FLORIDA FIELD NATURALIST

QUARTERLY PUBLICATION OF THE FLORIDA ORNITHOLOGICAL SOCIETY

VOL. 11, NO. 3 AUGUST 1983 PAGES 45-68

BIRD CASUALTIES AT A CENTRAL FLORIDA POWER PLANT

DAVID S. MAEHR, A. GORDON SPRATT, AND DAVID K. VOIGTS

Florida Game and Fresh Water Fish Commission, Wildlife Research Laboratory, 4005 S. Main St., Gainesville, Florida 32601; A.G.S., Florida Game and Fresh Water Fish Commission, 1239 S.W. Tenth St., Ocala, Florida 32674; D.K.V., Florida Power Corporation, P.O. Box 14041, St. Petersburg, Florida 33733.

Bird mortality at lighthouses, bridges, power lines, radio and TV antennas, tall buildings, and smoke stacks is well documented. Weir (1976) and Avery et al. (1980) thoroughly reviewed bird kills at man-made obstacles, primarily in North America. Bird kills in Florida were summarized for communication towers in Leon County (Stoddard 1962, Stoddard and Norris 1967, Crawford 1974, 1981), Orange County (Kale 1971, Taylor and Anderson 1973, 1974), Ft. Pierce and Tallahassee (Kale 1971). Such losses of birds can provide information about migration patterns and influences of weather on migration. We discuss in this paper two instances of passerine mortality at the Crystal River Generating Facility, Citrus County, Florida.

METHODS

The Crystal River Generating Facility of the Florida Power Corporation is approximately 2.2 km E of the Gulf of Mexico and covers 1 540 hectares in central Citrus County, Florida. Two pairs of chimneys associated with separate fossil fuel generating units are 152 and 183 m tall. The shorter chimneys, which have been in operation since November 1969, are painted with alternating bands of red and white and have flashing red lights. The taller chimneys are unpainted and equipped with flashing white "strobe" lights. One of these stacks was completed during the spring of 1981. The other became operable during the summer of 1982. None of the smoke stacks are floodlighted.

We began collecting birds at 10 00 and continued until 16 00 on 23 September 1982. Birds were refrigerated after transport to the Wildlife Research Laboratory in Gainesville and identified the following day. On 24 September, we identified and estimated numbers of birds on the site after a second kill. Estimates of total kills on both nights were made by Florida Power Corpora-

Florida Field Naturalist 11: 45-49, 1983.

tion employees when they removed birds from the site. Subsequent verification using conventional estimating methods was not possible. Weather data were obtained from the NOAA National Climate Center (Asheville, North Carolina) and from Florida Power Corporation weather records. All collected birds are deposited in the collection of the Florida State Museum, Gainesville, Florida. Scientific names of birds are in Table 1.

Results

On both nights, conditions near the facility were overcast to foggy with 0-16 kph winds out of the north and northeast. These conditions were apparently associated with a cold front that passed over central Florida on the night of 22 September 1982. No measurable rainfall fell on the nights of the casualties; however 3-5 cm fell on 22 September.

On 23 September 1982, 1 265 individuals from a kill estimated by Florida Power Corporation employees to be at least 3 000 birds were collected beneath the two pairs of chimneys. Twenty-nine passerine species were identified, the most abundant being the White-eyed Vireo (49%), Northern Parula (12%), Red-eyed Vireo (9%), Common Yellowthroat (7%), and Palm Warbler (5%) (Table 1). A systematic count was not possible on 24 September 1982; however, an estimated 2 000 birds were involved. Of 19 species identified on the 24th, the Gray Catbird (*Dumetella carolinensis*) and Prothonotary Warbler (*Protonotaria citrea*) were not represented in the 23 September collection. Estimated percentages for the 24th were White-eyed Vireo 60%, Red-eyed Vireo 30%, and Common Yellowthroat 5%. On both nights, the 183-meter tall stacks were associated with 95% of the mortality. A fan-shaped distribution of dead birds reflected the prevailing northerly winds.

Ring-billed Gulls (*Larus delawarensis*) were observed carrying bird carcases away from the facility and numerous "feather puddles" (Crawford 1974) and tracks of domestic cats (*Felis catus*) and raccoons (*Procyon lotor*) were observed. While predators and scavengers may have removed a number of birds from the facility, the removal of many more for safety and sanitary reasons greatly reduced the total available for collection.

Discussion

The mortality estimate of 3 000 birds may be one of the largest single night kills recorded for Florida (see Avise and Crawford 1981). Though most species found at the Crystal River Facility

TABLE 1. Bird casualties at the Crystal River Generating Facility, Florida Power Corporation, Cirtus County, Florida, on 23 September 1982.

Species	183-Stacks	152-Stacks
Empidonax spp.	15	
Veery (*Catharus fuscescens*)	1	
White-eyed Vireo (*Vireo griseus*)	595	35
Yellow-throated Vireo (*Vireo flavifrons*)	16	1
Red-eyed Vireo (*Vireo olivaceous*)	120	1
Tennessee Warbler (*Vermivora peregrina*)	2	
Northern Parula (*Parula americana*)	156	1
Yellow Warbler (*Dendroica petechia*)	1	
Chestnut-sided Warbler (*Dendroica pennsylvanica*)	7	
Magnolia Warbler (*Dendroica magnolia*)	18	
Black-throated Blue Warbler (*Dendroica caerulescens*)	1	
Black-throated Green Warbler (*Dendroica virens*)	1	
Blackburnian Warbler (*Dendroica fusca*)	4	
Yellow-throated Warbler (*Dendroica dominica*)	1	
Prairie Warbler (*Dendroica discolor*)	25	
Palm Warbler (*Dendroica palmarum*)	60	
Black-and-White Warbler (*Mniotilta varia*)	18	1
American Redstart (*Setophaga ruticilla*)	33	1
Worm-eating Warbler (*Helmitheros vermivorus*)	3	
Ovenbird (*Seiurus aurocapillus*)	11	1
Louisiana Waterthrush (*Seiurus motacilla*)	3	
Kentucky Warbler (*Oporornis formosus*)	5	
Connecticut Warbler (*Oporornis agilis*)	1	
Common Yellowthroat (*Geothlypis trichas*)	88	6
Hooded Warbler (*Wilsonia citrina*)	25	
Canada Warbler (*Wilsonia canadensis*)	1	
Yellow-breasted Chat (*Icteria virens*)	3	
Summer Tanager (*Piranga rubra*)	1	
Indigo Bunting (*Passerina cyanea*)	2	
Bobolink (*Dolichonyx oryzivorus*)	1	
TOTAL	1 218	47

were migrants expected in fall in Florida, a few were noteworthy. The Black-throated Green Warbler specimen is an early fall record, and the Connecticut Warbler is an unusual fall visitor with only one fall record reported by Crawford (1981). The 630 White-eyed Vireos collected exceeded by 112 the 25-year fall total killed at the Leon County site (Crawford 1981). If all bird casualties had been available for identification, this difference would have been much greater. An explanation for the high percentage of White-eyed Vireos found at the Crystal River Facility may be the reliance of this species on coastlines for navigation during migration,

making it more susceptible to collision with a coastal facility. Continued monitoring of the area for future kills may reveal other interesting patterns of Florida bird migration.

Most papers discussing bird mortality at man-made structures are generally thorough in reporting new records and other migration data. Few address the task of mitigating the huge annual loss of bird life caused by these structures. It is generally agreed (Weir 1976) that lighting appears to attract migrating birds under overcast conditions. Although we can not here directly address methods to prevent the continued mortality at man-made obstacles, the need to investigate alternatives of safe lighting should be stressed. Although 50 m shorter, only 5% of the mortality occurred at the red and white painted stacks with red lights. The reflecting qualities of the paint may have helped birds avoid impact after their initial attracton to lights, or red may have been a less alluring color. Any suggested cause and effect relationships, however, must be viewed with care. The heavy mortality at this strobe-lit facility is counter to findings of other studies. Taylor (1981) and Quilliam (1981) have suggested that strobe lights are less alluring to migrating birds than are colored lights. Another confounding factor was the well-lighted construction activity beneath the stacks with strobe lights. These lights, primarily incandescent, may have had some influence on the behavior of the birds involved. Because many factors can influence bird mortality at tall structures, further investigation is necessary to determine the exact causes of collisions.

A daily monitoring program was initiated by Florida Power Corporation immediately following these collisions at the Crystal River Generating Facility. In this way, valuable information on bird migration in this coastal situation can be accumulated and used to answer many of the questions about massive seasonal movements. Also, any changes in lighting conditions may be evaluated by noting changes in casualty rates.

ACKNOWLEDGMENTS

We thank Florida Power Corporation officials for permission to collect birds at the Crystal River Facility. S. A. Nesbitt, A. E. Shapiro, J. A. Rodgers, and K. C. Wenner assisted in bird identifications and provided valuable suggestions on the manuscript. R. L. Crawford and H. W. Kale provided valuable insight into the bird-tower problem. Comments by J. A. Kushlan and W. K. Taylor improved the quality of the manuscript.

LITERATURE CITED

AVERY, M. L., P. F. SPRINGER, AND N. S. DAILEY. 1980. Avian mortality at man-made structures: an annotated bibliography (revised). U. S. Fish and Wildl. Ser., Biolog. Ser. Prog., FWS/OBS—80/54.

AVISE, J. C., AND R. L. CRAWFORD. 1981. A matter of lights and death. Nat. Hist. 90(9): 6-14.

CRAWFORD, R. L. 1974. Bird casualties at a Leon County, Florida TV tower: October 1966-September 1973. Bull. Tall Timbers Res. Sta. 18: 1-27.

CRAWFORD, R. L. 1981. Bird casualties at a Leon County, Florida TV tower: a 25-year migration study. Bull. Tall Timbers Res. Sta. 22: 1-30.

KALE, H. W., II. 1971. Florida region. Amer. Birds 25: 723-733.

QUILLIAM, H. R. 1981. Bird kills at the Lenox Generating Station. Blue Bill 28: 96.

STODDARD, H. L., SR. 1962. Bird casualties at a Leon County, Florida TV tower, 1955-1961. Bull. Tall Timbers Res. Sta. 1: 1-94.

STODDARD, H. L., AND R. A. NORRIS. 1967. Bird casualties at a Leon County, Florida TV tower: an eleven-year study. Bull. Tall Timbers Res. Sta. 8: 1-104.

TAYLOR, W. K. 1981. No longer a big killer. Fla. Nat. 54: 4-5, 10.

TAYLOR, W. K., AND B. H. ANDERSON. 1973. Nocturnal migrants killed at a central Florida TV tower; autumns 1969-1971. Wilson Bull. 85: 42-51.

TAYLOR, W. K., AND B. H. ANDERSON. 1974. Nocturnal migrants killed at a central Florida TV tower, autumn 1972. Fla. Field Nat. 2: 40-43.

WEIR, R. D. 1976. Anotated bibliography of bird kills at man-made obstacles: a review of the state of the art and solutions. Dept. Fisheries and Environment, Canadian Wildl. Serv., Ontario Region.

REVIEW

Marine birds of the southeastern United States and Gulf of Mexico. Part I. Gaviiformes through Pelecaniformes.—R. B. Clapp, R. C. Banks, D. Morgan-Jones, and W. A. Hoffman 1982. U.S. Fish Wild. Serv., Off. Biol Serv. FWS/OBS-82/01, 637 pp. and **Marine birds of the southeastern United States and Gulf of Mexico. Part II. Anseriformes.**—R. B. Clapp, D. Morgan-Jones, and R. C. Banks 1982. P.S. Fish Wild. Serv., Off. Biol. Serv FWS/OBS-82/20, 491 pp. —These reports summarize the status of marine birds in the southeastern United States and explore the potential effects on these species of the development of petroleum resources on the outer continental shelf. Part I covers 39 species; Part II, 41. The authors can be justly proud of this comprehensive, virtually complete, summary of all available information on the species involved. An invaluable publication.—**Fred E. Lohrer**, Archbold Biological Station, Route 2, Box 180, Lake Placid, Florida 33853.