BIRD USE OF A NORTH-CENTRAL FLORIDA PHOSPHATE MINE

DAVID S. MAEHR

Phosphate mining is one of the most significant land-use practices affecting wildlife in Florida. Historically, surface mining has been associated with a general degradation of wildlife habitat (Agricolae 1556). Nevertheless, after clearcutting and overburden inversion, many organisms soon colonize the disturbed land. These disturbed lands include large tracts of flooded mine pits, spoil islands, and extensive waste-clay retention ponds as well as lesser areas of sand tailings dunes and reclaimed "land and lakes." In Florida, the combined surface area of these "new" landscapes associated with phosphate mining is estimated at over 74,000 ha (Hendry 1978).

In northern Florida, large phosphate waste-clay retention ponds containing open water and willow swamps *(Salix caroliniana)* contrast sharply with the surrounding natural, undisturbed forest communities of pine flatwoods, bald cypress *(Taxodium distichum)* and mixed-hardwood swamps (Davis 1967). For many species of birds, these new, phosphate-associated wetlands provide habitats unavailable in the region prior to mining. This study reports on the unusual occurrences of birds associated with the Occidental Chemical Company's Suwanee River mine, Hamilton County, Florida, located approximately 100 km from the Gulf and Atlantic coasts and within 7 km of the Suwanee River (Fig. 1).

Methods

Total counts in open water habitats and variable circular plot counts (Ramsey and Scott 1979) in dense vegetation were conducted 5 times each season from ½ hour before to 3 hours after sunrise. The four count stations within each habitat type were rotated over time each season to minimize the effect of time of day on bird census results.

Results

Observations of birds at a north-central Florida phosphate mine during the 17-month period December 1978-June 1980, revealed 118 species on mined lands and 54 species in surrounding flatwoods (Maehr 1980). The latter group closely matches species lists obtained in similar habitats in northern Florida and southern Georgia (Norris 1951, Nelson 1952, Sprunt 1954, Weston 1965, Stoddard 1978, H. M. Stevenson, pers. comm.). Many species I observed in lands created by phosphate mining were usually rare or absent in Florida flatwoods. Several of these species

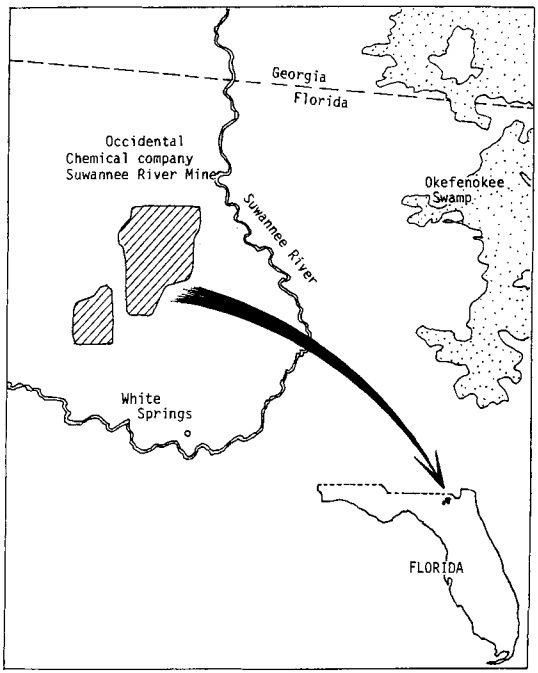

Fig. 1. Location of the Occidental Chemical Company Suwannee River Mine, Hamilton County, Florida.

were apparently casual migrants, whereas others were winter or summer residents. The following birds, unusual in their presence or abundance in north-central Florida, were apparently attracted to new aquatic habitats created by phosphate mining.

GAVIIFORMES. Common Loons *(Gavia immer)* were seen singly during the winter in large, open water impoundments.

PODICIPEDIFORMES. Horned Grebes *(Podiceps auritus)* were regular winter residents, and remained until late spring (5 May 1979). All were in small groups on open water.

PELECANIFORMES. Fifteen White Pelicans *(Pelecanus erythrorhynchos)* were seen in late fall, loafing on sand bars in large open water impoundments. Double-crested Cormorants *(Phalacrocorax auritus)* were common residents at the mine, with peak numbers occurring during the nesting season (May-July) when 1500 + birds nested in flooded tree snags in a shallow settling pond.

CICONIIFORMES. No unusual species were observed, but egrets and herons were abundant in mined areas. Nesting herons included 75 Great Egrets *(Casmerodius albus)* in the cormorant colony and 30 Black-crowned Night Herons *(Nycticorax nycticorax)*, 20 Snowy Egrets *(Egretta thula)*, 10 Louisiana Herons *(Hydranassa tricolor)*, 1500 Cattle Egrets *(Bubulcus ibis)*, and 2 White Ibises *(Eudocimus albus)* nested together in a single willow thicket colony.

Feeding concentrations of egrets and herons, dominated principally by Great Egrets, were observed in densities of up to 150 birds per ha in areas with an abundance of water hyacinth. Great Egrets often fed by diving from flight into open water for the abundant fish in these

areas. Wood Storks *(Mycteria americana)* in flocks of up to 30, used inundated areas for loafing and feeding from late summer to early winter.

ANSERIFORMES. Notable observations in this group included 8 Whistling Swans *(Olor columbianus)* in February 1980, occasional Blue and Snow geese *(Chen caerulescens)* throughout the winter, a flock of 7 White-fronted Geese *(Anser albifrons)* on 10 October 1979, Canada Geese *(Branta canadensis)*, a Surf Scoter *(Melanitta perspicillata*, Stafford 1979) and a female Oldsquaw *(Clangula hyemalis)* on 20 December 1979. These species were typically found on open water or in scattered patches of water hyacinth *(Eichhornia crassipes)*. Ducks nesting in mined areas included Mallards *(Anas platyrhynchos)*, Blue-winged Teal *(A. discors)*, Wood Ducks *(Aix sponsa)*, and Ruddy Ducks *(Oxyura jamaicensis*, see also Menk and Stevenson 1977).

FALCONIFORMES. Ospreys *(Pandion haliaetus)*, Bald Eagles *(Haliaeetus leucocephalus)*, and Red-shouldered Hawks *(Buteo lineatus)* were found in mined areas throughout the year. Migratory Peregrine Falcons *(Falco peregrinus)* have been observed at various locations, and may have been attracted to the mine because of the abundance of waterfowl and shorebirds in wetland areas. Marsh Hawks *(Circus cyaneus)* and American Kestrels *(F. sparverius)* were abundant winter residents in the entire area. An albinistic Red-tailed Hawk *(B. jamaicensis)* was seen perched over a willow swamp on 6 February 1980.

GRUIFORMES. Soras *(Poranza carolina)* were abundant in cattail *(Typha* sp.) - willow swamps from fall to early spring. King Rails *(Rallus elegans)* and Virginia Rails *(R. limicola)* were regularly heard in willow swamps. American Coots *(Fulica americana)* were the most abundant water bird during winter months. A single Sandhill Crane *(Grus canadensis)* was seen in early June 1980 using an upland, reclaimed "land and lakes" area.

CHARADRIIFORMES. Small flocks of dowitchers *(Limnodromus* sp.) were periodically common from fall through spring. Five American Avocets *(Recurvirostra americana)* were observed in October 1979 feeding in shallow settling ponds. Most notable among breeding shorebirds were 12 pairs of Black-necked Stilts *(Himantopus mexicanus)* that nested on floating debris in a shallow settling pond. Wintering Laridae included Laughing Gulls *(Larus atricilla)*, Bonaparte's Gulls *(L. philadelphia)*, Caspian Terns *(Sterna caspia)*, and Gull-billed Terns *(Gelochelidon nilotica)*. In 1979, Black Terns *(Chlidonias niger)* were observed between 12 May and 23 July, and were associated with open water habitats. Least Terns *(S. albifrons)* established three successful nesting colonies on processed sand tailings (which closely resemble natural nesting substrate) in the summer of 1979. Adult birds caught fish in adjacent settling ponds. At its peak in July, the Least Tern breeding population was about 200 birds.

STRIGIFORMES. No owls were seen or heard on active mine areas, although several species are resident in surrounding flatwoods. A Short-eared Owl *(Asio flammeus)* was observed on reclaimed land on 15 October 1979.

PICIFORMES. Few species in this group were seen within mined areas, but a pair of Downy Woodpeckers *(Picoides pubescens)* nested in a hollow snag over a water hyacinth-covered settling pond. The nearest flatwoods were over 500 m away.

PASSERIFORMES. Passerines were generally less abundant in mined areas than species in most other taxa. The low passerine abundance was probably a result of the dominance of open water and other wet habitats associated with phosphate mining. Migratory swallows were very common over open water in spring and fall. Red-winged Blackbirds *(Agelaius phoeniceus)* were the most numerous year-round residents and migrants, with peak numbers in late fall. During spring and fall, migrating warblers were periodically abundant in willow marshes and brush covered spoil piles. Short-billed Marsh Wrens *(Cistothorus plantensis)* were abundant winter residents and several Louisiana Waterthrushes *(Seiurus motacilla)* sang in willow swamps in May 1979.

Conclusions and Recommendations

There has been much recent concern in the United States and Florida regarding the disappearance of wetland resources and the subsequent effects on wildlife (Craighead 1971, Darnell 1977, Landin 1978, Patrick 1978, Stransky and Hall 1967, Weston 1965). Unlike wetland disappearance due to many industrial practices, phosphate mining can create habitats capable of supporting diverse bird communities. The potential and immediate importance of wetlands created by phosphate mining is clearly demonstrated by the numbers of individuals and species of birds presently utilizing these areas for all or part of their life cycles. Unfortunately, settling ponds provide only temporary replacements for the region's disappearing wetlands. With age, slime ponds succeed from open water and willow swamps to relatively unproductive, monotypic wax myrtle *(Myrica cerifera)* uplands (Schnoes and Humphrey 1980). An unavoidable trade-off exists between the elimination of "natural" premining flatwoods and the creation of significantly altered wetland communities. Short term increases in bird abundance may be followed by rapid and permanent decreases, which amplify the loss of traditional habitats in which many species evolved.

Current reclamation regulations in Florida (Florida Administrative Code, Chapter 16C-16) do not recognize wildlife needs or the opportunity to maintain valuable wildlife communities on phosphate mined lands. The lack of incentives for development of wildlife habitat following mining has encouraged the establishment of relatively unproductive bahia grass *(Paspalum notatum)* uplands, and sterile wetlands. With appropriate water-level management to control succession, phosphate settling ponds could retain healthy, if not natural, wildlife communities. The continued productivity of wildlife habitat on phosphate-mined lands depends on changes in industry guidelines and reclamation laws. The recommendations of current and future researchers are essential in realizing this goal.

Acknowledgments

I am indebted to Herbert W. Kale, II, Ronald F. Labisky and Wayne R. Marion for invaluable suggestions on the manuscript, and to Henry M. Stevenson for the use of his unpublished count data from Hamilton County. Funding of this project was made possible by a grant from the Occidental Chemical Company, White Springs, Florida.

Literature Cited

Agricolae, G. 1556. De re metallica. Translated from the first Latin edition by H. C. Hoover and L. H. Hoover. 1950. New York, Dover Publications, Inc.

Craighead, F. S., Sr. 1971. The trees of south Florida. Volume 1, Coral Gables, Univ. Miami Press.

DARNELL, R. M. 1977. Overview of major development impacts on wetlands. Pp. 19-28 *in* Proceedings of the National Wetland Protection Symposium. U.S. Dept. Interior.

DAVIS, J. H. 1967. General map of natural vegetation of Florida. Univ. Florida, Inst. Food Agric. Sci., Agric. Exp. Sta., Circular S-178.

HENDRY, C. W. 1978. Phosphate land reclamation study. Commission report on phosphate mining and reclamation, report to the Governor, Tallahassee, Fla.

LANDIN, M. C. 1978. Wading birds and wetland management. Pp. 135-141 *in* R. M. DeGraaf (ed.). Proceedings of the workshop management of southern forests for nongame birds. U.S. For. Serv., Gen. Tech. Rep. SE-14.

MAEHR, D. S. 1980. Avian abundance and habitat preferences on new habitats created by phosphate mining. M.S. Thesis, Univ. Florida.

MENK, G. E., AND H. M. STEVENSON. 1977. Second Florida breeding record of the Ruddy Duck. Fla. Field Nat. 5: 12-13.

NELSON, G. E., JR. 1952. The birds of Welaka. Quart. J. Fla. Acad. Sci. 15: 21-39.

NORRIS, R. A. 1951. Distribution and populations of summer birds in southwestern Georgia. Ga. Ornithol. Soc., Occ. Publ. No. 3.

PATRICK, R. 1978. Some impacts of channelization of riverine systems. Pp. 15-28 *in* Environmental quality through wetlands utilization. The Coordinating Council on the Restoration of the Kissimmee River Valley and Taylor Creek-Nubbin Slough Basin, Tallahassee, Fla.

RAMSEY, F. L., AND J. M. SCOTT. 1979. Estimating population density from variable circular plot surveys. Pp. 155-181 *in* R. M. Cormack, G. P. Patil, and D. S. Robson (eds.). Sampling biological populations. Fairland, Md., Internatl. Co-op. Publ. House.

SCHNOES, R. S., AND S. R. HUMPHREY. 1980. Terrestrial plant and wildlife communities on phosphate-mined lands in central Florida. Fla. State Mus., Spec. Sci. Rep. No. 3.

SPRUNT, A. 1954. Florida bird life. New York, Coward-McCann, Inc.

STAFFORD, S. K. 1979. Inland records of Oldsquaws and Surf Scoter from north Florida. Fla. Field Nat. 7: 25-26.

STODDARD, H. L. 1978. Birds of Grady County, Georgia. Bull. Tall Timbers Res. Sta., 21: 1-175.

STRANSKY, J. J., AND L. K. HALLS. 1967. Woodland management trends that affect game in coastal plain forest types. Proc. Annu. Conf. Southeast Assoc. Game Fish Comm. 21: 104-108.

WESTON, F. M. 1965. A survey of the birdlife of north-western Florida. Bull. Tall Timbers Res. Sta., 5:1-147.

School of Forest Resources and Conservation, University of Florida, Gainesville, Florida 32611. Present address: *Wildlife Research Laboratory, Florida Game and Fresh Water Fish Commission, Gainesville, Florida 32601*