0.52)	2.2 (0.59)	0.0	0.0	0.0	0.1 (0.10)
White-eyed Vireo	0	0.4 (0.40)	0.4 (0.27)	1.2 (0.42)	0.1 (0.10)	0.0	0.0	0.1 (0.10)

**t*-test, $P < 0.05$, significant differences within treatments between 1995 and 2003 detected only for Bachman's Sparrows.

Bachman's Sparrow (*Aimophila aestivalis*) Photo by Cliff Shackelford

Table 2. Changes in shrub-level foliage density (k) (MacArthur and MacArthur 1961) over an 8-year period of fire exclusion in Red-cockaded Woodpecker cluster areas and control sites in loblolly-shortleaf and longleaf pine habitat on the Angelina National Forest, Texas (n = 20).

Habitat condition	**Foliage density 0–1 m (k)**	**Foliage density 1–2 m (k)**	**Foliage density 2–3 m (k)**
Longleaf pine cluster area			
Mean in 1995 (±SE)	0.078 (0.008)	0.017 (0.006)	0.008 (0.001)
Mean in 2003 (±SE)	0.247 (0.053)	0.096 (0.020)	0.062 (0.015)
$t_{(18)}$	3.16	3.84	3.56
P	0.0054	0.0012	0.0023
Loblolly-shortleaf pine cluster area			
Mean in 1995 (±SE)	0.142 (0.012)	0.053 (0.014)	0.026 (0.007)
Mean in 2003 (±SE)	0.277 (0.019)	0.144 (0.023)	0.102 (0.019)
$t_{(18)}$	5.19	3.41	3.73
P	$<$0.0001	0.0031	0.0031
Longleaf pine control area			
Mean in 1995 (±SE)	0.065 (0.011)	0.041 (0.014)	0.025 (0.008)
Mean in 2003 (±SE)	0.152 (0.018)	0.081 (0.016)	0.045 (0.008)
$t_{(18)}$	4.12	1.87	1.80
P	0.0006	0.0774	0.0895
Loblolly-shortleaf pine control area			
Mean in 1995 (±SE)	0.061 (0.017)	0.022 (0.006)	0.011 (0.003)
Mean in 2003 (±SE)	0.099 (0.016)	0.062 (0.013)	0.034 (0.008)
$t_{(16)}$	1.62	2.96	2.85
P	0.1243	0.0091	0.0205

LITERATURE CITED

Bartram, W. 1791 [1955]. Travels through North and South Carolina, Georgia, east and west Florida. Dover Publications, New York.

Bonnicksen, T. M. 2000. America's ancient forests. John Wiley & Sons, Inc., New York.

Brennan, L. A., J. L. Cooper, K. E. Lucas, B. D. Leopold, and G. A. Hurst. 1995. Assessing the influence of Red-cockaded Woodpecker colony site management on non-target forest vertebrates in loblolly pine forests of Mississippi: study design and preliminary results, pp. 309–319 *In* D. L. Kulhavy, R. G. Hooper, and R. Costa,(eds.), Red-cockaded Woodpecker: recovery, ecology and management. College of Forestry, Stephen F. Austin State Univ., Nacogdoches, Texas.

Buckner, J. L., and J. L. Landers. 1979. Fire and disking effects on herbaceous food plants and seed supplies. Journal of Wildlife Management 43:807–811.

Campbell, L. 1995. Endangered and threatened animals of Texas. Texas Parks and Wildlife Department, Resource Protection Division, Endangered Resources Branch, Austin, Texas.

Conner, R. N., and C. S. Adkisson. 1975. Effects of clearcutting on the diversity of breeding birds. Journal of Forestry 73:781–785.

Conner, R. N., and J. G. Dickson. 1980. Strip transect sampling and analysis for avian habitat studies. Wildlife Society Bulletin 8:4–10.

Conner, R. N., J. W. Via, and I. D. Prather. 1979. Effects of pine-oak clearcutting on winter and breeding birds in southwestern Virginia. Wilson Bulletin 91:301–316.

Conner, R. N., D. C. Rudolph, and J. R. Walters. 2001. The Red-cockaded Woodpecker, surviving in a fire-maintained ecosystem. University of Texas Press, Austin, Texas.

Conner, R. N., J. G. Dickson, B. A. Locke, and C. A. Segelquist. 1983. Vegetation characteristics important to common songbirds in east Texas. Wilson Bulletin 95:349–361.

Conner, R. N., C. E. Shackelford, R. R. Schaefer, D. Saenz, and D. C. Rudolph. 2002. Avian community response to southern pine ecosystem restoration for Red-cockaded Woodpeckers. Wilson Bulletin 114:324–332.

Dickson, J. G., F. R. Thompson, III, R. N. Conner, and K. E. Franzreb. 1993. Effects of silviculture on Neotropical migratory birds in central and southeastern oak pine forests. pp. 374–385 *In* D. M. Finch and P. W. Stangel, (eds.), Status and management of neotropical migratory birds . USDA Forest Service General Technical Report RM-229, Fort Collins, Colorado.

Dunning, J. B. 1993. Bachman's Sparrow. *In* A. Poole, P. Stettenheim, and F. Gill, (eds.), Birds of North America, No. 38. The American Ornithologists' Union and Academy of Natural Sciences, Philadelphia, Pennsylvania. 15 pp.

Dunning, J. B., Jr., and B. D. Watts. 1990. Regional difference in habitat occupancy by Bachman's Sparrow. Auk 107:463–472.

Dunning, J. B., Jr., B. J. Danielson, B. D. Watts, J. Liu, and D. G. Krementz. 2000. Studying wildlife at local and landscape scales: Bachman's Sparrow at the Savannah River site. Studies in Avian Biology 21:75–80.

Engstrom, R. T. 1993. Characteristic mammals and birds of longleaf pine forests. Proceedings of the Tall Timbers Fire Ecology Conference 18:127–138.

Finch, D. M., and P. W. Stangel. 1993. Status and management of Neotropical migratory birds. USDA Forest Service General Technical Report RM-229, Fort Collins, Colorado.

Folkerts, G. W. 1982. The gulf coast pitcher plant bogs. American Scientist 70:260–267.

Frost, C. C. 1993. Four centuries of changing landscape patterns in the longleaf pine ecosystem. Proceedings of the Tall Timbers Fire Ecology Conference 18:17–43.

Glitzenstein, J. S., W. J. Platt, and D. R. Streng. 1995. Effects of fire regime and habitat on tree dynamics in north Florida longleaf pine savannas. Ecological Monographs 65:441–476.

Hagan, J. M., III, and D. W. Johnston. 1992. Ecology and conservation of Neotropical migrant landbirds. Smithsonian Inst. Press, Washington, D.C.

Hunter, W. C., A. J. Mueller, and C. L. Hardy. 1994. Managing for Red-cockaded Woodpeckers and Neotropical migrants–is there a conflict? Proc. Annu. Conf. Southeast. Assoc. Fish and Wildlife Agencies 48:383–394.

Hutto, R. L., S. M. Pletschet, and P. Hendricks. 1986. A fixed-radius point count method for nonbreeding and breeding season use. Auk 103:593–602.

Jackson, J. A., R. N. Conner, and B. J. S. Jackson. 1986. The effects of wilderness on the endangered Red-cockaded Woodpecker, pp. 71–78. In D. L. Kulhavy and R. N. Conner, (eds.), Wilderness and natural areas in the eastern United States: a management challenge. Center for Applied Studies, College of Forestry, Stephen F. Austin State Univ., Nacogdoches, Texas.

Johnson, A. S., and J. L. Landers. 1982. Habitat relationships of summer resident birds in slash pine flatwoods. Journal of Wildlife Management 46:416–428.

Keast, A., and E. S. Morton. 1980. Migrant birds in the neotropics: ecology, behavior, distribution, and conservation. Smithsonian Inst. Press, Washington, D.C.

Landers, J. L. 1991. Disturbance influences on pine traits in the southeastern United States. Proceedings of the Tall Timbers Fire Ecology Conference 17:61–98.

MacArthur, R. H., and J. W. MacArthur. 1961. On bird species diversity. Ecology 42:594–598.

Mattoon, W. R. 1922. Longleaf pine. U.S. Department of Agriculture, Bulletin No. 1061, Washington, D.C. 50p.

Plentovich, S., J. W. Tucker, N. R. Holler, and G. E. Hill. 1998. Enhancing Bachman's Sparrow habitat via management of Red-cockaded Woodpeckers. Journal of Wildlife Management 62:347–354.

Reynolds, R. T., J. M. Scott, and R. A. Nussbaum. 1980. A variable circular-plot method for estimating bird numbers. Condor 82:309–313.

Rudolph, D. C., and C. A. Ely. 2000. The influence of fire on Lepidopteran abundance and community structure in forested habitats of eastern Texas. Texas Journal of Science 52(4):127–138.

SAS Institute. 1988. SAS user's guide: statistics, version 6th edition. SAS Institute, Inc., Cary, North Carolina.

Shriver, W. G., P. D. Vickery, and D. W. Perkins. 1999. The effects of summer burns on breeding Florida Grasshopper and Bachman's sparrows. Studies in Avian Biology 19:144–148.

Tucker, J. W., Jr., G. E. Hill, and N. R. Holler. 1998. Managing mid-rotation pine plantations to enhance Bachman's Sparrow habitat. Wildlife Society Bulletin 26:342–348.

Webb, T., III. 1987. The appearance and disappearance of major vegetational assemblages: long-term vegetational dynamics in eastern North America. Vegetatio 69:177–187.

Wilson, C. W., R. E. Masters, and G. A. Bukenhofer. 1995. Breeding bird response to pine-grassland community restoration for Red-cockaded Woodpeckers. Journal of Wildlife Management 59:56–67.

TRAPPING AND RECAPTURE RATES FOR URBAN WHITE-WINGED DOVES IN WACO, TEXAS

Schaefer, C. L.,[1] J. T. Baccus,[1] M. F. Small,[1,3] and R. Welch[2]
[1]*Department of Biology, Texas State University – San Marcos, San Marcos, Texas 78666.*
[2]*Texas Parks and Wildlife Department, 1601 East Crest Drive, Waco, Texas 76705.*

ABSTRACT.—We banded White-winged Doves in a recently established urban population in Waco, Texas. We banded a total of 1,517 White-winged Doves between 16 January and 17 June 2002 and 20 January and 11 July 2003 during 11,235 trap/hours at 36 locations. Capture and recapture rates and their implications are discussed.

The breeding range for White-winged Doves (*Zenaida asiatica*) in Texas, until about 1950, was almost exclusively confined to the brush country and citrus groves of 4 southern counties (Cameron, Starr, Hidalgo and Willacy) in the lower Rio Grande Valley (LRGV) of South Texas (Cottam and Trefethen 1968, George et al. 1994). In the 1950's, White-winged Doves began expanding their breeding and wintering range northward, becoming less migratory, and more urban (Small and Waggerman 1999, West et al. 1993, George et al. 1994). By 1990, more White-winged Doves occurred in South Texas north of the LRGV (Zapata to Travis counties), with the majority of these birds in Bexar County (San Antonio) (Waggerman 1990). In 2001, over 1,300,000 White-winged Doves inhabited San Antonio, Texas (Bexar County), while less than 400,000 occurred in the LRGV, a substantial change over a relatively short time (Waggerman 2001).

Current hypotheses suggest that loss of traditional White-winged Dove breeding habitat to freezes, droughts, agricultural and urban development have extirpated White-winged Doves from traditional environs and into alternative urban habitats (West et al. 1993). Punctuated range expansions of this magnitude are rare in doves, matched only by Eurasian Collared Dove (*Streptopelia decaocto*) expansion in Europe beginning around 1900 (Hengeveld 1993). Increases in the density of White-winged Doves in urban areas have prompted scientific interest in quantifying and qualifying this phenomenon. This study presents banding data collected from January 2002 to August 2003 on urban breeding White-winged Doves in Waco, Texas. In this article, we examine trapping effort, trapping locations, and recapture rates as part of a study to examine breeding biology and recruitment in urban White-winged Dove populations.

METHODS AND MATERIALS

Waco, Texas (McLennan County) is located in north-central Texas near the confluence of the Bosque and Brazos rivers. The environment of the city is characterized by gently sloping topography, dark colored clay soils, and a moderate, subtropical climate (Miller 2001). Our study area covered 25.87 ha. Waco has a human population of 202,983 (U.S. Census Bureau 2000). White-winged Doves first appeared on the Waco Audubon Society's Christmas Bird Count in 1993 (www.audubon.org), and based on call count surveys taken in 1999, 2001, 2002 and 2003 by Texas Parks and Wildlife Department (G. L. Waggerman personal communication), the population has increased steadily.

We located trap sites primarily through local Audubon society members and via cooperation from residents in areas with high White-winged Dove concentrations. Mean trap-site area was less than 0.10 ha at a home and garage or other small structure. We placed traps on driveways or patios and occasionally in areas of low vegetation. Most trap sites had active bird feeders or birdbaths that attracted White-winged Doves and, when possible, we positioned traps near feeders, water, and protected perches (Baskett 1993).

All activities for this study were conducted in accordance with state permit #SPR 0890–234 and federal banding permit #06827. Standard walk-in wire funnel traps (Figure 1) (Reeves 1968) were baited continuously with a 2:1 mixture of chicken scratch and black-oil sunflower seeds (Purina Corp, St. Louis, Missouri). Homeowners did not alter their normal activities and continued to fill bird-feeders and bird baths. We trapped from 16 January to 17 June 2002 and from 20 January to 11 July 2003. We set individual traps no more than

[3]E-mail: doveman@centurytel.net

Figure 1. Photo of 3 trapped adult White-winged Doves in Waco, Texas (photo courtesy of Cynthia Schaefer).

every other day, but effort varied based on homeowner activity, presence of predators, and geographic area. Traps were overturned and left on site when not in use. We determined trapping effort by calculating the number of hours each trap was set between sunrise and sunset with one trap open one hour comprising 1 trap/hour. We checked traps every 2 to 3 hours and released non-target species. No birds were injured or killed as a result of trapping and banding efforts. We banded White-winged Doves with USFWS size 4a aluminum numbered leg bands (Figure 2). We determined gender of adult White-winged Doves for 2002 using cloacal character-

Figure 2. Photo of a White-winged Dove being fitted with a leg band in Waco, Texas (photo courtesy of Cynthia Schaefer).

istics (Miller and Wagner 1955). We recorded hatching year (HY) birds as unknown gender. For 2002, we used chi squared goodness-of-fit contingency test to determine if trapping probability differed by gender. Comparison of the 5 most productive trap sites versus all others was tested for difference using a paired *t*-test. Differences were considered significant if $\alpha \leq 0.05$.

RESULTS

Between 16 January and 17 June 2002 and 20 January and 11 July 2003, we produced 11,235 trap/hours at 36 locations. This effort resulted in the banding of 1,517 White-winged Doves, comprised of 88.9% adults and 11.1% HY birds. For 2002, we captured 419 adult females, 261 adult males, 78 undetermined adults, and 110 HY. Capture probability was significantly greater for females than males for 2002 ($n = 680$, $\chi^2 = 36.71$, $P > 0.001$).

For both years, mean overall trap rate was 0.1372 doves/trap/hour and overall recapture rate was 0.0049 doves/trap/hour. We recaptured 52 individuals 1 time (no individual was recaptured ≥ 2 times), a 3.4% recapture rate based on 1,517 banded birds. Five trap sites yielded 55.7% of doves captured. These sites had a mean trap rate of 0.248, significantly higher than the overall trap rate of 0.137 ($P < 0.01$).

DISCUSSION

Capture rate was relatively low for this urban White-winged Dove population in winter, with a subsequent, steady increase as migrating birds arrived in the study area (mid-March). Recapture rates were extremely low, however, no similar studies exist with which to compare urban data and rural trapping efforts have not been published, although capture rates in rural areas are substantially lower (G. L. Waggerman personal communication). Urban banding studies are uncommon, making predictions based on prior research difficult. Only 3.4% of banded White-winged Doves were recaptured during the study. This can be explained by a population that was much larger than anticipated, too few doves banded, some or all wintering White-winged Doves in the study area migrated elsewhere to breed, or a combination of these factors. Recapture rates in this study were of interest because they allowed us to distinguish wintering White-winged Doves from potential migrants. When relying on recaptured birds for a dataset, it is vital to have an *a priori* expectation of effort needed to secure the number of recaptures required to meet the objectives of the study.

The greater likelihood of trapping females versus males may have been because male White-winged Doves incubate eggs and attend nestlings for the majority of the daylight period with females attending the nest at night (Cottam and Trefethen 1968). The 5 trap sites which provided the greatest number of captures had several common characteristics, thus allowing speculation as to the reason for their trap success. All 5 sites had bird feeders and water present before and during trapping. Residents at 4 of the 5 sites also fed doves prior to the study by throwing feed on the ground, usually daily. All 5 sites had low levels of predators, relatively low levels of disturbance (dogs, children, very low traffic), and power lines and/or mature trees in close proximity to traps which served as perch sites. Future banding efforts in urban areas might benefit by using trap sites that possess some or all of these characteristics. This information could be useful in planning future studies examining urban and migratory populations of doves.

Low recapture rate in this study precluded us from estimating abundance using mark-recapture methods (e.g., Jolly-Seber) (Bibby et al. 2000). More intensive trapping studies in urban areas are recommended to validate estimates of urban breeding White-winged Dove populations.

ACKNOWLEDGMENTS

We thank G. L. Waggerman for all his help on this project. This study was funded by a grant from the Texas Parks and Wildlife Department White-winged Dove stamp fund.

LITERATURE CITED

Bibby, C. J., N. Burgess, D. Hall, and S. Mustoe. 2000. Bird Census Techniques. Academic Press: London.

Cottam, C., and J. B. Trefethen, eds. Whitewings: the life history, status, and management of the white-winged dove. D. Van Nostrund Co. Inc., Princeton, NJ. 348 pp.

George, R. R., E. Tomlinson, R. W. Engel-Wilson, G. L. Waggerman, and A. G. Spratt. 1994. White-winged dove. Pp. 29–50 in Migratory, shore and upland game bird management in North America. T. C. Tacha and C. E. Braun, eds. Allen Press, Lawrence, Kansas.

Hengeveld, R. 1993. What to do about the North American invasion by the Collared Dove? Journal of Field Ornithology 64: 477–489.

Miller, G. B., and J. M. Greenwade. 2001. Soil Survey of McLennan County Texas. US Department of Agriculture and Natural Resources Conservation Service, Washington, D.C.

Miller, W. J., and F. H. Wagner. 1955. Sexing mature columbiformes by cloacal characters. Auk 72: 279–285.

NATIONAL AUDUBON SOCIETY. 2002. The Christmas Bird Count Historical Results [Online]. Available http://www.audubon.org/bird/cbc.

Small, M. F., and G. L. Waggerman. 1999. Geographic redistribution of breeding white-winged doves in the lower Rio Grande Valley of Texas: 1976–1997. Texas Journal of Science. 51:15–19.

U. S. CENSUS BUREAU. 2000. Census 2000. U.S. Department of Commerce, Washington, D.C.

West, L. M., L. M. Smith, R. S. Lutz, and R. R. George. 1993. Ecology of urban white-winged doves. Transactions of the North American Wildlife and Natural Resource Conference 58:70–77.

Waggerman, G. L. and C. L. Lyon. 2001. White-winged dove and white-tipped dove density, distribution and harvest. Performance Report, Fed. Aid Project W-128-R-9, Job 2. Texas Parks and Wildlife Department, Austin 20 pp.

SHORT COMMUNICATIONS

TEXAS BIRDS AND THE BLIZZARD OF 1886

Stanley D. Casto[1]
Department of Biology, University of Mary Hardin-Baylor, Belton, Texas 76513

The blizzard of 1886 began as an arctic cold mass that moved out of Canada during the first week in January. Railway traffic and communications were brought to a halt as snow and ice covered the tracks and high winds blew down telegraph poles in Illinois, Iowa, Kansas, Minnesota, Nebraska, and North and South Dakota (Anon. 1886a). As the storm moved southward, subzero temperatures caused great suffering among men, domestic animals, and all forms of wildlife.

The blizzard entered the Texas Panhandle during the early morning of Thursday, January 7th. By daylight it had reached the Dallas area where local streams froze over by the end of the day. Moving swiftly, the frigid winds reached San Antonio that evening causing the mercury to plummet to 5° F. Other low temperatures during the first day included 4° below zero at Sherman, 0° at Fort Worth and 4° above freezing at Denison (Anon. 1886b).

By Friday morning the temperature at Galveston was 11° with winds averaging 35 miles per hour (Anon. 1886c). Other parts of the state were even colder. At Brownwood, Gilmer, Greenville, and McKinney, it was 2° below zero and at Paris, Lamar County, a minus 8° (Anon. 1886d). An unconfirmed [and unlikely] temperature of 20° below zero was reported from Oakland in Colorado County (Anon. 1886e).

Saturday was as cold or colder than the previous day. Ice formed in the Rio Grande at Eagle Pass as the temperature fell to 20° F (Anon. 1886f). At Bowie it was 8° below zero while at Wills Point and Brenham the thermometer registered 10° below (Anon. 1886g). At Galveston, Henry Dodge, a man who hunted ducks for the market, was found frozen in his boat (Anon. 1886h). By Sunday, January 10th, Galveston Bay was frozen to a depth of 1–1/2 inches and large numbers of dead fish were visible beneath the ice (Anon. 1886i). Dead fish were also reported at Corpus Christi and Indianola where the local inhabitants eagerly broke the ice to retrieve their frozen prey. Rendered helpless by the cold, an enormous alligator was discovered by hunters at Sweetwater Lake near Galveston (Anon. 1886j).

A temperature of 20° F at Galveston on Monday raised hopes that the storm had passed. However, about midnight it began to snow and by mid-morning of the following day six inches had accumulated with drifts up to 1–1/2 feet deep (Anon. 1886k). Major waterways including the Bosque, Brazos, Concho, Llano, and

[1]Present address: 889 Nola Ruth, Harker Heights, Texas 76548. E-mail: Sscasto2@aol.com

Red River were still frozen over. People skated on the Brazos at Waco, while in Paris an entrepreneur reportedly cut 15 tons of ice from a local pond (Anon. 1886L). Eagle Lake in Colorado County remained frozen over for several days (Anon. 1886m).

A general warming trend began on Wednesday, January 13, and the citizens of Texas returned to their normal routine. Several people had frozen during the blizzard and an unknown number of cattle and pigs had died (Anon 1886n). Included in the newspaper accounts were also reports of the death and disability of various species of birds.

Chickens suffered greatly and reports of their freezing on the roost were received from Brown, Colorado, Erath, and Grayson counties (Anon. 1886o). Sea gulls and "other aquatic birds", alive but unable to fly because of the intense cold, were seen around Galveston Bay (Anon. 1886i). Hunters, seeing geese on a tank near Victoria, approached to within gunshot only to find that the birds were "frozen stiff." The 15 to 20 dead birds were apparently trapped as the shallow water froze around them. Several other geese, so weak that they could hardly fly, as well as a number of dead ducks were also seen around the tank (1886p). Mockingbirds, grackles, killdeers and other species were found dead at Grigsby's Bluff [now Port Neches] near Beaumont. One mockingbird was frozen as if in flight and a Green-winged Teal, torpid and unable to fly, was easily captured (Rachford 1886).

The death of chickens during the first night of the blizzard suggests that they were roosting in exposed locations such as trees, rather than in "chicken houses" or sheds. Most of the wild birds apparently died on the second and third days of the storm (Rachford 1886). The dead geese at Victoria were obviously trapped as the water froze around them. Smaller birds may have died of cold stress aggravated by the lack of food and water as ponds and streams froze over driving insects and other invertebrate prey into hiding. Birds that were hypothermic and unable to fly were undoubtedly at a greater risk of predation. The extent of mortality during the blizzard of 1886 is unknown. However, it is likely that reports in the media were representative of a widespread and significant die-off throughout the northern half of Texas.

The blizzard of 1886 with its accompanying mortality was followed during the next 20 years by four additional die-offs attributed to cold weather. A cold spell during January 1888 killed Mourning Doves in Wichita County and at Gainesville a temperature of 0° F caused the deaths of turkeys, chickens, and various wild birds, including a Field Sparrow (Ragsdale 1888). Northern Bobwhite died in Grayson County of cold stress during this same blizzard (Oberholser n.d.). During mid-March 1892, thousands of warblers perished in the vicinity of Rockport during a three-day 'norther' (Attwater 1892). Another blizzard in February 1899 caused the deaths of "birds of different kinds" in Austin County. Dead birds were "scattered all over the fields" in some sections of the State. Chickens froze on their roosts in Austin, Fannin, Fayette, Hunt, McLennan, and Mills counties and doves and "other birds" were found dead in Lavaca County. At Brownsville in extreme southern Texas, it was claimed that "thousands" of chachalacas died when the temperature reached 11° F and snow covered the ground for an entire day (Anon. 1899, Smith 1910). More disastrous and widespread was the blizzard and cold rain during the first twelve days of February 1905 that resulted in non-game birds, particularly migrants, being "found dead all over the State, from the Rio Grande to the Red River, and [in] the entire region bordering the Gulf of Mexico" (Davis, et al. 1905).

The above reports suggest that severe blizzards, 'northers', snow, and cold rain were responsible for the deaths of many birds, both wild and domestic, in early Texas. Although widely noted in the news media, the brief communications by J. H. Rachford, H. P. Attwater, and A. P. Smith represent the only reports of the lethal effects of these episodic events in Texas to appear in the ornithological literature.

LITERATURE CITED

Anon. 1886a. The blizzard in the West. *News Orleans Daily Picayune*, 9 January 1886.

_______. 1886b. Texas weather. *Dallas Morning News*, 8 January 1886; The big freeze. *San Antonio Daily Express*, 9 January 1886.

_______. 1886c. The coldest on record. *Galveston Daily News*, 9 January 1886.

_______. 1886d. [temperature at McKinney]. *Galveston Daily News*, 9 January 1886; [temperature at Gilmer and Paris]. *Fort Worth Daily Gazette*, 9 January 1886.

_______. 1886e. Oakland notes. Columbus *Colorado Citizen*, 14 January 1886.

_______. 1886f. Eagle Pass. *Galveston Daily News*, 10 January 1886.

_______. 1886g. Texas weather. *Dallas Morning News*, 10 January 1886.

_______. 1886h. Another stiff at Galveston. *Fort Worth Daily Gazette*, 12 January 1886; [dateline Galveston, Texas, Jan. 11]. *New York Daily Times*, 12 January 1886.

_______. 1886i. Bound with icy bands. *Galveston Daily News*, 10 January 1886.

_______. 1886j. Cold wave notes. *Corpus Christi Caller*, 10 January 1886; Some remarkable weather. *Corpus Christi Caller*, 10 January 1886; Neighborhood news. *Victoria Advocate*, 23 January 1886; Slaying a saurian. *Galveston Daily News*, 11 January 1886.

_______. 1886k. A Texas snow storm. *Fort Worth Daily Gazette*, 13 January 1886, Heaviest snowstorm ever known in Galveston. *New York Daily Times*, 13 January 1886.

_______. 1886L. Skating. *Waco Daily Examiner*, 9 January 1886; Putting up natural ice. *Fort Worth Daily Gazette*, 13 January 1886.

_______. 1886m. Eagle Lake items. Columbus *Colorado Citizen*, 14 January 1886.

_______. 1886n. Alvin: Cattle succumbing to the intense cold. *Galveston Daily New*s, 10 January 1886; Columbus *Colorado Citizen*, 21 January 1886; Daingerfield. *Galveston Daily News*, 9 January 1886; From Dublin: Animals frozen stiff. *San Antonio Daily Express*, 9 January 1886; [Bellville]. *Stephenville Empire*, 16 January 1886.

_______. 1886o. [Brownwood: Brown County]. *Dallas Morning News*, 9 January 1886; [Dublin: Erath County]. *San Antonio Daily Express*, 9 January 1886; [Collinsville: Grayson County]. *Fort Worth Daily Gazette*, 9 January 1886; [Oakland: Colorado County]. Columbus *Colorado Citizen*, 14 January 1886.

_______. 1886p. [frozen geese]. *Victoria Advocate*, 16 January 1886.

_______. 1899. Cold weather record [Austin County]. *Galveston Daily News*, 14 February 1899; Thick ice at Kenney [Austin County]. *Galveston Daily News*, 14 February 1899; Ten below zero [Camp County]. *Galveston Daily News*, 13 February 1899; Muldoon [Fayette County]. *La Grange Journal*, 16 February 1899; Hail [Fannin County]. *Bonham News*, 17 February 1899; In North Texas [Hunt County]. *Dallas Morning News*, 13 February 1899; Six below at Mullin [Mills County]. *Galveston Daily News*, 14 February 1899; The blizzard in Texas [McLennan County]. *Waco Times-Herald*, 14 February 1899; [dead doves and other birds in Lavaca County]. *Hallettsville Herald*, 16 February 1899; Pasture and farm [dead birds in various regions]. *Marlin Democrat*, 23 February 1899.

Attwater, H. P. 1892. Warblers destroyed by a ‘norther’. *Auk* 9:303.

Davis, M. B., R. M. Minier, and A. Abeel. 1905. The late frost. *Texas Field and Sportsman* 4:57–59.

Oberholser, H. C. (n.d.). Typescript of *The Bird Life of Texas*, p. 3118 [microfilm]. Center For American History, University of Texas at Austin.

Rachford, J. H. 1886. [letter to the editor]. *Hoosier Naturalist* 1(6):90.

Ragsdale, G. H. 1888. Ornithology Book E. Box 3D113, folder 3. Ragsdale Papers, Center For American History, University of Texas at Austin [see entries for 15 January and 8 February 1888].

Smith, A. P. 1910. Miscellaneous bird notes from the Lower Rio Grande. *Condor* 12:93–103.

CARRION CONSUMPTION BY A GREAT BLUE HERON (*AVES: ARDEINAE*)

Christopher M. Ritzi[1] AND Clare M. Ritzi

Department of Biology, Sul Ross State University, Alpine, Texas 79832

Great Blue Herons (*Ardea herodias*) are known to eat a large variety of food, ranging from small fish, amphibians, invertebrates, birds, and small mammals (Butler 1992). The foraging strategy of this bird is largely that of an upright, stand-and-wait predator. A heron will wade out into the water and remain still, allowing nearby fish and other vertebrates to become accustomed to its presence (Willard 1977). When a promising food item comes within range, the heron will strike with its bill, capturing the prey between its mandibles. This allows prey to either be swallowed whole or to be broken up into small pieces (Butler 1997).

On 29 December 2000, we observed a Krider’s Red-tailed Hawk (*Buteo jamaicensis kriderii*) feeding on a slightly decomposed Eastern Cottontail (*Sylvilagus floridanus*) approximately 1.5 miles east of Ponder near the intersection of FM 2469 and Robinson Road in Denton County, Texas. While observing the hawk, a Great Blue Heron flew into the area and began advancing towards the hawk. At a distance of 15–20 meters, the birds began exchanging vocalizations for a short time, while the heron continued its

[1]Email: critzi@sulross.edu

advance. The hawk abandoned the carcass when the heron was approximately 3m away, allowing the heron access to the rabbit. The heron then proceeded to feed on the carcass by tearing off pieces, periodically lifting its head upright to swallow. After five minutes, it stopped feeding and flew off in the direction of a local pond.

To the knowledge of the authors, this is the first record of scavenging by a Great Blue Heron. The only heron known to consume carrion is the White-faced Heron (*Ardea novaehollandiae*) of Australia (Klapste 1991). It has been speculated that other large herons and egrets may occasionally eat carrion, but scavenging behavior and its importance has been poorly documented in the literature for most vertebrates (DeVault and Rhodes 2002, DeVault and Krochmal 2002). In Oregon, Great Blue Herons have been reported to practice fish kleptoparasitism (prey stealing) of Double-crested Cormorants (*Phalacrocorax auritus*) (Merrifield 1992). Kleptoparasitism has been documented in a variety of other wading birds as well, ranging in size from Wood Storks (*Mycteria americana*) to Little Blue Herons (*Florida caerulea*) (Kushlan 1978). Merrifield (1992) also documented the consumption of a dead Red Phalarope (*Phalaropus fulicarius*) by a Great Blue Heron, followed by several attempts to capture another Red Phalarope from a nearby flock of 15 to 20 individuals. Although the author did not observe the heron initially capture the phalarope, it's continued stalking behavior afterwards, along with reports of other herons predating phalaropes (Packard 1943), suggests that the heron probably captured and killed its prey. Here, we complement these behavioral records with this scavenging observation to expand the literature associated with both Great Blue Heron food habits and scavenging behavior in general.

ACKNOWLEDGEMENTS

We would like to thank James Hugh and Joan Magers for providing logistical support in this observation study, and Dale W. Sparks for helpful comments on an earlier draft of this manuscript.

LITERATURE CITED

Butler, R. W. 1992. Great Blue Heron. *In* The Birds of North America, No. 25 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, DC: The American Ornithologist' Union.

Butler, R. 1997. The Great Blue Heron. UBC Press. Vancouver.

DeVault, T. L., and A. R. Krochmal. 2002. Scavenging by snakes: an examination of the literature. Herpetologica 58(4): 429–436.

DeVault, T. L., and O. E. Rhodes, Jr. 2002. Identification of vertebrate scavengers of small mammal carcasses in a forested landscape. Acta Theriol. 47(2): 185–192.

Klapste, J. 1991. Carrion eating by herons (Ardeinae). Aust Birdwatcher 14(3): 108.

Kushlan, J. A. 1978. Nonrigorous foraging by robbing egrets. Ecol. 59(4): 649–653.

Merrifield, K. J. 1992. Two unusual foraging behaviors of Great Blue Herons in Lincoln County, Oregon. Northwest Nat. 73(1): 25–26.

Packard, F. M. 1943. Predation upon Wilson's Phalarope by Treganza's Heron. Auk 60(1): 97.

Willard, D. E. 1977. The feeding ecology and behavior of five species of herons in southeast New Jersey. Condor 79(4): 462–470.

Information for Contributors

The *Bulletin of the Texas Ornithological Society* is a semiannual journal which publishes original research reports and short communications in the field of ornithology. Articles on a wide range of subjects are accepted, including documentation of new Texas records, interpretations of laboratory and field studies, historical perspectives on Texas ornithology, and developments in theory and methodology. Although the emphasis is on Texas birds, the *Bulletin* accepts papers which advance the knowledge of birds in general.

Manuscripts, including tables, should be typed and double-spaced on one side of 8.5 x 11 inch (22 x 28 cm) white paper. Allow 3 cm margins on all sides. Manuscripts may be printed using a high resolution dot-matrix or letter-quality printer. The last name of the first author must be at the top of each page of the manuscript and on the back of every figure. Submitted articles should follow the format observed in this issue of the *Bulletin of the Texas Ornithological Society*. Feature articles should include an abstract and a "Literature Cited" section. Short Communications do not need an abstract.

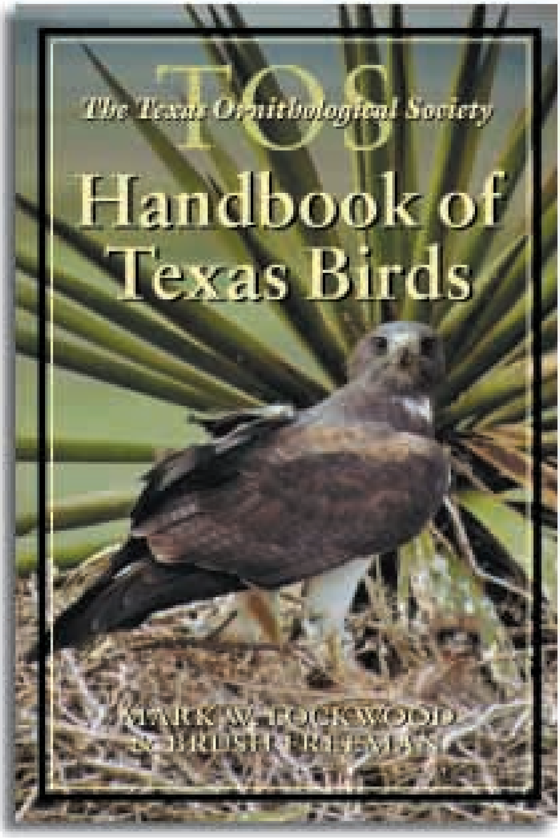
Scientific and common names of North American birds must follow the 1998 A.O.U. Check-list and supplements. The 24-hour clock (0730), the continental dating convention (3 January 1989), and the metric system should be used.

Submit an original and two complete copies of the manuscript. Each manuscript will be subject to editing and will normally be reviewed by at least two persons who are knowledgeable in the subject. The reviewers will provide the editor with advice on the article's acceptability and accuracy. If the article passes review and is correct in form, it will be scheduled for publication. A voluntary page charge of $35 per printed page will be assessed. **Payment of complete page charges will normally result in earlier publication.** Accepted articles will be published on a "space available" basis if the page charges are not paid. Authors will be sent proofs of their articles prior to the final printing.

Articles, artwork and photographs submitted for inclusion in the *Bulletin* should be sent to the editor: Jack Clinton Eitniear, 218 Conway Drive, San Antonio, Texas 78209. (Electronic submission of manuscripts, as a Word attachment, is encouraged.)

Jack Clinton Eitniear, Editor E-Mail: Bulletin@Texasbirds.org

Printed by Cadmus Professional Communications, Ephrata, PA 17522, USA

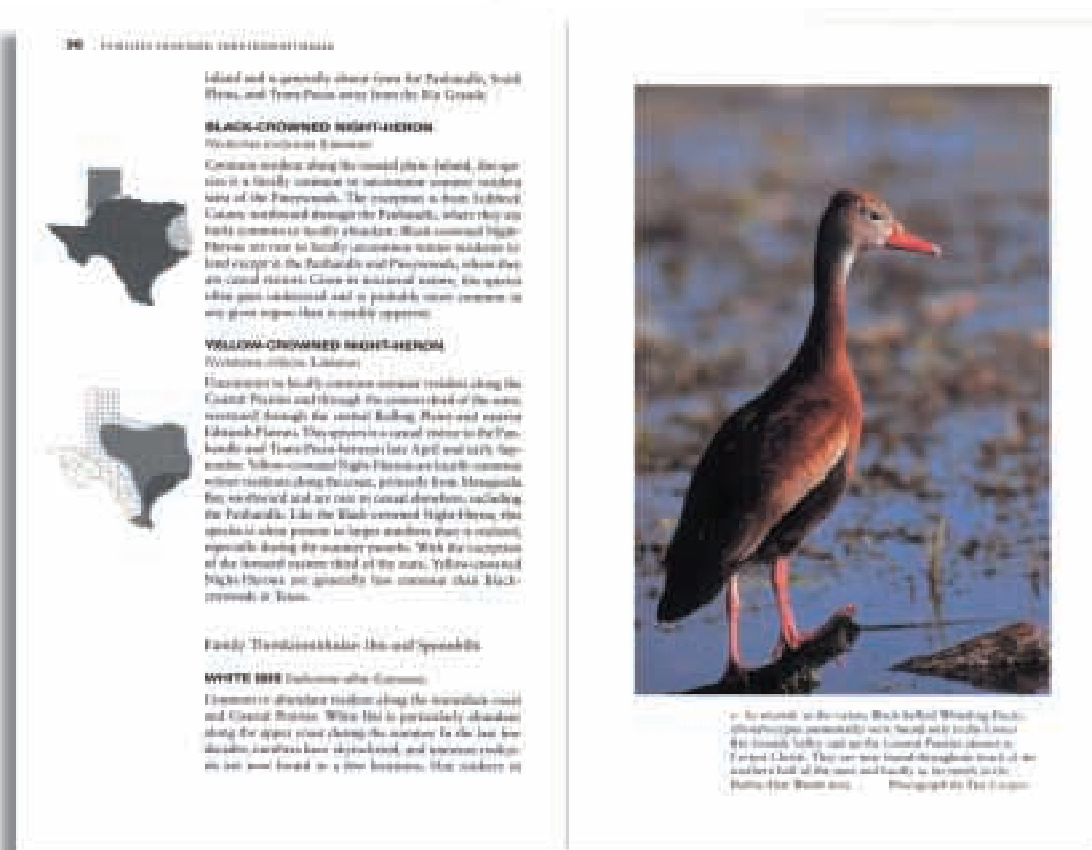


The most ambitious edition yet of the TOS checklist, which features:

- ✔ 623 species of birds currently listed for Texas
- ✔ Expert descriptions of the occurrence of each species
- ✔ Convenient range maps and distribution details for each species
- ✔ 140 color photographs by well-known bird photographers of Texas specialties, rarities, and species of conservation concern

6⅛x9¼. 360 pp. 140 color photos. 627 maps. Bib. Index.
$50.00 cloth; $24.95 paper

MARK W. LOCKWOOD is secretary of the TOS Texas Bird Records Committee and a biologist at Texas Parks and Wildlife.
BRUSH FREEMAN is past vice president of the Texas Ornithological Society and a member of the Texas Bird Records Committee.


BLACK-CROWNED NIGHT-HERON

YELLOW-CROWNED NIGHT-HERON

WHITE IBIS

TEXAS A&M UNIVERSITY PRESS
College Station, Texas • Orders: 800-826-8911
Fax: 888-617-2421 • www.tamu.edu/upress