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## THE BIRDS OF A SHORT-HYDROPERIOD, *MUHLENBERGIA*-DOMINATED WETLAND PRAIRIE IN SOUTHERN FLORIDA

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**Abstract.**—We surveyed the avifauna of the Bird Drive Everglades Basin, a 33.7 km<sup>2</sup> wetland dominated by muhly prairie in Dade County, Florida, between March 1988 and September 1989. We observed 65 bird species in the study area. Nearly all were native species and most were found repeatedly. The most common species were Eastern Meadowlark, Northern Mockingbird, and Loggerhead Shrike. Important groups included passerines with 22 species, birds of prey with 8 species, and wading birds with 10 species. Wading bird use, while strongly affected by seasonal rainfall and flooding, was extensive when conditions were suitable after the onset of the summer rainy season. This short hydroperiod prairie supported large numbers of feeding wading birds when longer hydroperiod marshes were deeply flooded and may, therefore, form an important constituent of the foraging habitat of this group.

Herbaceous wetland prairies dominated by muhly grass (*Muhlenbergia capillaris* [Lam.] Trin.) comprise one of southern Florida's major wetland communities. Muhly prairie is widespread throughout this region, and covers extensive areas throughout Everglades National Park and Big Cypress National Preserve (Olmsted et al. 1980, Bass and Kushlan 1982), the East Everglades of Dade County (Hofstetter and Hilsenbeck 1980), and other areas of Dade County (McMahon 1989, pers. observ.). It is generally found as a more or less wide band about the periphery of the sawgrass marshes that comprise the true Everglades. With typical hydroperiods of one to five months (Olmsted et al. 1980, Olmsted and Loope 1984) muhly prairie has shorter inundation periods and shallower flooding depths than the sawgrass marshes.

With the exception of reports on the Cape Sable Seaside Sparrow (*Ammodramus maritimus mirabilis*) (Bass and Kushlan 1982), little specific information has been published about the birds occurring in this habitat. As part of a study of a muhly-dominated wetland in central Dade County,

we made periodic bird surveys. This paper reports the results of these surveys from 1988 and 1989. These data may be used for comparisons with other muhly prairies and with other habitats in southern Florida.

The Bird Drive Everglades Basin (Fig. 1) is a 33.7 km<sup>2</sup> hydrologically isolated area dominated by herbaceous wetlands (McMahon 1989). The area is bordered to the north and west by wetlands, to the south by agricultural fields, and to the east by residential suburbs. It currently has relatively short hydroperiods as estimated using surveyed elevations and the 1978 through 1987 records from a United States Geological Survey ground water monitoring well located a few hundred meters south of the study area. Annual inundation over this time was most often between one and five months but longer and shorter periods of flooding occurred.

The Bird Drive Everglades Basin was originally part of Florida's 10000 km<sup>2</sup> Everglades and, like today's remaining Everglades, was dominated by long hydroperiod sawgrass marsh and flats communities (1956 Dade County aerial photographs). Beginning in the 1920s, construction of canals and road embankments have isolated the Basin from regional sheet flow of water. This disruption became nearly complete with the widening of Tamiami Trail (US 41) in the early 1960s. As a result, essentially all surface water is now derived from local rainfall. The restriction of surface water flow and active drainage by canals have effected a reduction in wetland hydroperiods and are probably the principal causes of the shift, which occurred in the 1960s and 1970s, in the dominant plant community from sawgrass and flats to the present dominance by *Muhlenbergia* (Richter and Myers 1990).

Muhly dominated prairies comprised 57% of the study area. Somewhat more than half of this prairie had been invaded by scattered individuals of the introduced Australian tree *Melaleuca quinquenervia*. *Melaleuca* was dominant and formed closed canopy forests over an additional 10% of the wetland. Seasonal agriculture, in which land is fallow during the summer wet season, accounted for 21% of the study area, and was concentrated in the southeast. The study area also contained a number of other disturbed environments (McMahon 1989), the most important of which were excavated borrow pits and canals, and shallow disturbances made by all-terrain vehicles.

#### METHODS

We made field visits to the Bird Drive Everglades Basin every one to three weeks from March 1988 through May 1989. We also visited the area less frequently through September 1989. A typical visit included a two- to four-hour walk over a 2 to 5 km route and a 3 to 10 km drive along dirt roads within the basin. We also made briefer visits in which only a small part of the area might be visited. In all, 31 major and 9 short visits were made.

The species, approximate number of individuals, and location were recorded for each bird sighting. These data provide an estimate of the minimum number of species forming

the local avifauna together with a qualitative impression of relative abundances. Observations over an entire annual cycle allow seasonal differences to be determined. Quantitative estimates of population abundance are not, however, possible.

## RESULTS

A total of 65 bird species was identified in the Bird Drive Everglades Basin (Table 1). Well represented groups included wading birds (10 species), birds of prey (8 species), and passerines (22 species). The most

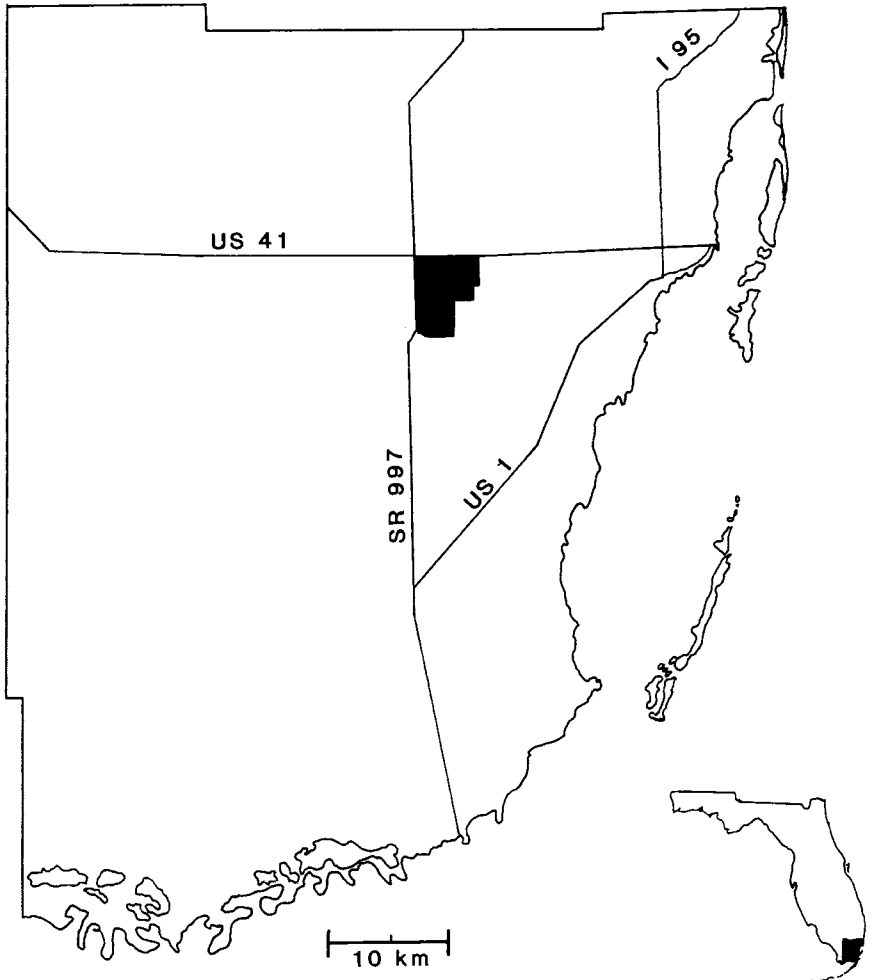


Figure 1. The location of the Bird Drive Everglades Basin in Dade County Florida. The study area is approximately 33.7 km<sup>2</sup> of Dade County's 5700 km<sup>2</sup>.

Table 1. Bird species found in the Bird Drive Everglades Basin.

Species	No. of occurrences <sup>1</sup>	No. of individuals <sup>2</sup>	SP	Seasons <sup>3</sup> SU F	W	Habitat <sup>4</sup>
Pied-billed Grebe, <i>Podilymbus podiceps</i>	••	•	•	•	•	F*
Common Gallinule, <i>Gallinula chloropus</i>	••	•	•	•	•	E*
Anhinga, <i>Anhinga anhinga</i>	•••	••	•	•	•	E
Great Blue Heron, <i>Ardea herodias</i>	•••	•••	•	•	•	M
Green-backed Heron, <i>Butorides striatus</i>	•••	•••	•	•	•	M
Little Blue Heron, <i>Egretta caerulea</i>	•••	•••	•	•	•	M
Cattle Egret, <i>Eubulcus ibis</i>	•••	••••	•	•	•	A
Great Egret, <i>Casmerodius albus</i>	•••	•••	•	•	•	M
Snowy Egret, <i>Egretta thula</i>	•••	•••	•	•	•	M
Tricolored Heron, <i>Egretta tricolor</i>	•••	•••	•	•	•	M
Wood Stork, <i>Mycteria americana</i>	•	••	•	•	•	M
Glossy Ibis, <i>Plegadis falcinellus</i>	•	•	•	•	•	M
White Ibis, <i>Eudocimus albus</i>	•••	••••	•	•	•	M
Blue-winged Teal, <i>Anas discors</i>	•	•	•	•	•	M
Turkey Vulture, <i>Cathartes aura</i>	•••	•••	•	•	•	X
Sharp-shinned Hawk, <i>Accipiter striatus</i>	••	••	•	•	•	M
Red-tailed Hawk, <i>Buteo jamaicensis</i>	•••	•••	•	•	•	M
Red-shouldered Hawk, <i>Buteo lineatus</i>	•••	•••	•	•	•	M
Bald Eagle, <i>Haliaeetus leucocephalus</i>	••	•	•	•	•	X
Northern Harrier, <i>Circus cyaneus</i>	•••	•••	•	•	•	M
Osprey, <i>Pandion haliaetus</i>	••	••	•	•	•	X
Merlin, <i>Falco columbarius</i>	••	••	•	•	•	M
American Kestrel, <i>Falco sparverius</i>	•••	•••	•	•	•	M
Common Bobwhite, <i>Colinus virginianus</i>	••	••	•	•	•	M
Killdeer, <i>Charadrius vociferus</i>	•••	••••	•	•	•	M
Greater and Lesser Yellowlegs, <i>Tringa</i> sp. <sup>6</sup>	•••	••••	•	•	•	M

Table 1. (continued)

Species	No. of occurrences <sup>1</sup>	No. of individuals <sup>2</sup>	Seasons <sup>3</sup>			Habitat <sup>4</sup>
			SP	SU	F	
Spotted Sandpiper, <i>Actitis macularia</i>	••	••	•	•	•	M
Common Snipe, <i>Gallinago gallinago</i>	•	•			•	M
Ring-billed Gull, <i>Larus delawarensis</i>	•	•	•			A*
Least Tern, <i>Sterna antillarum</i>	•	•	•			E*
Mourning Dove, <i>Zenaidura macroura</i>	••••	••••	•	•	•	M
Ground Dove, <i>Columbina passerina</i>	••••	••••	•	•	•	M,A
Burrowing Owl, <i>Athene cucularia</i>	•	•			•	M
Common Nighthawk, <i>Chordeiles minor</i>	••••	••••	•	•		M
Belted Kingfisher, <i>Ceryle alcyon</i>	••••	••••	•	•	•	M
Common Flicker, <i>Colaptes auratus</i>	••	••			•	X
Pileated Woodpecker, <i>Dryocopus pileatus</i>	••	••			•	M
Red-bellied Woodpecker, <i>Melanerpes carolinus</i>	••	•			•	M
Gray Kingbird, <i>Tyrannus dominicensis</i>	••	••			•	X
Eastern Phoebe, <i>Sayornis phoebe</i>	••	••	•		•	M
Tree Swallow, <i>Tachycineta bicolor</i>	••	••••	•		•	M
Barn Swallow, <i>Hirundo rustica</i>	••	••••	•		•	M
House Wren, <i>Troglodytes aedon</i>	••	••			•	M
Blue Jay, <i>Cyanocitta cristata</i>	••••	••••	•	•	•	M
Northern Mockingbird, <i>Mimus polyglottos</i>	••••	••••	•	•	•	M
Gray Catbird, <i>Dumetella carolinensis</i>	••	•	•		•	M
Brown Thrasher, <i>Torostoma rufum</i>	••	•	•			M
American Robin, <i>Turdus migratorius</i>	••	••••				M
Blue-gray Gnatcatcher, <i>Poliophtila caerulea</i>	••	•	•		•	M
Loggerhead Shrike, <i>Lanius ludovicianus</i>	••••	••••	•	•	•	M
European Starling, <i>Sturnus vulgaris</i>	•	•	•			X
White-eyed Vireo, <i>Vireo griseus</i>	•	•				X
Yellow-rumped Warbler, <i>Dendroica coronata</i>	•	••••			•	M

Table 1. (continued)

Species	No. of occurrences <sup>1</sup>	No. of individuals <sup>2</sup>	Seasons <sup>3</sup>			Habitat <sup>4</sup>
			SP	F	W	
Palm Warbler, <i>Dendroica palmarum</i>	•••	•••••	o	•	•	M
Northern Waterthrush, <i>Seiurus noveboracensis</i>	••	•				M
Common Yellowthroat, <i>Geothlypis trichas</i>	•••	••	•	•	•	M
Eastern Meadowlark <i>Sturnella magna</i>	•••••	•••••	•	•	•	M
Red-winged Blackbird, <i>Agelaius phoeniceus</i>	•••	•••••	•	•	•	M
Boat-tailed Grackle, <i>Quiscalus major</i>	•••••	•••••	•	•	o	M
Common Grackle, <i>Quiscalus quiscula</i>	••	••	•	•		M
Cardinal, <i>Cardinalis cardinalis</i>	••••	••	•	•		M
Indigo Bunting, <i>Passerina cyanea</i>	•	•	•	•		M
American Goldfinch, <i>Carduelis tristis</i>	•	•	•	•		M
Rufous-sided Towhee, <i>Pipilo erythrophthalmus</i>	•••	••	•	•	•	M

<sup>1</sup>Number of different days on which the species was observed from March 1988 through September 1989. • = 1, •• = 2 - 5, •••• = 6 - 10, ••••• = 11 - 19, •••••• ≥ 20.

<sup>2</sup>Total number of individuals observed from March 1988 through September 1989. • ≤ 5, •• = 6 - 15, •••• = 16 - 35, ••••• = 36 - 100, •••••• > 100.

<sup>3</sup>SP = March - May, SU = June - September, F = October - November, W = December - February; • = species present in the season, o = species present in the season but in abundance that is clearly lower than in other seasons.

<sup>4</sup>A = primarily associated with agricultural areas; A\* = exclusively found in agricultural areas; E = primarily associated with canals and other artificial excavations; E\* = exclusively found in canals and other artificial excavations. M = found primarily in mucky-dominated prairie, including adjacent wooded areas or road sides; X = found primarily in other areas including tree islands or flying overhead.

<sup>5</sup>These two species were not always distinguished reliably in the field. Table entries of the two species are combined.

regular species, found on many visits, were the Eastern Meadowlark, Northern Mockingbird, and Loggerhead Shrike; the absence of the meadowlark from winter observations was probably an accident of sampling as this species was abundant during a subsequent winter in a nearby similar habitat (Richter, pers. observ.). Among the other year-round inhabitants were Turkey Vulture, Red-tailed Hawk, Red-shouldered Hawk, Killdeer, Mourning Dove, Belted Kingfisher, and Common Yellowthroat. Approximately 10 of the observed species might be considered casual occurrences of species that were seen once or twice and only in small numbers.

Most of the wading birds showed a strongly seasonal pattern of abundance. The Little Blue Heron, Great Egret, Snowy Egret, Tricolored Heron, and White Ibis began to appear in abundance after the onset of the rainy season caused the prairie to flood in June of 1988. They persisted through late October, by which time earlier cessation of rainfall had allowed the prairie to dry out. These species remained rare to absent for the remainder of the study. A major regional drought began in September 1988 and continued until after the study ended. Rainfall over the study area was only 73 cm (data from a continuous recording gauge 1.5 km west of the study area maintained by the South Florida Water Management District) from September 1988 through August 1989, little more than half the area's 12-month average of 137 cm (MacVicar and Lin 1984). As a result, the prairie did not flood during the 1989 "wet" season. Wading birds simply failed to show up under these conditions.

Another important seasonal pattern was exhibited by the presence of a number of migratory winter residents. These species included the Northern Harrier, American Kestrel, American Robin, and Palm Warbler. These birds were present only from October through April.

September and October 1988 were the months with the most species present (Fig. 2). This abundance was largely due to the influx of wading birds and shorebirds, such as yellowlegs, after the prairie flooded. With the exception of a possible dip in late winter and early spring, no other strong seasonal patterns of species richness are apparent.

## DISCUSSION

Our survey results show that the short-hydroperiod, muhly prairie of the Bird Drive Everglades Basin supported many of southern Florida's native bird species in appreciable numbers. Especially noteworthy is this habitat's seasonal importance to wading birds, a group that has been the subject of considerable recent concern because of declining numbers (Frederick and Collopy 1988, 1989, Walters et al. 1992). Considerable use occurred even though dominance by *Muhlenbergia* grass has existed for only a few decades. It is likely that the muhly prairie provides a



functional replacement for the naturally short hydroperiod wetlands that once existed farther east but have been drained and filled.

The results also point to the existence of inter-annual variation, a phenomenon that is especially noteworthy with respect to birds that forage over flooded land. Species number and individual abundance of these birds were high in the late wet season of 1988, a year of normal rainfall. In contrast, these species were either rare or absent altogether one year later when rainfall was well below normal. This variation suggests that much additional reduction of hydroperiod in this wetland would reduce considerably its attractiveness as foraging grounds to such species as the herons and egrets, the yellowlegs and other shorebirds, and the Belted Kingfisher. It also points out the need to survey habitats under a variety of conditions.

An aspect of the prairie that is due to human alteration may have increased the habitat's attractiveness to a number of species. Much of the prairie was criss-crossed by all-terrain vehicle trails. These trails ranged from temporarily flattened vegetation to permanent ruts worn well below natural grade. Depressed areas collected water and held it after the surrounding prairie had dried. Fish, principally *Gambusia* sp., were concentrated in, and crayfish (*Procambarus alleni*) were often active in these areas, thus increasing their quality as avian feeding grounds. Although quantitative data were not collected, wading birds

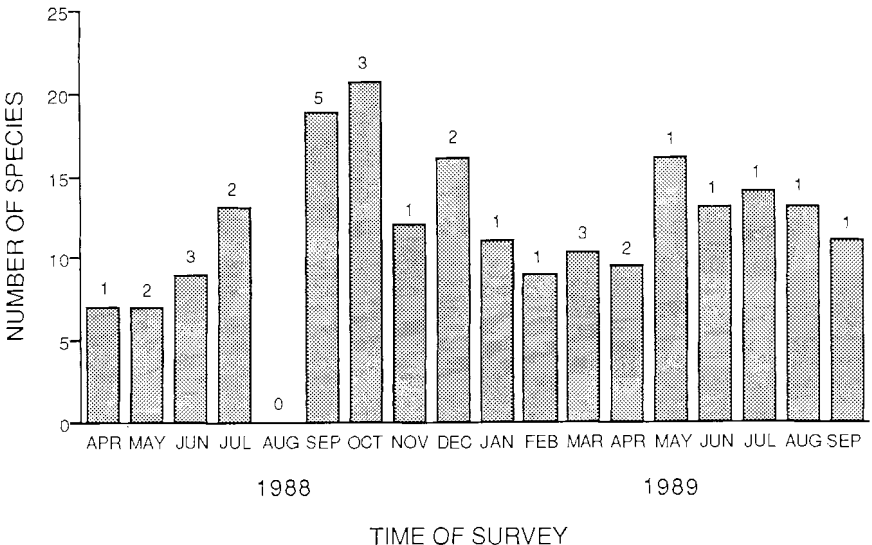


Figure 2. Average number of species seen on a full-length visit (see Methods) during each month. The number of visits for the month is shown over the bars.

appeared to show some preferential association with artificial depressions late in the flooded season.

Species introduced into southern Florida were conspicuously rare or absent from the study area. The only introduced species observed in the study area was the European Starling, represented by a single individual. While many parrots (Owre 1973, pers. observ.), Rock Doves (*Columba livia*), House Sparrows (*Passer domesticus*), starlings and a number of other exotic species are common in nearby suburban areas (Cooper and Neville 1985, pers. observ.), they made little use of native prairie habitat. Cattle Egrets, an Old World species spreading to much of the New World, were observed on several occasions in the muhly prairie.

A number of species, in contrast, were predominantly found in artificial habitats within the study area. The Pied-billed Grebe, Common Gallinule, and Least Tern were observed only in canals and made little, if any use of the muhly prairie (Table 1). These species are primarily associated with permanently flooded or almost permanently flooded areas. Anhingas, Great Blue Herons, Green-backed Herons, and Belted Kingfishers, while present most of the year, were found primarily in association with excavations except when the prairie was flooded. Cattle Egrets and Ring-billed Gulls were primarily associated with agricultural areas (Table 1).

In summary, these observations show that muhly prairie is used by many southern Florida bird species. This habitat supports a number of seasonal inhabitants in considerable abundance as well as several year-round residents. These prairies may be especially important as wading bird foraging habitat during the early dry season in years of normal and high rainfall. At this time, longer hydroperiod sawgrass marshes are too deeply flooded to allow these birds to forage (e.g., Frederick and Collopy 1988). In contrast, water depth is already shallow in the muhly prairie and rapidly receding waters have begun to concentrate (Kushlan et al. 1975) or expose (Kushlan 1979) forage organisms. Muhly prairie thus provides valuable foraging habitat at a season when it may otherwise be in limited supply.

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