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AVIFAUNA OF AN UNIMPOUNDED SALT MARSH ON MERRITT ISLAND

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Abstract.—Variable circular plots were used to quantify avian composition and abundance in an unimpounded salt marsh. There were 31 avian species of conservation concern observed using the marsh for resting, feeding, or breeding. A high species richness (89 species) and density of birds (15 birds per ha) used the marsh.

Few studies have quantified the avian species composition of the salt marshes that border much of Florida's coastline (Engstrom 1992). Few studies of avian species composition in saline environments have been published in North America (Burger et al. 1992, Weller 1994). The objective of this paper is to quantify avian composition within several remnants of unimpounded salt marsh that occur along the estuarine edges of the Indian River lagoon system on Merritt Island.

Most salt marshes that remain along the Indian River are impounded for mosquito control or are highly fragmented due to human activities (Larson 1995). Impoundment could have benefited most bird species (see Provost 1969), but contributed to the extinction of the Dusky Seaside Sparrow (*Ammodramus maritimus nigrescens*) (Sykes 1980, Kale 1988) and the reduction of Black Rail populations on Merritt Island (Sykes 1978). Impounded salt marshes often have higher bird densities and biomass than do unimpounded marshes because there is more shallow, open water in impoundments (Trost 1968, Provost 1968, Burger et al. 1992, Smith and Breininger 1995). Unimpounded salt marshes on Merritt Island were described as "avian deserts" (Provost 1969).

STUDY AREA AND METHODS

The Indian River Lagoon watershed, an estuary of national significance, occurs between barrier islands and the mainland of central Florida's Atlantic coast (DeFreese

1991). This coastal zone of central Florida is the southern transition between grassy marshes to the north and mangrove swamps to the south (Schmalzer 1995). Merritt Island National Wildlife Refuge includes much of the northern Indian River Lagoon complex. Estuarine water levels on Merritt Island are influenced by wind-driven tides, rainfall, and evapotranspiration, but not ocean tides. The marsh occurred adjacent to Gator Hole, an estuarine water located at the northern extent of the Banana River estuarine lagoon. Seven stations were located in the marsh 100-200 m from the open water estuary and at least 200 m apart from each other.

Scientific nomenclature follows Wunderlin (1982) for plants and American Ornithologists' Union (1983) for birds. Salt pans, that were occasionally flooded, comprised 1/5 of the marsh; mangroves (*Avicennia germinans*) comprised 1/5 of the marsh; short (< 1 m) vegetation (*Distichlis spicata, Salicornia* spp., *Batis maritima, Borrichia frutescens, Spartina alterniflora,* and *Juncus roemerianus*) comprised 3/5 of the marsh. Small, permanently flooded pools (< 0.3 ha) were scattered among the vegetation. All seven stations included pools, salt pans, mangroves and most or all of the short vegetation from above. Remnants of such heterogeneous vegetation are common along the estuary (Larson 1995, Schmalzer 1995).

The variable circular plot (VCP) method (Reynolds et al. 1980) was selected to survey birds because of its advantages in patchy habitat (Breininger 1990, 1992; Breininger and Schmalzer 1990, Breininger and Smith 1992). Each station was surveyed eight times. Survey periods were spring 1985 (26 March, 28 March, 7 May, 15 May), summer 1985 (1 July, 8 July, 28 August), fall 1985 (4 September, 3 October, 16 October, 21 November), and winter 1985/1986 (2 December, 22 January, 27 January, 26 February, 27 February). Birds flushed during arrival to the station were tallied, and distances between their flushing location and the station's center point were recorded. All birds seen or heard within seven-minute sampling intervals were recorded, except for those birds that flew over the area without landing (e.g., swallows). Surveys were conducted between one-half hour before sunrise to three hours after sunrise. No surveys were conducted during rain or windy conditions.

The mean number of birds per visit was calculated for every species by summing the total number of detections and dividing by the number of visits (56). Densities were calculated for common species (see below) using an effective detection distance (x) that was determined for each taxon. The x was estimated as the inflection point of a graph of the number of birds per area per band using 10-m concentric bands according to criteria of Reynolds et al. (1980). All ducks, shorebirds, and herons were grouped to determine the x for species within these taxa. The x for all other species was determined separately for each species if the number of observations was greater than 25.

The number of detections were calculated by multiplying the number of singing males by two, unless the total count of all sightings was greater, in which case the total number of sightings was used. Estimates of birds per ha were calculated by summing the number of detections within x, dividing by the number of visits and $\prod x^2$, and multiplying by 10,000 (Reynolds et al. 1980).

Results

Patches of *Spartina alterniflora* were flooded throughout the survey, but *Distichlis spicata* and *Avicennia germinans* were flooded from August to March. The salt pans were flooded in October and November. Thirty-eight species of wintering birds and 51 local breeders used the marsh (Table 1). Wintering species included individuals that were winter residents and individuals present on Merritt Island only during migration (Cruickshank 1980). Most of the local breeders did not nest

Table 1. Bird abundances (mean sightings/visit) of birds sighted within an unimpounded salt marsh on Merritt Island, 1985-1986.

Common name	Status[a]	Scientific name	Birds/visit[b]
Red-winged Blackbird	B	*Agelaius phoeniceus*	2.96
Willet	B	*Catoptrophorus semipalmatus*	1.32
Yellow-rumped Warbler	W	*Dendroica coronata*	1.29
Blue-winged Teal	W	*Anas discors*	1.21
Rufous-sided Towhee	B	*Pipilo erythrophthalmus*	1.07
Least Sandpiper	W	*Calidris minutilla*	0.86
Western Sandpiper[c]	W	*Calidris mauri*	0.80
Tricolored Heron[c]	B	*Egretta tricolor*	0.66
White Ibis[c]	B	*Eudocimus albus*	0.63
Common Yellowthroat	W	*Geothlypis trichas*	0.61
Boat-tailed Grackle	B	*Quiscalus major*	0.54
Royal Tern[c]	B	*Sterna maxima*	0.52
Dunlin[c]	W	*Calidris alpina*	0.41
Mottled Duck[c]	B	*Anas platyrhynchos*	0.39
Unknown *Calidris*	W	*Calidris* spp.	0.38
Semipalmated Plover	W	*Charadrius semipalmatus*	0.36
Short-billed Dowitcher[c]	W	*Limnodromus griseus*	0.32
Palm Warbler	W	*Dendroica palmarum*	0.32
Unknown *Anas*	W	*Anas* spp.	0.21
Northern Cardinal	W	*Cardinalis cardinalis*	0.20
American Robin	W	*Turdus migratorius*	0.18
Tringa spp.	W	*T. melanoleuca* and *T. flavipes*	0.16
Killdeer	B	*Charadrius vociferus*	0.16
Carolina Wren	B	*Thryothorus ludovicianus*	0.16
White-eyed Vireo	B	*Vireo griseus*	0.14
Unknown sparrow	W		0.13
Ruby-crowned Kinglet	W	*Regulus calendula*	0.11
Reddish Egret[c]	B	*Egretta rufescens*	0.11
Northern Mockingbird	B	*Mimus polyglottos*	0.11
Little Blue Heron[c]	B	*Egretta caerulea*	0.11
Great Egret[c]	B	*Casmerodius albus*	0.09
Common Moorhen	B	*Gallinula chloropus*	0.09
Eastern Kingbird	B	*Tyrannus tyrannus*	0.09
Snowy Egret[c]	B	*Egretta thula*	0.07
Savannah Sparrow	W	*Passerculus sandwichensis*	0.07
Northern Bobwhite	B	*Colinus virginianus*	0.07
Least Bittern[c]	B	*Ixobrychus exilis*	0.07
House Wren	W	*Troglodytes aedon*	0.07
Common Ground-Dove	B	*Columbina passerina*	0.07
Northern Flicker	B	*Colaptes auratus*	0.07
American Black Duck[c]	W	*Anas rubribes*	0.07

[a]B = breeds on Merritt Island, W = species includes individuals that winter on Merritt Island; many individuals may only use Merritt Island during migration.

[b]p = species sighted within the marsh while the investigator was transiting among stations, but not sighted while at a station.

[c]Species of conservation concern (vulnerable to local, regional, or global extinction [Breininger et al. 1994]).

Table 1. (Continued) Bird abundances (mean sightings/visit) of birds sighted within an unimpounded salt marsh on Merritt Island, 1985-1986.

Common name	Status[a]	Scientific name	Birds/visit[b]
Prairie Warbler[c]	B	*Dendroica discolor*	0.05
Northern Harrier[c]	W	*Circus cyaneus*	0.05
Mourning Dove	B	*Zenaida macroura*	0.05
Gray Catbird	W	*Dumetella carolinensis*	0.05
Black-bellied Plover[c]	W	*Pluvialis squatarola*	0.05
Sharp-tailed Sparrow	W	*Ammodramus caudacutus*	0.04
Song Sparrow	W	*Melospiza melodia*	0.04
Eastern Phoebe	W	*Sayornis phoebe*	0.04
Mallard	W	*Anas platyrhynchos*	0.04
Gray Kingbird	B	*Tyrannus dominicensis*	0.04
Green Heron	B	*Butorides striatus*	0.04
Great Blue Heron	B	*Ardea herodias*	0.04
Black-wiskered Vireo[c]	B	*Vireo altiloquus*	0.04
Belted Kingfisher	W	*Ceryle alcyon*	0.04
Unknown *Seiurus*	W	*S. noveboracensis* or *S. motacilla*	0.02
Tree Swallow	W	*Tachycineta bicolor*	0.02
Unkown swallow	W		0.02
Roseate Spoonbill[c]	B	*Ajaia ajaja*	0.02
Common Snipe	W	*Gallinago gallinago*	0.02
Pied-billed Grebe	B	*Podilymbus podiceps*	0.02
Osprey[c]	B	*Pandion haliaetus*	0.02
Common Nighthawk	B	*Chordeiles minor*	0.02
Eastern Meadowlark	B	*Sturnella magna*	0.02
Laughing Gull	B	*Larus atricilla*	0.02
Clapper Rail	B	*Rallus longirostris*	0.02
Black Vulture	B	*Coragyps atratus*	0.02
Black-crowned Night-Heron[c]	B	*Nycticorax nycticorax*	0.02
American Bittern[c]	W	*Botaurus lentiginosus*	0.02
Cattle Egret	B	*Bubulcus ibis*	P
Glossy Ibis[c]	B	*Plegadis falcinellus*	P
Wood Stork[c]	B	*Mycteria americana*	P
Turkey Vulture	B	*Cathartes aura*	P
Bald Eagle[c]	B	*Haliaeetus leucocephalus*	P
Red-tailed Hawk	B	*Buteo jamaicensis*	P
American Kestrel	W	*Falco sparvarius*	P
Merlin[c]	W	*Falco columbarius*	P
Peregrine Falcon[c]	W	*Falco peregrinus*	P
Black Rail[c]	B	*Laterallus jamaicensis*	P
Virginia Rail	W	*Rallus limicola*	P
Sora	W	*Poranza carolina*	P
American Coot	B	*Fulica americana*	P

[a]B = breeds on Merritt Island, W = species includes individuals that winter on Merritt Island; many individuals may only use Merritt Island during migration.

[b]p = species sighted within the marsh while the investigator was transiting among stations, but not sighted while at a station.

[c]Species of conservation concern (vulnerable to local, regional, or global extinction [Breininger et al. 1994]).

Table 1. (Continued) Bird abundances (mean sightings/visit) of birds sighted within an unimpounded salt marsh on Merritt Island, 1985-1986.

Common name	Status[a]	Scientific name	Birds/visit[b]
Wilson's Plover[c]	B	*Charadrius wilsonia*	P
Black-necked Stilt[c]	B	*Himantopus mexicanus*	P
Spotted Sandpiper	W	*Actitis macularia*	P
Ring-billed Gull	W	*Larus delawarensis*	P
Gull-billed Tern[c]	B	*Sterna nilotica*	P
Black Skimmer[c]	B	*Rynchops niger*	P
Fish Crow	B	*Corvus ossifragus*	P
Sedge Wren[w]	W	*Cistothorus platensis*	P
Marsh Wren[w]	W	*Cistothorus palustris*	P
Common Grackle	B	*Quiscalus quiscula*	P

[a]B = breeds on Merritt Island, W = species includes individuals that winter on Merritt Island; many individuals may only use Merritt Island during migration.
[b]p = species sighted within the marsh while the investigator was transiting among stations, but not sighted while at a station.
[c]Species of conservation concern (vulnerable to local, regional, or global extinction [Breininger et al. 1994]).

within these marshes (Table 2). All species were observed feeding within the marsh except Royal Terns that occasionally used the marsh for loafing. Nearly all of the Common Yellowthroat sightings involved wintering birds that did not nest on Merritt Island (Breininger and Schmalzer 1990, Breininger and Smith 1992, Breininger 1992).

The effective detection distances ranged from 40 m to 60 m. The mean density of all birds combined for the entire year was 15 birds per ha. Densities of most birds were highest during the fall months and lowest during spring (Table 2). Fall had the highest total bird densities because of the seasonal abundance of ducks and shorebirds. Densities of Red-winged Blackbirds, Rufous-sided Towhees, and Boat-tailed Grackles were highest during summer. Red-winged Backbirds had three times higher densities than did any other species. Only Red-winged Blackbirds, Rufous-sided Towhees, and Tricolored Herons were common throughout the year. Yellow-rumped Warblers had high densities in the winter.

DISCUSSION

Salt marshes are essential habitat for several species such as Clapper Rails, Sharp-tailed Sparrows, and Seaside Sparrows (Burger et al. 1992, Weller 1994). Although Merritt Island marshes no longer have Dusky Seaside Sparrows, they provided essential habitat for species of conservation concern including Black Rails, Black-wiskered Vireos, and Florida Prairie Warblers. Twenty-eight other birds in Merritt Island

Table 2. Bird densities (birds/ha) of the most common birds counted within an unimpounded salt marsh on Merritt Island, 1985-1986.

Status	Species	Spring	Summer	Fall	Winter
Breeders within habitat	Red-winged Blackbird	2.4	5.3	4.8	2.1
	Willet	0.2	0.2	4.3	0
	Rufous-sided Towhee	1.4	2.2	0.3	0.6
	Boat-tailed Grackle	0.2	1.4	0	0.1
	Totals	4.2	9.1	9.4	2.8
Other local breeders	Tricolored Heron	0.1	1.0	1.0	0.3
	Royal Tern	0	0	2.2	0
	White Ibis	0	1.6	0.5	0.1
	Mottled Duck	0	0.5	1.0	0
	Totals	0.1	3.1	4.7	0.4
Winter residents	Yellow-rumped Warbler	0	0	0.4	5.0
	Blue-winged Teal	0	0	4.6	0.1
	Common Yellowthroat	0.8	0	1.5	1.9
	Western Sandpiper	0	0	2.6	0
	Palm Warbler	0	0	0.6	1.0
	Unknown Calidris	0	0	1.5	0
	Short-billed Dowitcher	0	0	1.3	0
	Least Sandpiper	0	0	1.1	0
	Dunlin	0	0	1.0	0
	Semipalmated Plover	0	0	0.6	0
	Totals	0.8	0.0	15.2	8.0
All birds		5.1	12.2	29.3	11.2

salt marshes are species of conservation concern not restricted to salt marshes (Breininger et al. 1994).

Eighty-nine avian species were sighted in Merritt Island salt marsh in comparison to 78 species seen in New Jersey (Burger et al. 1992) and 121 species in Texas (Weller 1994). Most birds sighted in salt marshes were the same in all three states. The higher diversity in Texas might be explained by a longer study period and the sampling of a greater diversity of wetland types (Weller 1994). For example, another 26 species not recorded in the Merritt Island salt marsh, were recorded in adjacent open water impoundments on Merritt Island (Breininger and Smith 1990). Many local breeders that did not nest in the marsh do nest in salt marsh vegetation on nearby islands (Breininger et al. 1994, Smith and Breininger 1995). The close proximity of open water, mudflats, grasses, shrubs, and trees was responsible for the high avian diversity found in this marsh. The high diversity of breeding birds using this marsh differs from low diversity associated with structurally simple marshes (Engstrom 1992).

Red-winged Blackbirds were dominant breeding birds in salt marshes at Merritt Island, New Jersey (Burger et al. 1992), and Texas (Weller 1994). Boat-tailed Grackles were also abundant breeding birds

at Merritt Island and Texas (Weller 1994). Rufous-sided Towhees were also abundant at Merritt Island because mangroves added a shrub and tree component to salt marshes.

Breeding bird counts have been performed near Merritt Island in the cordgrass (*Spartina bakeri*) marshes of the St. Johns National Wildlife Refuge (Leenhouts 1982a, Leenhouts 1992b). Spring and summer bird composition included Red-winged Blackbirds, Eastern Meadowlarks, King Rails (*Rallus elegans*), Black Rails, Common Yellowthroats, Rufous-sided Towhees, and Common Nighthawks. Black Rails were more common in the cordgrass marshes (Leenhouts 1982a, Leenhouts 1982b) compared to the salt marsh examined in this study.

Although no King Rails were sighted in the Merritt Island salt marsh, they occur in Merritt Island swale marshes (Breininger 1992). Swale marshes are narrow freshwater marshes within scrub-dominated landscapes. Green Herons were the only other species that occurred in higher densities in swale marshes than in salt marshes.

The densities of Tricolored Heron, White Ibis, Blue-winged Teal, Mottled Duck, Short-billed Dowitcher, and peeps (*Calidris* spp.) were similar in salt marsh and open water impoundments on Merritt Island (Breininger and Smith 1990). Willets were more abundant in salt marshes than in open water impoundments. Open water impoundments on Merritt Island lacked many species adapted to emergent salt marsh vegetation, but open water had greater waterbird densities than did the Merritt Island salt marsh. Compared to salt marshes, impoundments had higher densities of American Widgeon (*Anas americana*), Northern Pintail (*A. acuta*), Northern Shoveler (*A. clypeata*), Lesser Scaup (*Aytha affnis*) American Coot, Greater Yellowleg, Lesser Yellowleg, Killdeer, Semipalmated Plover, American Avocet (*Recurvirostra americana*), Black-necked Stilt, Snowy Egret, Great Egret, and Glossy Ibis (Trost 1968, Provost 1968, Breininger and Smith 1990, Smith and Breininger 1995).

Temporal variation in waterbird use is influenced by rainfall, water level management practices, movements of local and migratory populations, and changes in overall population size (Clark 1979, Girard and Taylor 1979, Paul et al. 1979, Smith and Breininger 1988, Breininger and Smith 1990, Schikorr and Swain 1995). For Merritt Island salt marshes, shorebird densities were highest in fall when most impoundments were flooded for wintering waterfowl and too deep for shorebirds. For Merritt Island salt marshes, wading bird densities peaked in summer, similar to peak times that wading birds used the adjacent estuary (Smith and Breininger 1990, Schikorr and Swain 1995).

Total bird densities in Merritt Island salt marshes were comparable to habitats with high avian densities (Breininger and Smith 1990, 1992; Breininger and Schmalzer 1990, Burger et al. 1992). Perhaps

only large stands of homogeneous, emergent salt tolerant grasses (e.g., cordgrass) have low avian densities (Trost 1968, Provost 1968, Leenhouts 1982a, Leenhouts 1982b).

This study was too limited in duration and geographical extent to make broad conclusions regarding avian seasonal patterns in salt marshes. Densities from avian survey techniques should be interpreted cautiously owing to potential errors (Verner 1985). Secretive species such as rails, bitterns, and sparrows should be surveyed using additional methods, such as playback recordings (Manci and Rusch 1988). Despite study limitations, I conclude that natural Merritt Island salt marshes are important for the conservation of biological diversity, and they can provide habitat for large numbers of resident and migratory birds. Avian composition and abundance are likely to vary spatially because water levels, habitat structure, vegetative composition, and landscape patterns vary greatly in salt marshes (Brown and Dinsmore 1986, Craig and Beal 1992, Larson 1995, Schmalzer 1995). These sources of variation are relevant to conservation but they have received little study. Management activities in salt marshes are occurring across decades with little quantification of the effects on avian populations.

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MOVEMENT AND SPATIAL ORGANIZATION OF RACCOONS IN NORTH-CENTRAL FLORIDA

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Abstract.—Raccoons (*Procyon lotor*) were live-trapped in north-central Florida in November 1991, and February, May and August 1992. Twenty adults were radio-collared and followed throughout the winter and spring. Adult raccoon home ranges overlapped with those of up to 31 other raccoons. Home-range overlap was high both between and within sexes. Contact between raccoons was observed throughout the winter and spring and there was no winter denning. Males moved faster and farther than females, had larger home ranges, and their home ranges overlapped with larger numbers of other raccoons and larger proportions of each other raccoon's home range.

Raccoons are the most widely distributed species of the New World family Procyonidae. Their range extends from central Canada, throughout the U.S. except for the northern Rocky Mountains and the Great Basin, south to the tropics of Central America (Kaufmann 1982). Raccoons are highly adaptable (Mugaas et al. 1993) and their social organization, movement patterns and reproductive behaviors vary with climate, habitat type, and level of human activity (Kaufmann 1982). We describe movements and spatial organization of raccoons during the winter and spring in northern Florida, an area with a mild winter where raccoons have an extended breeding season.

Movements and home-range sizes of raccoons vary with age, sex, habitat, season, food availability, and probably other factors. Home ranges of males are generally larger than those of females, which are even more restricted when they have young (see review in Sanderson 1987). In the northern parts of their distribution raccoons make less extensive movements during the winter than during other seasons (Sanderson 1987). In all studies from Tennessee northward, periods of inactivity or reduced activity have been noted during very cold weather and when snow covers the ground. The lengths of these periods vary, but in very cold climates denning may last up to four months (Kaufmann 1982, Mugaas and Seidensticker 1993).

Previous research indicates that the most common social grouping among raccoons is a mother and her young of the year and that associations between adult males and females for activities other than breeding are rare (Kaufmann 1982). However, communal winter denning is known from several locations (Twichell and Dill 1949, Whitney and Underwood 1952, Mech and Turkowski 1966, Rabinowitz 1981).

Groups of siblings or females and their offspring often den together, and occasionally groups including one or more adult males have been found in the same winter den (Twichell and Dill 1949, Mech and Turkowski 1966). Animals of both sexes and all ages will also congregate at a concentrated food source (Sharp and Sharp 1956, Seidensticker et al. 1988).

In captivity, raccoons that were originally captured from the same area showed a higher frequency of dominant-subordinate interactions and fewer aggressive encounters than did animals captured farther apart, indicating a rudimentary social structure among neighboring raccoons and some degree of "neighbor recognition" (Barash 1974). Home ranges of adult females overlap extensively (Stuewer 1943, Johnson 1970, Urban 1970, Worley 1980, Allsbrooks and Kennedy 1987, Seidensticker et al. 1988), as do those of adult males (Stuewer 1943, Urban 1970, Lotze 1979, Worley 1980, Seidensticker et al. 1988), although Fritzell (1978) found little overlap in the ranges of adult males in the harsh environment of the prairies of North Dakota. Thus, adult male and female ranges overlap to a large degree, and males may mate with several females in a year. However, the extent of home-range overlap among a large number of individuals within a relatively small area has not been reported in the literature.

Study Area and Methods

The study was conducted at the Katharine Ordway Preserve-Carl Swisher Memorial Sanctuary (the Ordway Preserve), a 3,750-ha mosaic of sandhill uplands, hardwood hammocks, old fields, and wetlands in Putnam County, north central Florida. Currently, the only human activities on the preserve are research and educational excursions from the University of Florida. The study area encompassed 1,257 ha in the western part of the preserve and on adjacent private lands (Figure 1). Private lands were rural residential areas, with widely-spaced houses interspersed in hardwood hammock around lakes, slash pine plantations, and a small town, Melrose, Florida.

Climate in the area is humid and subtropical (Chen and Gerber 1990). Mean annual rainfall over the last 30 years was 135 cm (National Oceanic and Atmospheric Administration 1960-1990). About 60% of the annual precipitation falls between May and September, but there is considerable yearly variation in both the timing and extent of the rains (Ryser 1991). Winter temperatures can fluctuate greatly, and freezing temperatures occur on at least a few days and nights each year (Ryser 1991).

Raccoons were trapped in November 1991, and February, May, and August 1992 for four to five nights per trapping session. Raccoons captured for the first time were anesthetized by intramuscular injection with ketamine hydrochloride (Ketaset, Bristol Laboratories, Syracuse, NY) at a dosage of 10 mg/kg estimated body mass (Bigler and Hoff 1974) and were measured, weighed, and ear-tagged. Recaptured animals were identified, weighed, and released. In November and February all animals classified as adults (n = 29), based on large size, permanent dentition, and testicular or mammary development, were fitted with radiocollars (Advanced Telemetry Systems, Bethel, MN) with a battery life of approximately six months. Radiocollars were 1% of the mean body mass of males and 2% of the mean body mass of females. These collars were removed from recaptured animals in May and August.

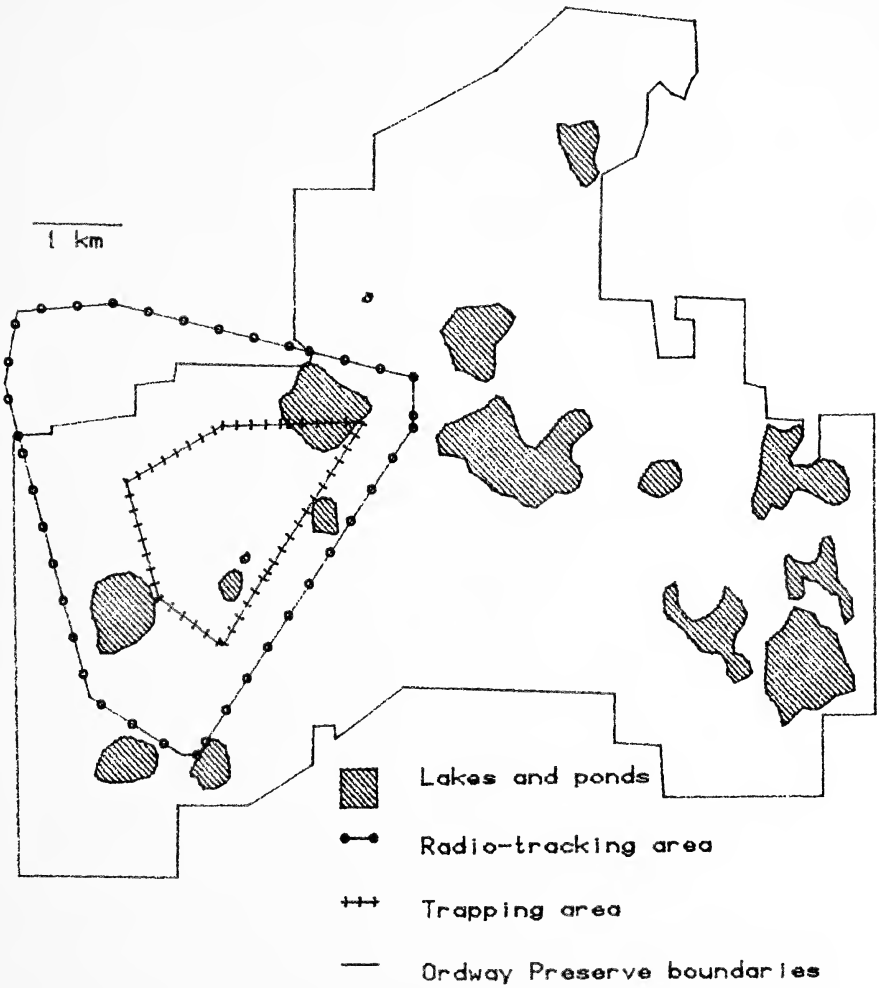

Figure 1. Study area on the Ordway Preserve and neighboring private lands.

From November 1991 to May 1992, radiocollared animals were located by triangulation (Kenward 1987) with portable telemetry equipment from known locations along roads, or by following the signal to the animal. Triangulation error was estimated by taking readings on transmitters in known places from locations normally used for radiotracking. Mean triangulation error (Heezen and Tester 1967) for bearings taken from 200 to 600 m away was 58.8 m, with a 95% confidence interval of 34.0 to 83.6 m. When animals were on the preserve most readings were taken from a distance of 200 to 600 m, but when they were off the preserve the distances were sometimes greater.

Raccoons were located in the daytime one or more times a week. At night, when raccoons were active, one to four individuals were radio-located every two hours throughout the night. Each raccoon was followed all night at least once every two months. Approximately 40% of locations on each animal was collected at night and 60% was daytime locations. Data collected on radio-tagged animals for which there were fewer than 50

locations were used in descriptions of home-range overlap and descriptions of social interactions, but not for home-range analysis.

A map of the area was created by digitizing roads and habitat contours from 1":200' aerial photos (Florida Department of Transportation 1989) using the ERDAS (Version 7.5, ERDAS, Inc., Atlanta, GA) geographic information system. The digitized maps were converted into the ARC/INFO (Version 3.4D, Environmental Systems Research Institute, Redlands, CA) geographic information system format for editing and manipulation. Home ranges were calculated for the 20 animals that were located >50 times using the program HOME RANGE (Ackerman et al. 1990). Corrected minimum convex polygons (MCPcorr) (Ryser 1991), which were minimum convex polygons (MCPs) (Mohr 1947) with lake areas subtracted, were used for comparisons of home-range sizes between the sexes and for calculation of home-range overlap

Mean home-range sizes of males and females were compared with the Mann-Whitney test (Mann and Whitney 1947). Proportions of home ranges overlapped by radiocollared raccoons was measured with ARC/INFO. For each animal with >50 locations we determined the total number of raccoons of both sexes whose ranges overlapped that individual's range. This total included radiocollared animals with >50 locations and uncollared animals captured during the study period. Mann-Whitney tests (Mann and Whitney 1947) were used to compare range overlap by sex in terms of number of ranges overlapped and mean proportions of each individual's range that were overlapped by other raccoons. Proportions of home ranges that individuals shared with male and female raccoons were compared with the Wilcoxon matched pairs test. Statistical analyses were performed using the program Statistica 5.1 for windows (StatSoft 1996).

Distances between consecutive locations were measured for each animal using ARC/INFO. Lakes were skirted in the measurements, but otherwise the shortest straight-line distance was taken. Nightly movements were the sum of straight-line distances between consecutive locations. Mean hourly movements (based on readings taken two hours apart), mean nightly movements, and mean distance between consecutive daytime rest sites were calculated for each animal, averaged for both sexes, and comparisons between the sexes were made with Mann-Whitney tests.

Results

Mean home-range size of males was almost four times that of females ($U = 0, P = 0.0002$). Males tended to move faster and farther each night than females. Mean hourly movement of males was two times faster than that of females ($U = 9, P = 0.0026$). Mean nightly movement of males was also over two times farther than that of females ($U = 3, P = 0.0005$). Mean distance between consecutive rest sites for males was three times that of females ($U = 9, P = 0.0026$) (Table 1).

Home-range overlap was extensive between and within sexes. Each raccoon's range overlapped with the ranges of four to 31 other raccoons. Overall, male ranges overlapped with ranges of more raccoons than did female ranges ($U = 14.5, P = 0.01$). Male ranges overlapped with more female ranges than female ranges did with each other ($U = 6.5, P = 0.001$), but there was no difference between the sexes in the number of male ranges they overlapped with ($U = 38, P = 0.43$) (Table 2).

Home-range overlap varied from less than 1% to 100% (Table 3). Females shared larger mean proportions of their home ranges with

Table 1. Movement parameters and home-range size of radio-collared raccoons, Ordway Preserve, Florida, November 1991-May 1992.

	HM[1]	NM[2]	CRS[3]	MCPcorr[4]
MALES (n = 8)				
Mean	229.6	2,586	710.6	259.9
SE	32.5	298	162.7	43.1
Minimum	116.4	1,700	242.1	137.0
Maximum	370.4	4,280	1,569.7	435.0
FEMALES (n = 12)				
Mean	115.1	1,283	271.2	66.4
SE	12.2	121	27.1	8.8
Minimum	62.9	720	183.6	29.0
Maximum	214.9	2,200	498.2	118.0
OVERALL				
Mean	160.9	1,805	446.5	143.4
SE	19.3	199	81.3	27.9

[1]HM = mean hourly movement in meters.
[2]NM = mean nightly movement in meters.
[3]CRS = mean distance (meters) between consecutive rest sites.
[4]MCPcorr = minimum convex polygon with lake area subtracted (ha).

other raccoons (of either sex) than did males ($U = 6$, $P = 0.001$). For both sexes, a greater mean proportion of home ranges was shared with males than with females ($U = 3$, $P = 0.0001$) (Table 3). Figure 2 illustrates the distribution and overlap of home ranges of the radio-tagged raccoons with >50 locations.

Radiocollared raccoons were usually located alone, but they were found with other raccoons at 15 rest sites (9.6% of total number) and females were captured with young 11 times (Table 4), in sandhill, swamp, and hardwood hammocks. On another 11 occasions, animals were located in rest sites within 100 m of each other. One time, three females (#21, #28, and #29) and a male (#12) were found resting within 150 m of each other in the swamp, although their actual rest sites were not seen. When they became active at dusk they did not travel together.

Females were observed with small young in July, August, October, November, and December and with males from November through March. Two different pairs of adult males were found together in the same tree, but adult females were never found together. One pair of males (#16 and #24) located sleeping in the same tree one day also foraged together during the night for three to four hours, and these two animals were found in rest sites within 100 m of each other at another time. Their home ranges overlapped approximately 57% (Table 3). The other pair of males found in a tree together (#1 and #17) had ranges that overlapped

Table 2. Number of home ranges with which ranges of adult raccoons located ≥50 times overlapped, Ordway Preserve, 1991-1992.

MALES				FEMALES			
ID[1]	Males	Females	Total	ID[1]	Males	Females	Total
1	10	12	22	2	5	7	12
8	10	9	19	3	6	4	10
12	7	8	15	4	3	1	4
16	14	17	31	5	7	5	12
17	7	10	17	9	9	7	16
18	6	7	13	13	6	3	9
24	7	15	22	19	7	5	12
33	5	8	12	21	12	9	21
				25	3	4	7
				26	7	4	11
				28	8	6	14
				29	11	8	19
Mean	8.25	10.75	18.88		7.00	5.25	12.25
SD	2.92	3.62	6.17		2.76	2.26	4.79

[1]ID = individual raccoon identification number.

more than 75% (Table 3). Female ranges were overlapped from 73-100% (Table 3) by the ranges of the males they were found with. A male (#33) and female (#13), located at rest sites within 100 m of each other one day, were resting in the same tree the next day. This female had been with male #17 two days earlier, and was palpably pregnant when she was captured six weeks later. Male #33's range encompassed 84% of male #17's range, and male #17's range encompassed 49% of male #33's (Table 3).

Raccoons monitored in the same vicinity during a night typically moved independently, although they sometimes used the same area during the course of the night. Movements of raccoons were not linear, and animals changed directions and back-tracked frequently. Female #20 was observed foraging for about 30 minutes after she left her rest site on 6 January 1992. She walked at a fairly steady pace with nose to the ground, pausing frequently and occasionally scratching and digging. She travelled about 75 m in half an hour.

Because individuals varied greatly in their movements, and sample sizes were small for each individual, no attempt was made to correlate the amount of movement with ambient temperature. However, on no occasion was a raccoon found not to move at all during the night, even when temperatures were below 0°C.

Discussion

Adult raccoons at the Ordway shared their ranges to varying degrees with up to 31 other adults of both sexes. It is probable that not all

Table 3. Mean proportions of home ranges of radio-collared raccoons shared by other raccoons located ≥50 times, Ordway Preserve, 1991-1992.

MALES				FEMALES			
ID[1]	Males	Females	Combined	ID[1]	Males	Females	Combined
1	0.20	0.15	0.18	2	0.81	0.48	0.63
8	0.43	0.29	0.35	3	0.48	0.20	0.38
12	0.51	0.31	0.40	4	0.99	0	0.99
16	0.25	0.13	0.18	5	0.32	0.20	0.26
17	0.43	0.15	0.26	9	0.53	0.12	0.47
18	0.41	0.18	0.27	13	0.71	0.56	0.68
24	0.22	0.05	0.10	19	0.92	0.58	0.75
33	0.48	0.12	0.27	21	0.40	0.47	0.42
				25	1.00	0.16	0.58
				26	0.59	0.40	0.51
				28	0.50	0.32	0.45
				29	0.42	0.37	0.40
Mean	0.37	0.17	0.25		0.64	0.32	0.54
SD	0.12	0.09	0.10		0.24	0.16	0.20

[1]ID = individual raccoon identification number.

raccoons in the area were detected, especially on the edges of the study area. Also, home-range sizes used to measure overlap are most likely underestimates of annual home ranges because they were based only on winter and spring data and because the minimum convex polygon method is dependent on sample size and underestimates home-range size (White and Garrott 1990). Thus, the true amount of overlap in the area is probably even greater than that detected in this study. This extent of home-range overlap has not been previously reported, but there are few published studies with a large number of radiocollared raccoons followed simultaneously in a small area.

As in other studies (Fritzell 1978, Lotze 1979, Taylor 1979, Worley 1980, Rabinowitz 1981, Allsbrooks and Kennedy 1987), males occupied larger ranges which overlapped more extensively and with more individuals than females, and they traveled faster and farther than did females. It is hypothesized that home-range size is related to body size (McNab 1963), spatial and temporal dispersion of resources (Macdonald 1983), and habitat quality (Ellis 1964). Ellis (1964) concluded that raccoons have smaller home ranges and move less in areas of high quality habitat. The data on home-range size and movement parameters in this study are not consistent and suggest that they may be influenced independently by different factors, or in different ways by the same factors.

The two raccoons (Male #16, MCPcorr = 435 ha; Male #24, MCPcorr = 429 ha) with the largest home ranges at the Ordway were those whose ranges included the highest proportions of sandhill, the least-

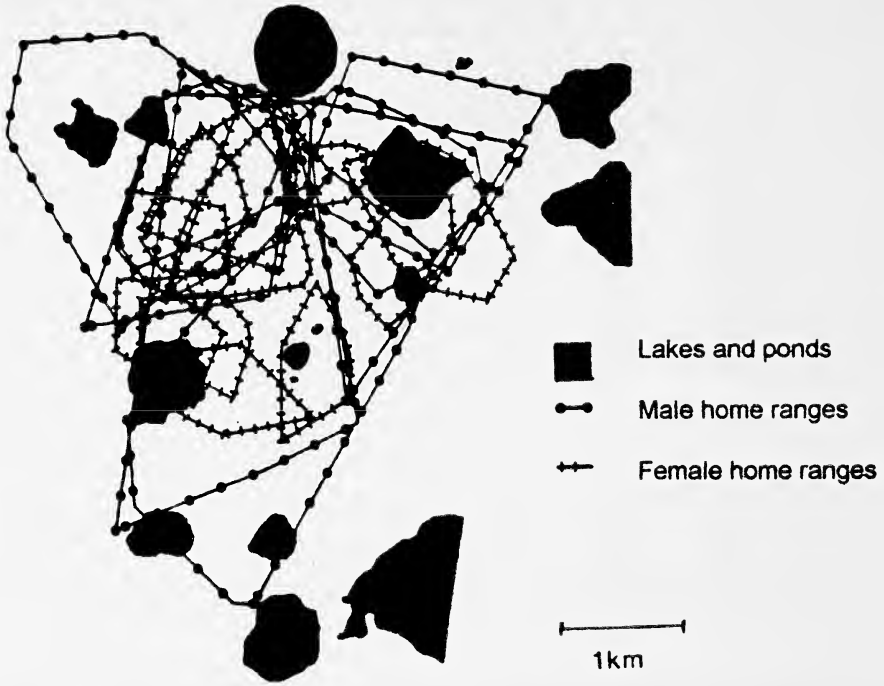

Figure 2. Raccoon home-range overlap at the Ordway Preserve, November 1991-May 1992.

preferred habitat type (Walker 1995). These raccoons also moved the farthest during the night and had the fastest rate of movement. In contrast, the raccoon whose home range included the highest proportion of swamp, the most-preferred habitat type (Walker 1995), had the smallest home range (Female #9, MCPcorr = 29 ha) but her rate of movement and the distance she traveled at night were not significantly different from other female raccoons at the Ordway.

The home-range size and movement parameters of Ordway raccoons are similar to those obtained in a study of raccoons in xeric scrub habitat in south-central Florida (Worley 1980). Male home-range size and movement parameters and female movement parameters were not significantly different from those in this study, but female home-range sizes were larger than at the Ordway ($t = -4.1, P = 0.0008$). The habitat in south-central Florida is more xeric and lacks the wetland areas that Ordway raccoons preferred (Walker 1995).

Raccoons at the Ordway usually foraged and rested alone. Extensive home-range overlap could be facilitated by temporal and spatial avoidance of other raccoons, although we cannot conclude that from our data. Black bears in North Carolina whose ranges overlapped did

Table 4. Raccoons found together, Ordway Preserve, Florida, November 1991-May 1992.

	Numbers of occurrence	Months of occurrence
Female with young	17	July, August, October, November, December
Female with male	6	November, February, March
Female with female	0	
Male with male	2	March, April
Female and unknown adult	1	January
Total	26	

not exhibit mutual avoidance among neighbors (Horner and Powell 1990). Contact between raccoons at the Ordway was infrequently noted, but it was observed in a variety of forms, and was surely an under-representation of social behavior because of the limitations of using radio-telemetry to study a nocturnally-active species.

Ordway raccoons did not den to avoid harsh weather, and some degree of contact between individuals was observed throughout the winter. This year-round contact between adult raccoons may be what allows the persistence of enzootic rabies (Smith et al. 1990) in raccoons in Florida. In a study in the mountains of Virginia, a rabies epizootic died out over the winter because the incubation period of the virus was not long enough to bridge the raccoons' noninteractive period during the fall and winter (Seidensticker et al. 1988).

It is evident from this and previous studies that raccoons, that appear to have a basic social structure amenable to group formation, may share living space with large numbers of other raccoons. It is certainly an oversimplification to label raccoons a solitary species, although they are not group-living. They have a high level of social tolerance, but as a small-bodied, nocturnal omnivore the benefits they could accrue from group-living may be outweighed by the advantages of solitary living (Linn 1984).

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NOTES

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EARLY WINTER BREEDING RECORD OF THE EURASIAN COLLARED-DOVE IN NORTHERN FLORIDA

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Eurasian Collared-Doves (*Streptopelia decaocto*) originated in the Old World where breeding between mid-autumn and mid-winter is occasional in Europe (Cramp 1985, Hengeveld 1993) and irregular in India (Rana 1975). Breeding information on the exotic Eurasian Collared-Dove in the Americas is anecdotal and mainly limited to Florida (Smith 1987, Hengeveld 1993, Stevenson and Anderson 1994). Smith (1987; *in litt.*) speculated that Eurasian Collared-Doves in southern Florida probably extend breeding from early autumn through winter, though he provided no data. Stevenson and Anderson (1994) indicate that breeding has not been documented from early autumn to winter. However, C. Jones recently found a nest with eggs in Citrus County on 28 December 1994 (Pranty 1995), and an occupied nest was observed in a live oak (*Quercus virginiana*) in Leon County from 2-26 November 1995 (G. Menk *in litt.*)

Eurasian Collared-Doves have expanded their range along the Gulf Coast of northwest Florida since 1991 (see Robertson and Woolfenden 1992, Stevenson and Anderson 1994). The birds are now locally distributed along the coast, including Franklin County, where breeding has been confirmed in at least four localities (McNair, unpubl.). According to area residents, this species first colonized Carabelle in spring 1993; the time of the first breeding attempt is unknown.

I document herein one nesting record of the Eurasian Collared-Dove in late autumn-early winter of 1994-1995 at Carabelle, where this expanding population had been in existence for about two years.

I located an active nest of the Eurasian Collared-Dove along the waterfront of the Carabelle River between the Carabelle Marina and a residence on 8 January 1995. The bulky, trashy platform-nest was 7.6 m high in a 12.8 m tall sand pine (*Pinus clausa*). The pine diameter at breast height was 30.2 cm. The nest was placed in a fork of two branchlets on one of the lowest horizontal branches, 3 m from the trunk and 2.1 m from the edge of the vegetation. The nest was well exposed. The compass direction from the trunk to the nest was 251 degrees.

Two large squabs were in the nest on 8 January, one a bit larger than its sibling. I watched an adult feed the young from 1730-1800 hr. The male cooed softly several times. The nest was empty on 9 January, when I saw only the adults in adjacent areas.

On 18 January, two juveniles were seen 1400-1420 hr, attended by adults. The juveniles looked similar to the adults but were distinguished by the barely noticeable black smudge without a white border on the hind neck, among other characters.

Both adults and juveniles visited feeders in the yard of the residence near the nest-site. This yard also provided trees used for resting and roosting, especially southern magnolias (*Magnolia grandiflora*) and Carolina laurel cherries (*Prunus caroliniana*). These species are favored nocturnal roosting sites for the doves elsewhere in the county (McNair, unpubl. data).

Backdating from 9 January when the young fledged and assuming mean incubation and nestling periods of 15 and 16 days, respectively (Goodwin 1983, Cramp 1985), would place estimated onset of egg-laying to be 7 December. The late autumn and early winter

of 1994-1995 was mild and no freezing temperatures occurred until after 18 January. The young had been fledged for nine days.

Seasonal weather patterns and favorable local resources (suitable nest-site, availability of roosting sites, and feeders provisioned with seeds) probably facilitated this late and successful nesting attempt. The long breeding season of this multiple-brooded species undoubtedly favors continued successful expansion of this species' range.

I thank R. T. Engstrom, F. C. James, P. W. Smith, and R. West for their reviews of this note.

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REVIEW

Fla. Field Nat. 25(1):24-25, 1997.

Rare and endangered biota of Florida, Volume V. Birds.—J. A. Rodgers Jr., H. W. Kale II, and H. T. Smith, Eds., 1996. University Press of Florida, Gainesville, Florida. ISBN 08130-1449-2. 688 pages.—The fifth volume in the new Rare and Endangered Biota of Florida series focuses on birds. This current series is an update of the original, widely reprinted five-volume series organized by the Florida Committee on Rare and Endangered Plants and Animals' (FCREPA). This volume is dedicated to the memory of Herb Kale, who served as editor on both the present volume and its predecessor. FCREPA was founded in 1973 by biologists concerned with the status of Florida's flora and fauna. The first FCREPA meeting resulted in the original five-volume series evaluating those species needing conservation and/or protection. In that series, as in this current series, each species account is written by a biologist that has worked directly with a particular species or done extensive literature research on it. Like the earlier volume on birds, this book is as an authoritative and definitive reference for Florida's threatened and endangered avifauna.

This volume is organized similarly to its earlier counterpart, containing preliminary sections on definitions of status categories and descriptions of the major habitats of Florida. The introduction enumerates those species whose status categories have changed since the earlier volume and presents a good overview on listing trends and criteria. A table of the federal, state, and FCREPA status for all birds in the book greatly improves on the older version for use and readability.

The first three species accounts are brief but illuminating accounts of extinct species: the Passenger Pigeon, Carolina Parakeet and Dusky Seaside Sparrow, the latter of which was still extant when original account was written in 1978. Following the species accounts of the recently extirpated Zenaida Dove, Key West Quail Dove and Whooping Crane, the chapters proceed in order of decreasing species rarity. In a manner similar to the Birds of North America series, each accounts follows a specified format. Within each account, sections on the natural history, ecology and conservation of each species are standard, although not always consistent, for each species in the book. The present volume improves on the older one by adding sections on taxonomy, habitat requirements and habitat trend, demographic characteristics, key behaviors, and conservation measures taken, all of which add information either missing or hard to find in the earlier volume. The sections are also more extensive and informative than in the earlier version.

Like the Birds of North America series, both biologists and nature enthusiasts will appreciate the quantity and quality of natural history information contained in the species accounts. Particular standouts are the chapters on Red-cockaded Woodpecker, Sooty Tern, Magnificent Frigatebird, and Brown Noddy, which are detailed and in-depth without sacrificing readability. The other accounts are excellent or worthwhile but may contain less information, in many cases because so little is known about the species. For instance, population trends are not even known for Least Bittern, Merlin, Gull-billed Tern, and both Black and Yellow-crowned Night Heron, among others; the most recent quantitative statewide data mentioned for Florida's Osprey population dates from 1983. In addition to population data, much basic biology and behavior remains unknown for many birds, including Mangrove Cuckoo, Antillean Nighthawk and Black-whiskered Vireo. Hopefully this book will spur biologists to explore research opportunities on these species either directly or through graduate students, and funding agencies concerned with conservation will rise to support such work.

Attention to detail varies among chapters; more uniformity might have been achieved with greater editorial control. For instance, in the Conservation Measures Taken section

some authors note that the species is protected by the Migratory Bird Treaty Act and Wildlife Code of the State of Florida, and include additional state and federal listings; other authors only note the species is "protected by federal and state laws", or fail to mention any legal protection at all. Readers or students unfamiliar with conservation regulations may think that some birds are protected by laws such as the Migratory Bird Treaty Act and other birds are not. Many chapters give a history of state and federal listings for the species, while others do not. While the book is explicitly about Florida birds, many chapters make little mention of population size or trends outside of Florida, although complete range maps are included in the text. Nonetheless, readers may be left wondering what proportion of the species' world-wide distribution occurs in Florida. A map at the beginning of the book labeling the Florida counties would also be helpful for comparing species distribution maps. The legibility and labeling of the included river drainage map could be improved. However, the book as a whole is handsomely designed and solidly produced, with distribution maps for each species and photographs of most.

The complexity of decision-making about listings becomes apparent throughout the course of the book. The reader may wonder if a bird was placed in the proper category, about inclusion or exclusion of extralimitals, and how aspects of rarity and vulnerability were weighed in the listing decisions. These are problems inherent with the listing process in general, especially when little is known about many of the species, and the editors acknowledge that some decisions were difficult or controversial. Overall, this book is an excellent resource on threatened and endangered birds in Florida from both conservation and basic biology perspectives. Administrators, biologists, technicians, naturalists, and students, including primary and secondary school students, will find this an invaluable resource for information about Florida's rare and endangered birds.—**Dirk E. Burhans,** Archbold Biological Station, P.O. Box 2057, Lake Placid, Florida 33852.

FIELD OBSERVATIONS

Fla. Field Nat. 25(1):26-31, 1997.

Summer Report: June-July 1996.—The observations listed here are based on rare or unusual species or significant numbers of birds reported to the Florida Ornithological Society (F.O.S.) Field Observations Committee (F.O.C.). As these reports are not formally reviewed, they may be considered tentative.

Significant reports are welcomed for inclusion in future issues of this section. Reports should include the following information: species, number of individuals, age and sex of the bird(s), color morph if applicable, location (including county), date, observer(s), and significance of the report. Reporting periods are winter (December-February), spring (March-May), summer (June-July), and fall (August-November). Submit reports to regional compilers within 2 weeks after the close of each period, or to the state compiler within 1 month. Reports may be E-mailed to the state compiler at blp414@aol.com.

Following the examples set by *Florida Bird Species: An Annotated List* (Robertson and Woolfenden 1992, F.O.S. Spec. Publ. No. 6) and *The Birdlife of Florida* (Stevenson and Anderson 1994, Univ. Press of Florida), sight-only observations are considered "reports," while only those supported by verifiable evidence (photographs, video or audio tapes, or specimens) are called "records."

Bruce Anderson (*in litt.* July 1995) revised the list of birds for which the F.O.S. Records Committee (F.O.S.R.C.) requires documentation. These species are marked in this report with an asterisk (*) to alert the observers of their need to supply the F.O.S.R.C. with details of their sightings. (Some reports that lack all documentation have been omitted from this report).

A county designation accompanies the first-time listing of each site in this report; further listings of the same site lack the county name. Abbreviations used are as follows: A.P.A.F.R. = Avon Park Air Force Range, ca. = circa, C.P. = county park, F.B.R. = Florida Birding Report (*fide* Robbie Wooster), N.W.R. = national wildlife refuge, R&W 1992 = Robertson and Woolfenden 1992, S&A 1994 = Stevenson and Anderson 1994, S.P. = state park, S.R.A. = state recreation area, S.T.F. = sewage treatment facility, T.A.P. = Tomoka Aquatic Preserve (*Volusia*), T.L.W.M.A. = Three Lakes W.M.A. (*Osceola*), W.C.A. = Water Conservation Area, W.M.A. = wildlife management area, and N., S., E., W., etc. for compass directions. Bold-faced species, if any, denote birds newly reported or verified in Florida.

We thank Rich Paul and Ann Schnapf, the summer editors of *National Audubon Society Field Notes* for sharing information with us. Robbie Wooster contributed reports submitted to the Florida Birding Report hotline. R&W 1992 and S&A 1994 were used to determine the regional and seasonal status of many species. Editor Todd Engstrom suggested many helpful comments to the manuscript.

Summary of the Summer Season

Bob Duncan reports that Hurricane Opal, which struck the W. Panhandle on 4 October 1995, "cleaned Santa Rosa Island of its dunes, from Fort Pickens to Navarre," creating nesting habitat for Snowy Plovers, Least Terns, and Black Skimmers. Most roof-nesting Least Terns returned to nesting on beaches.

The only F.O.S.R.C. rarity reported this season was the White-cheeked Pintail that summered at Merritt Island N.W.R. Other interesting observations included 2 or 3 apparent pairs of Black-bellied Whistling-Ducks at a *Hamilton* phosphate mine fewer than 25 km south of the Georgia border, increasing summer reports of White-tailed Kites outside their Everglades breeding areas, a male and female Northern Harrier seen sepa-

rately in the same area of Three Lakes W.M.A., Whip-poor-wills in the Orlando area for the second consecutive summer, a Black-throated Green Warbler (*Lake*), and a Henslow's Sparrow (*Okeechobee*) that was the state's first summer report.

Species Accounts

COMMON LOON: 1 in breeding plumage off Crystal River (*Citrus*) 18 Jun (R. Paul, A. Schnapf).

SOOTY SHEARWATER: 1 from Turtle Mound, Canaveral National Seashore (*Volusia*) 1 Jun (B. Roberts, T. Taylor); 1 lethargic on the beach at Archie Carr N.W.R. (*Brevard*) 3 Jun (S. Belson).

*RED-FOOTED BOOBY: 1 immature brown morph at Sarasota Bay (*Manatee* and *Sarasota*) 3 Jul (R. Paul, A. Schnapf).

AMERICAN WHITE PELICAN: 50 at Choctawhatchee Bay (*Okaloosa*) 4 Jun (D. Ware); 6 at McKay Bay impoundments (*Hillsborough*) 30 Jun, and 1 there 21 Jul (both A. and R. Smith); 6 in N. Jacksonville (*Duval*) 27-31 Jul (R. Clark, M. Dolan).

BROWN PELICAN: 1 at Lake Jackson (*Leon*) 30 Jun (G. Menk); 9598 pairs nested in the state this year (S. Nesbitt).

MAGNIFICENT FRIGATEBIRD: 2 over Panama City Beach (*Bay*) 12 Jul (L. Rainbow).

WADING BIRDS: 11,000 pairs of 8 species nested at Indian River Lagoon (*Brevard* and/or *Volusia*) (C. Sewell); 7233 pairs nested at W.C.A. 2 and 3 (*Broward* and *Dade*) (P. Frederick); 1300 pairs of 7 species nested at Marco Island (*Collier*) (T. Below).

REDDISH EGRET: birds nested at 2 new sites "(for this century)" this year: Johns Pass (*Pinellas*) and Useppa Bird Key (*Lee*) (R. Paul, A. Schnapf).

WHITE IBIS: 8100 pairs nested at Alafia Bank (*Hillsborough*) (R. Paul, A. Schnapf); 3200 pairs nested at Indian River Lagoon (C. Sewell); 1013 nests at W.C.A. 2 and 3 (P. Frederick).

GLOSSY IBIS: 525 nests at Alafia Bank (R. Paul, A. Schnapf); 108 nests at Marco Island (T. Below); 19 nests at W.C.A. 2 and 3 (P. Frederick); 1 at Fort Walton Beach (*Okaloosa*) 26 Jun (D. Ware); 1 at Lake Lafayette (*Leon*) 20 Jul (H. Horne) was thought to be a southbound migrant (*fide* G. Menk).

ROSEATE SPOONBILL: 120 nests at 3 sites in *Hillsborough*, *Pinellas*, and *Manatee* (R. Paul, A. Schnapf); 15 inland nests at W.A.C. 2 and 3 (P. Frederick); 1 adult and 3 first-year birds at Lake Hancock (*Polk*) 9 Jun (M. McMillian, B. Pranty); 1 at Lake Wales (*Polk*) 16 Jun (T. Palmer); 4 at Paynes Prairie State Preserve (*Alachua*) 17-20 Jun (J. Weimer); 1 first-year bird at St. Marks N.W.R. (*Wakulla*) 21-30 Jun (J. Reinman, J. Burkepile, L. Gall).

WHITE SPOONBILL: 1 at McKay Bay 21 and 30 Jul (both A. and R. Smith) was presumably the same bird observed since 20 Oct 1993.

WOOD STORK: 560 nests at Corkscrew Swamp Sanctuary (*Collier*) fledged over 1250 young (E. Case).

BLACK-BELLIED WHISTLING-DUCK: 4-6 at Occidental W.M.A. (*Hamilton*) 4 Jul through the season "seemed to be paired up" (J. Krummrich, J. Hintermister).

*WHITE-CHEEKED PINTAIL: 1 at Merritt Island N.W.R. (*Brevard*) 11 May through the season (*fide* P. Small and F.B.R.).

BLUE-WINGED TEAL: 1 male at Lake Jackson 2 Jul (G. Menk); 1 migrant at Kissimmee Prairie Sanctuary (*Okeechobee*) 31 Jul (T. Dean, B. Pranty).

NORTHERN SHOVELER: 2 at Merritt Island N.W.R. through the season (*fide* P. Small and F.B.R.).

GADWALL: 1 at Merritt Island N.W.R. through the season (B. Sicolo et al.).

LESSER SCAUP: 1 at McKay Bay impoundments 23 Jun (B. and M. Hoffman, R. Smith) was not seen again; 1 at Occidental W.M.A. 4 Jul through the season (J. Hintermister, D. Cimbaro).

RUDDY DUCK: 6 at Occidental W.M.A. 14 Jul through the season, but evidence of breeding was not observed (B. Roberts, J. Hintermister).

SWALLOW-TAILED KITE: 1 or 2 in S.E. Jacksonville in the first half of Jun may have attempted to nest locally (N. Wamer, P. Powell); the peak count at the Corkscrew Swamp Sanctuary roost was 348 birds 27 Jul (R. Wooster).

WHITE-TAILED KITE: 2 adults at A.P.A.F.R. (*Polk*) 21Jun (T. Dean, C. Collins); 1 over U.S.-98 at the Istokpoga Canal (*Highlands*) 19 Jul (L. and P. Gray); 1 adult at the Swallow-tailed Kite roost at Corkscrew Swamp Sanctuary 21 Jul (R. Wooster).

MISSISSIPPI KITE: *ca.* 75 over Tram Road S.T.F. (*Leon*) 5 Jun (G. Menk).

BALD EAGLE: 1113 young fledged from 725 successful nests in 876 active territories this year (S. Nesbitt).

NORTHERN HARRIER: 1 female in *Okeechobee* 2 Jun (B. Carlton, J. Kitik, V. McKinney); 1 male flushed from the ground in native dry prairie at T.L.W.M.A. 15 Jul, and 1 female in the same area 5 Aug (both B. Pranty).

SHORT-TAILED HAWK: 1 dark morph at Disney Wilderness Preserve (*Osceola* or *Polk*) 26 Jun (T. Palmer); 1 light morph juvenile near its nest near Kenansville (*Osceola*) 14 Jul (S. Backes, M. Wilkinson); 1 dark morph at A.P.A.F.R. (*Highlands*) 25 Jul (T. Dean, B. Pranty).

PEREGRINE FALCON: 1 adult at Bienville Plantation (*Hamilton*) 27 Jul (M. Dolan).

CHUKAR: 1 at Shady Hills (*Pasco*) 9 Jun (D. Robinson) was the second county report.

AMERICAN COOT: *ca.* 72 at Lake Jackson 11 Jul - the species is not known to breed in *Leon* (G. Menk); 1 adult and 4 chicks at Wekiwa Springs S.P. (*Orange*) 30 Jul (P. Small).

BLACK-BELLIED PLOVER: 2 in "full basic plumage" at Content Key (*Monroe*) 7 Jul (P. Hess).

SEMIPALMATED PLOVER: 12 at Huguenot City Park, Jacksonville 6 Jul (N. Wamer); 18 at T.A.P. 15 Jul (L. Malo, D. Shelley, C. DuToit).

BLACK-NECKED STILT: 1 at Dog Island (*Franklin*) 23 Jul (D. Evered).

LESSER YELLOWLEGS: 2 at T.A.P. 2 Jul (L. Malo, D. Shelley, C. DuToit).

SOLITARY SANDPIPER: 1 at Hague Dairy (*Alachua*) 20 Jul (M. Manetz, R. Rowan); 1 at T.L.W.M.A. 29 Jul (B. Pranty, D. Perkins).

WILLET: 1 at Springhill Road S.T.F. (*Leon*) 15 Jul (G. Menk).

SPOTTED SANDPIPER: 2 northbound migrants at Springhill Road S.T.F. 5 Jun (G. Menk); 1 southbound migrant at Occidental W.M.A. 14 Jul (B. Roberts); 2 at T.A.P. 15 Jul (L. Malo, D. Shelley, C. DuToit).

MARBLED GODWIT: 1 at St. Marks N.W.R. 2 Jun (D. and S. Jue) and 7 Jun (L. McCullagh); 2 at Bald Point (*Franklin*) 23 Jun (E. White, M. Hill); up to 20 summered at Hillsborough Bay (*Hillsborough*) (R. Paul, A. Schnapf).

RUDDY TURNSTONE: 4 at T.A.P. 2 Jul (L. Malo, D. Shelley, C. DuToit).

RED KNOT: 1 at Occidental W.M.A. 29 Jul (M. Manetz, H. Adams).

SANDERLING: 4 (1 in breeding plumage) at St. George Island (*Franklin*) 9 Jun (D. and S. Jue).

LEAST SANDPIPER: 1 at Timberlake (*Okaloosa*) 8 Jul (D. Ware); 5 at Huguenot City Park 14 Jul (B. Roberts); 2 at Occidental W.M.A. 14 Jul (B. Roberts); *ca.* 200 at Springhill S.T.F. 15 Jul (G. Menk).

STILT SANDPIPER: 5 at Springhill Road S.T.F. 15 Jul (G. Menk).

SHORT-BILLED DOWITCHER: a flock of 10 molting into winter plumage off Marathon (*Monroe*) 3 Jul (P. Hess).

LONG-BILLED DOWITCHER: 1 at Cape San Blas (*Gulf*) 20 Jul and 3 Aug (both J. Stevenson).

COMMON SNIPE: 1 that called when flushed at T.L.W.M.A. 27 Jun (B. Pranty) was a rare summer report.

LAUGHING GULL: "thousands of young birds" observed at the Huguenot City Park colony (*fide* P. Powell).

GULL-BILLED TERN: 2 pairs nesting on a rooftop in Panama City 1 Jul (G. Sprandel) was the first *Bay* breeding report (S&A 1994:288), and the second rooftop nesting report (*see* Coburn 1996. *Florida Field Nat.* 24:76-77); 2 that courted over Alafia Bank 3 Jun may have nested locally (R. Paul).

CASPIAN TERN: 93 pairs nested at Tampa Bay (*Hillsborough*) (R. Paul, A. Schnapf); 4 nests at the Apalachicola River mouth (*Franklin*) was a new site (*fide* J. Gore).

ROYAL TERN: 2225 nests at 2 sites in *Pinellas* and *Manatee* (R. Paul, A. Schnapf).

SANDWICH TERN: 445 nests at 2 sites in *Pinellas* and *Manatee* (R. Paul, A. Schnapf).

COMMON TERN: 3 in breeding plumage at St. George Island, an occasional breeding site, 9 Jun (D. and S. Jue); 1 at Huguenot City Park 30 Jun (R. Clark); 60 at Hillsborough Bay 9 Jul (R. Paul).

FORSTER'S TERN: 2 at Newnans Lake (*Alachua*) 3-24 Jul (R. Rowan, M. Manetz); 2 juveniles ("light buff on back and wings") at Gulf Breeze (*Santa Rosa*) 14 Jul were thought to be the first regional (and state?) report in this plumage (B. Duncan).

LEAST TERN: *ca.* 500 nests on a Florida Power Corp. rooftop in St. Petersburg (*Pinellas*) fledged *ca.* 250 young (D. Voigts); 330 unsuccessful nests off Marco Island (T. Below); 35 nests at Three Rooker Bar (*Pinellas*) (A. Schnapf, N. Douglass); *ca.* 50 nests at Fort Matanzas National Monument (*St. Johns*), few nests, probably none successful, at Huguenot City Park, and no successful nests at Guana River S.P. and Anastasia S.R.A (*St. Johns*) this season (*fide* P. Powell).

BLACK TERN: 1 in breeding plumage at Newnans Lake 3 Jul (R. Rowan); 10,000 at Santa Rosa Island 22 Jul (E. Case); 1 at Banana Lake (*Polk*) 27 Jul (T. Palmer).

BLACK SKIMMER: 99 successful nests at a new sandbar off Marco Island (T. Below); 320 nests in Tampa Bay (*Hillsborough*) (R. Paul, A. Schnapf); 210 nests at Three Rooker Bar (A. Schnapf, N. Douglass).

EURASIAN COLLARED-DOVE: first nesting reported at the University of South Tampa, Tampa (*Hillsborough*) in late Jul-early Aug (G. Woolfenden).

WHITE-WINGED DOVE: 3 at Dog Island 16-23 Jun (D. Evered).

ROSE-RINGED PARAKEET: the pair at Cedar Key (*Levy*) nested successfully this season, producing 2 young. The population is now 5 birds (D. Henderson).

WHIP-POOR-WILL: singles at Little-Big Econ State Forest (*Seminole*) 13 Jul (B. Sicolo) and Rock Springs Run State Reserve (*Orange*) 23 Jul (P. Small, E. Egensteiner, T. Williams) and 30 Jul (B. Emanuel).

SCISSOR-TAILED FLYCATCHER: 1 "immature" at Springhill Road S.T.F. 26 Jul (*fide* H. Horne).

CLIFF SWALLOW: 1 at Horseshoe Beach (*Dixie*) 21 Jun (D. Evered); 1 at Tram Road S.T.F. 23 Jul (H. Horne); 1 at Springhill Road S.T.F. 26 Jul (H. Horne).

BARN SWALLOW: 4 nests under 1-75 (*Manatee*) 21 Jun (R. Smith); 3 nests under the Beeline Expressway over the St. Johns River (*Orange* and *Brevard*) 20 Jul (K. Fisher, P. Small); 100+ migrants at Corkscrew Swamp Sanctuary 31 Jul (R. Wooster).

GRAY CATBIRD: 1 or 2 in *Alachua* late May-19 Jul, but no singing or other evidence of breeding was observed (R. Robinson).

HILL MYNA: 1 pair nested again in Stuart (*Martin*) and apparently produced 1 fledgling (E. Hess).

BLACK-WHISKERED VIREO: 1 at Honeymoon Island S.R.A. 11 Jun, possibly the last site in *Pinellas* that still supports this species (A. and R. Smith); 2 at Town Islands (*Sarasota*) 14 Jun and 3 Jul (R. Paul, A. Schnapf).

YELLOW WARBLER: 1 at Occidental W.M.A. 29 Jul (J. Hintermister).

BLACK-THROATED GREEN WARBLER: 1 at Emeralda Marsh Conservation Area (*Lake*) 22 Jun (*fide* J. Marburger) was only the second summer report (S&A 1994:559), but details were not provided.

YELLOW-THROATED WARBLER: 1 migrant at A.P.A.F.R. (*Highlands*) 18 Jul (N. Hamel).

PRAIRIE WARBLER: 4 near the Frankland Causeway (*Pinellas*) 5 Jun (R. Paul, S. Cooper); 4 pairs in *Sarasota* 14 Jun (A. Schnapf, B. Lamoureux); only 1 singing male located in Fort DeSoto C.P. (*Pinellas*) in Jun, but Brown-headed Cowbirds were found easily on every visit (R. Smith, M. Wilkinson); single migrants at San Felasco Hammock State Preserve (*Alachua*) 17 Jul (M. Manetz) and A.P.A.F.R. (*Highlands*) 22 Jul (N. Hamel).

BLACK-AND-WHITE WARBLER: 1 at Turkey Creek Sanctuary (*Brevard*) 19 Jul (B. Cooper); 1 at Tosohatchee State Reserve (*Orange*) 20 Jul (K. Fisher, P. Small); 1 at San Felasco Hammock State Preserve 20 Jul (M. Manetz).

AMERICAN REDSTART: 2 males at Aripeka (*Hernando*) 2 Jun (R. Smith); 1 singing male at the Lowry Park Zoo, Tampa 17 Jun (B. and M. Hoffman); 1 at A.P.A.F.R. (*Highlands*) 27 Jul (L. Riopelle); 1 N. of High Springs (*Columbia*) 29 Jul (M. Manetz); 1 at Saddle Creek C.P. (*Polk*) 31 Jul (P. Fellers).

PROTHONOTARY WARBLER: 1 migrant at Saddle Creek C.P. 31 Jul (P. Fellers).

OVENBIRD: 1 at Saddle Creek C.P. 31 Jul (P. Fellers).

LOUISIANA WATERTHRUSH: 1 at F.S.U. Dairy (*Leon*) 5 Jul (G. Menk); 1 at Tosohatchee State Reserve 20 Jul (L. Malo); 1 in *Alachua* 20 Jul (M. Manetz, D. Cimbaro); 2 at Saddle Creek C.P. 26 Jul (P. Fellers).

YELLOW-BREASTED CHAT: at least 1 pair probably bred at Paynes Prairie State Preserve this season (J. Morris, M. Manetz).

ROSE-BREASTED GROSBEAK: 1 male at Crawfordville (*Wakulla*) 3 Jun (G. Weymouth).

PAINTED BUNTING: 3 singing males at T.A.P. 11 Jun, and a juvenile there 2 Jul (L. Malo, D. Shelley, C. DuToit).

FLORIDA GRASSHOPPER SPARROW: 13 nests found this season at A.P.A.F.R. (*Highlands*) and T. L.W.M.A. included one clutch many weeks later than the latest egg date of 22 Jun in S&A (1994:639) (M. Scheuerell, B. Pranty, T. Dean, note by D. Perkins et al. in prep.).

HENSLOW'S SPARROW: 1 singing at Kissimmee Prairie Sanctuary 5 Jun (C. Collins) and 18 Jun (M. Scheuerell, B. Pranty [photos] et al., note in press to *Fla. Field Nat.*) was the first summer report in Florida.

SHINY COWBIRD: 1 "pair" at Jacksonville 1 Jun-25 Jul (R. Clark); 2 at Cedar Key through the season (D. Henderson).

HOUSE FINCH: adults feeding young at 2 feeders in *Bay* 9-23 Jun (G. Carter, A. Parker) established the first breeding reports for the county (*fide* T. Menart).

AMERICAN GOLDFINCH: 1 remained at a S. Jacksonville feeder until 2 Jul (B. Rhodes).

PIN-TAILED WHYDAH: 1 adult male at Boca Chica Key (*Monroe*) 21 Jun (B. Dusek, H. Howitt).

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David Voigts, Noel Wamer, Don Ware, Jim Weimer, Rick West, George Weymouth, Eddie White, Margie Wilkinson, T. Williams, Glen Woolfenden, and Robbie Wooster.

Fall 1995 report not published previously: Royal Tern: 1 at Lake Lafayette (*Leon*) 15 Sep (Jay LaVia).

Winter 1995-1996 report not published previously: Red-throated Loon: 1 at Bayport Park 23 Dec (Dave Goodwin, Charlie Buhrman, Erik Haney, and Dave Bowman) was the first *Hernando* report (S&A 1994:16).

Spring 1996 reports not published previously: Leach's Storm-Petrel: 1 picked up on the beach in S. *Duval* 31 May (*fide* Peggy Powell, specimen to Florida Museum of Natural History); Magnificent Frigatebird: 1 over Guana River S.P. (*St. Johns*) 25 May (Noel Wamer); Western Tanager: 1 adult male at Orange Park (*Clay*) 24 Apr (Lenore McCullagh).

Report prepared by **Bill Pranty**, state compiler (8515 Village Mill Row, Bayonet Point, Florida 34667; phone 813-862-4556). Other committee members are **Linda Cooper** (115 Lameraux Road, Winter Haven, Florida 33884), **Gail Menk** (2725 Peachtree Drive, Tallahassee, Florida 32304), and **Peggy Powell** (2965 Forest Circle, Jacksonville, Florida 32257).

Editorial

Six editors have successfully guided the *Florida Field Naturalist* through 24 volumes from 1973 through 1996: Henry M. Stevenson (1973-1976), Fred E. Lohrer (1976-1982), James A. Kushlan (1982-1986), James A. Rodgers, Jr. (1987-1990), Peter G. Merritt (1991-1994), and Walter K. Taylor (1995-1996). Members of the Florida Ornithological Society owe them thanks for producing an excellent scientific natural history journal. I especially thank Walter K. Taylor, my immediate predecessor, for his help and thoughtfulness during the editorial transition.—**R. Todd Engstrom**, Editor.

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INFORMATION FOR CONTRIBUTORS

The *Florida Field Naturalist* is a fully refereed journal emphasizing biological field studies and observations of vertebrates, especially birds, in and near Florida and the nearby West Indies. It welcomes submission of manuscripts containing new information from these areas. Please consult recent issues for style and Vol. 18, No. 1 for detailed information. Submit manuscripts for consideration to the Editor, R. Todd Engstrom. Monograph-length manuscripts may be submitted for consideration to the Editor of Special Publications, Glen E. Woolfenden. Send books and other materials for review to Associate Editor, Reed Bowman. For preliminary assistance regarding submission of manuscripts dealing with bird distribution and rarities contact Associate Editor, Bruce H. Anderson. Reports of rare birds in Florida should also be submitted to the FOS Records Committee Secretary, Bruce H. Anderson. For preliminary assistance regarding submission of scientific, technical, or behavioral contributions contact Associate Editor, Richard T. Paul.

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