

Status of birds using phosphate-mined lands in Florida

*A look at the birdlife
of a manmade habitat in
its early stages of succession*

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SURFACE MINING IS OFTEN associated with degradation of the landscape and the elimination of avian habitat. Although some studies on birds have noted benefits to a few opportunistic bird species (Allaire 1978b, Kimmel and Samuel 1978, Whitmore and Hall 1978, Wray *et al.* 1978), most research indicates that surface mining decreases bird use in both abundance and species richness (Brewer 1958, Karr 1968, Allaire 1978a, Crawford *et al.* 1978). Although the observations and trends reported in the above studies may reflect surface mining of coal in general, they do not reflect consequences of all surface mining activities. This paper is an attempt to summarize the status of 176 bird species that have been identified on phosphate-mined lands in Florida. It also is intended to focus attention on a temporary landscape that is apparently attractive to and heavily used by a variety of bird species.

Phosphate mining is a rapidly increasing land-use in the United States. Methods of extraction are similar to surface mining of coal, but local geology, topography, and phosphate-processing methods contribute to the creation of dissimilar landscapes. Florida has produced over 90% of the phosphate mined in the United States and accounts for approximately one-third of world production (Zellers and Williams 1978). Over 77,000 hectares have been mined in Florida since the late 1800s (Hawkins 1979) and projections forecast the exhaustion of high-quality domestic reserves within 30 years (Lincer 1979).

Table 1. Birds of Florida phosphate mines.

LEGEND:

Habitats	Status	Relative Abundance
UM Unreclaimed Mines	r Year Round Resident	A Abundant
ESSP Early Successional	m Migrant	C Common
Settling Ponds	s Summer Resident	U Uncommon
LSSP Late Successional	w Winter Resident	I Incidental
Settling Ponds	n Nesting	
RM Reclaimed Mines		

SPECIES	STATUS	Relative Abundance			
		UM	ESSP	LSSP	RM
Com. Loon	m		I		
Pied-billed Grebe	rn	C	A	C	C
Horned Grebe ^a	w		U		
Am. White Pelican	wm		C		
Double-crested Cormorant	rn	C	A	C	C
Anhinga	rn	C	C	C	C
Am. Bittern	m			U	
Least Bittern	sn		C	C	
Great Blue Heron	r	C	C	C	C
Great Egret ⁴	rn	C	A	C	C
Snowy Egret ⁴	rn	C	C	C	C
Little Blue Heron ⁴	rn	C	C	C	C
Tricolored Heron	rn	C	C	C	C
Cattle Egret	rn	C	C	A	C
Green-backed Heron	rn	C	C	A	C
Black-crowned Night-Heron ⁴	rn	C	C	C	C
White Ibis ⁴	rn			C	
Glossy Ibis ⁴	sn			C	
Wood Stork ¹	s		U	U	
Tundra Swan ^a	w		I		
Greater White-fronted Goose ^a	w		I	I	
Snow Goose	w		U		
Canada Goose	w	I	I		
Wood Duck	rn	C	C	C	C
Green-winged Teal	w		C	C	
Am. Black Duck	w		U		
Mottled Duck	r		U		
Mallard	r	U	U	U	
N. Pintail	w		C		
Blue-winged Teal	wrn	A	A	A	U
Cinnamon Teal ^d	w		I		
N. Shoveler	w	C	A	A	

Table 1. (Continued)

SPECIES	STATUS	Relative Abundance			
		UM	ESSP	LSSP	RM
Gadwall	w		C	C	
Am Wigeon	w		C	C	
Canvasback	w		U		U
Redhead	w		U		
Ring-necked Duck	w		A		
Lesser Scaup	w		A		
Oldsquaw	w		U		
Surf Scoter ^c	w		I		
White-winged Scoter	w		I		
Com Goldeneye ^d	w		U		
Bufflehead	w		C		
Hooded Merganser	w		A		A
Com Merganser ^d	w		I		
Red-breasted Merganser ^d	w		U		
Ruddy Duck	wrn		A		A
Black Vulture	r	C	C	C	C
Turkey Vulture	r	C	C	C	C
Osprey ²	r		C	C	C
Bald Eagle ²	r		U	U	
N Harrier	w	C	C	C	C
Sharp-shinned Hawk	w				U
Cooper's Hawk ^{a,4}	w				U
Red-shouldered Hawk	r		C	C	C
Red-tailed Hawk	r		C	C	C
Am Kestrel	w	C	C	C	C
Peregrine Falcon ^a	m		U	U	
N Bobwhite	r	C	C	C	C
King Rail ^a	w			C	
Virginia Rail ^a	w			U	
Sora	w			A	
Purple Gallinule	sn		C		
Com Moorhen	rn	C	A	A	C
Am Coot	w	A	A	A	A
Limpkin ^{c,4}	r	C			
Sandhill Crane ^{a,2}	m				U
Black-bellied Plover ^b	m		U		
Semipalmated Plover	m		U		
Killdeer	r	C	C	C	C
Black-necked Stilt	sn		C	C	C
Am Avocet ^{d,4}	m		U		
Greater Yellowlegs	w	C	C	C	C
Lesser Yellowlegs	w	C	C	C	C
Solitary Sandpiper	w	U	U	U	U
Spotted Sandpiper	w	U	U	U	U
Semipalmated Sandpiper	m	C	C	C	C
W Sandpiper	m		C		
Least Sandpiper	m	C	C	C	C
White-rumped Sandpiper ^b	m		U		
Pectoral Sandpiper	m	C	C	C	
Dunlin ^b	m		U		
Stilt Sandpiper ^b	m		U		
Long-billed Dowitcher	m		U	U	U
Com Snipe	w	C	C	C	C
Laughing Gull	w		C		C
Bonaparte's Gull	w		U		U
Ring-billed Gull	w	A	A	C	U
Herring Gull ^b	w		U		U
Gull-billed Tern ^a	m		U	U	
Caspian Tern ^{a,4}	m		U		
Com Tern ^c	m	U			
Forster's Tern	w		C		
Least Tern ²	sn	C	C	C	
Black Tern	m		U		
Mourning Dove	rn	C			C
Com Ground Dove	rn	C			
Yellow-billed Cuckoo	s			C	
Smooth-billed Ani ^c	s	U			

In the United States, phosphate mining is concentrated in the marine sediments of northern and west-central Florida. Flat terrain and high pH substrates are not characterized by rapid surface run-off and acid mine drainage, problems commonly associated with coal extraction.

Habitats associated with phosphate mining are highly variable. Dragline-created mine pits fill rapidly with water and result in finger lakes bisected by tall spoil piles. Scant vegetation is characteristic of heavily eroded spoil piles and of deeply flooded mine pits. The most conspicuous features of modern phosphate mines are huge impoundments (settling ponds) used for the disposal of phosphate-processing waste. This waste is a phosphate-rich clay slurry that is pumped considerable distances to settling ponds for dewatering and consolidation. Because slurry is highly adsorptive and dries very slowly, it may still contain 70% water even after 20 years of dewatering and consolidation (Farmer and Blue 1978). Further, because the volume of slurry is greater than the volume of ore removed, the swollen clay necessitates above-ground storage. Slurry is pumped into previously mined or unmined diked impoundments characterized by scattered spoil islands and flooded flatwoods trees, respectively. Younger settling ponds (early successional) are characterized by expanses of open water and scattered Water Hyacinth (*Eichornia crassipes*), while older settling ponds (late successional) are invaded by Coastal Plain Willow (*Salix caroliniana*), cat-tails (*Typha* spp.) and other aquatic and semi-aquatic plants. Settling areas with dead trees or willow thickets often contain extensive colonies of Double-crested Cormorants, Anhingas, Black-crowned Night-Herons, Cattle and Great egrets, Wood Storks, and White Ibises.

Reclamation of affected areas is required by state and local laws but unlike coal mining, phosphate-mine reclamation does not fall under any Federal jurisdiction. Currently, most reclaimed land is created by flattening and contouring spoil piles and planting Bahia Grass (*Paspalum notatum*). The resultant landscape consists of grass-covered uplands interspersed with deep finger lakes.

THE VARIETY OF NEW LANDSCAPES associated with phosphate mining has provided habitats previously unavailable to birds in the mined regions of Florida. However, phosphate mining also has

eliminated habitat for many woodland species (Maehr 1980:39). The majority of unreclaimed phosphate-mined habitats are now dominated by wetlands, and the species using them are characteristic of natural marshes and swamps. The importance of aquatic habitats to birds in phosphate-mined lands is reflected by the 95 wetland species (54% of total) identified in three major phosphate mine ecology studies (Nat'l Fish and Wildlife Laboratory 1978, Maehr 1980, Schnoes and Humphrey 1980). According to Kale (1978), two species (1.2%) are listed as endangered, four species (2.3%) as threatened, two species (1.2%) as rare, and 13 species (7.5%) as species of special concern (Table 1). The majority (86%) of the above species are also associated with wetlands.

Table 1 is a synthesis of the three recent studies of animal communities on phosphate-mined lands in Florida as well as some additional records. The first study on phosphate-mined lands in Florida was conducted in Hamilton County, in northern Florida, by the U.S. Fish & Wildlife Service (Nat'l Fish and Wildlife Laboratory 1978) to determine potential impacts of mining on federally listed wildlife species. This same site was also studied by Maehr (1980) to document seasonal habitat use by birds. Schnoes and Humphrey (1980) studied wildlife communities on a variety of sites in central Florida. Because censusing techniques were different among these studies, direct comparisons of data were impossible. However, general patterns in abundance were discernible, so the bird species lists were combined and subjective abundance values were assigned to each species. The information should be viewed with the realization that wetlands in the United States are disappearing at a rapid rate (Stegman 1976), and that most phosphate-mined habitats (except those reclaimed) are relatively temporary and short-lived. Therefore, the species composition of these areas is expected to change drastically as a result of current trends in mining, reclamation procedures, and ecological succession on these sites.

Although the needs of wildlife are partially addressed in recent reclamation regulations, the technology for replacement of natural wetlands (wet prairies, pine flatwoods, cypress and gum swamps, etc.) is in its infancy. This fact is supported by the observation that fewer species use reclaimed habitats, all of

Table 1. (Continued)

SPECIES	STATUS	Relative Abundance			
		UM	ESSP	LSSP	RM
Com. Barn-Owl ^c	r	U			
Great Horned Owl ^c	r	U			
Short-eared Owl ^a	w				I
Com. Nighthawk	s	C			C
Chuck-will's widow ^c	s	U			
Chimney Swift	s			C	C
Ruby-throated Hummingbird	s	U			U
Belted Kingfisher	r	C	C	C	C
Red-bellied Woodpecker	r	U	U	U	
Yellow-bellied Sapsucker ^c	w	U			
Downy Woodpecker	r	U		U	
Hairy Woodpecker ^{c,4}	r	U		U	
N. Flicker	r	C	U	U	
Pileated Woodpecker ^c	r	U			
E. Wood-Pewee ^a	m			U	
E. Phoebe	w	C	C	C	C
Great Crested Flycatcher	s	U		C	
E. Kingbird	s		U	C	U
Purple Martin ^b	s		U		U
Tree Swallow	w	A	A	A	A
N. Rough-winged Swallow	sn	C	C	C	C
Bank Swallow ^a	m	C	C	C	C
Barn Swallow	m	C	C	C	C
Blue Jay ^c	r	C			
Am. Crow	r	C	C	C	C
Fish Crow	r	C	C	C	C
Tufted Titmouse ^c	r	C			
Carolina Wren	r	C		C	
House Wren	w	C	C	C	
Sedge Wren	w				C
Marsh Wren ^c	w	U			U
Ruby-crowned Kinglet	w	C		A	
Blue-gray Gnatcatcher ^c	w	C		C	
E. Bluebird	r		C	C	C
Hermit Thrush ^c	w			U	
Wood Thrush ^c	w	U			
Am. Robin	w	A	A	A	A
Gray Catbird	w	U		C	U
N. Mockingbird	rn	C	C	C	C
Brown Thrasher	rn	U		U	
Water Pipit	w		U		
Cedar Waxwing ^c	w	C		C	
Loggerhead Shrike	rn	C			C
Eur. Starling	rn	C	C	C	C
White-eyed Vireo	rn	U	U	C	
Tennessee Warbler ^a	m				U
Orange-crowned Warbler	m	C			C
N. Parula	sn	U		U	
Yellow Warbler ^a	m			U	
Yellow-rumped Warbler	w	A	A	A	A
Prairie Warbler	m			U	
Palm Warbler	w	C	U	C	U
Black-and-white Warbler ^c	w	U			
Am. Redstart ^{c,3}	m	U		U	
Prothonotary Warbler ^a	s			U	
Louisiana Waterthrush ^{a,3}	s			C	
Com. Yellowthroat	rn	C	C	A	C
Summer Tanager	sn	U		C	
N. Cardinal	rn	C	C	C	U
Blue Grosbeak	s		U	U	U
Indigo Bunting	s		U	U	U
Painted Bunting ^c	w	U			
Rufous-sided Towhee	rn	C		C	U
Chipping Sparrow	w		C		
Savannah Sparrow	w	A	U	U	A
Song Sparrow	w	C	C	C	C
Swamp Sparrow	w	C	C	A	C

Table 1. (Continued)

SPECIES	STATUS	Relative Abundance			
		UM	ESSP	LSSP	RM
White-throated Sparrow ^a	w			C	
Dark-eyed Junco ^b	w				U
Bobolink	m				C
Red-winged Blackbird	rn	A	A	A	A
E. Meadowlark	r	C	C	C	C
Rusty Blackbird	w	C		C	
Boat-tailed Grackle	rn	A	A	A	C
Com. Grackle	m	U	U	U	U
Brown-headed Cowbird	m	U	U	U	U
Orchard Oriole ^a	m			C	
Total Species		96	148	109	85
Total Species for all habitats	176				

^aFrom Maehr 1980.
^bFrom National Fish and Wildlife Laboratory 1978.
^cFrom Schnoes and Humphrey 1980.
^dFrom Florida Game & Fresh Water Fish Commission harvest records.
^eFrom Stafford 1979.
¹Listed as endangered (Kale 1978).
²Listed as threatened (Kale 1978).
³Listed as rare (Kale 1978).
⁴Listed as species of special concern (Kale 1978).

which are highly altered, disturbed landscapes, than any of the others studied (Table 1). Apparently, current reclamation practices replace landscape features and habitat diversity attractive to birds with a relatively sterile, little-used habitat. This information should serve as a baseline for comparisons between today's phosphate-mine bird communities and those found in the future as a consequence of changes in mining and reclamation procedures, succession, or the eventual cessation of mining in Florida.

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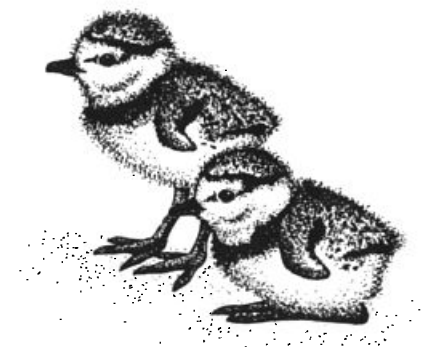
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Killdeer chicks. Drawing by Hillary Hulén.