

FINAL REPORT

HABITAT SELECTION, MOVEMENTS AND NUMBERS OF
PIPING PLOVERS WINTERING IN COASTAL ALABAMA

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by

Mark J. Zivojnovich

Guy Baldassarre
Project Leader

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ABSTRACT

Aspects of the wintering ecology of Piping Plovers (Charadrius melodus) were studied in Mobile Bay, Alabama, from 28 January to 1 March 1987. A total of 594 locations of 14 Piping Plovers fitted with miniature radio transmitters was obtained, primarily from 3 sites in Mobile Bay (Dauphin Island, Little Dauphin Island, and Sand Island); 81% of all locations were from Little Dauphin Island. Plovers appeared to use habitats when low tides and north winds created good feeding conditions by exposing mudflats on the study sites. Under poor habitat conditions, plovers dispersed from feeding areas on study sites and perhaps from Mobile Bay, but returned when habitat conditions improved. A maximum of 58 Piping Plovers was censused on the study areas during the study period. Protection of preferred feeding sites is recommended as a winter management practice for this species.

INTRODUCTION

The Piping Plover (Charadrius melodus) is a shorebird endemic to North America, occurring locally in suitable habitat throughout its range (Cairns 1982). The Eastern Piping Plover (C. m. melodus) breeds along the coasts of eastern North America from Virginia to Quebec and Newfoundland and winters mainly from South Carolina, southward through Florida. The Interior Piping Plover (C. m. circumcinctus) breeds locally in the prairie provinces, Dakotas, Nebraska, and Minnesota, and occurs very locally along shores of the Great Lakes. This subspecies winters along the Gulf Coast, south into Mexico (Cairns and McLaren 1980, Johnsgard 1981, Haig and Oring 1986).

Piping Plovers are small, with both sexes similar in size and coloration. Adults average 55 gm in weight, with a mean wing length of 117 mm and mean tail length of 51 mm (Wilcox 1959). The back is a pale gray-brown while the forehead, cheeks, throat, and underparts are white (Johnsgard 1981). Adult males in breeding plumage have a dark bar across the forecrown and black shoulder patches often extending across the breast. The bill is yellow-orange with a black tip. The legs are the same orange color as the bill. In winter, Piping Plovers lack the dark forecrown, the breastband is reduced to lateral gray patches, and the bill is all black (Johnsgard 1981).

Piping Plovers arrive on their breeding grounds from late March through April. The Atlantic Coast and Great Lakes populations exclusively use sandy beaches for nesting habitat (Hall 1981); the interior population favors open shorelines of large, shallow lakes (Johnsgard 1981), but will also nest on alluvial islands, saline wetlands, and along semi-permanent ponds and lakes (Evans 1984). Wilcox (1959) found that adult males tend to be philopatric to the same breeding area.

Nests consist of shallow scrapes, often lined with shell fragments or pebbles; the normal clutch size is 4 eggs (Bent 1929). Adults defend a territory ranging about 100 ft. from the nest site, meeting intruders with ground or aerial chases (Cairns 1982). Incubation is shared by both sexes and the young hatch in 27-31 days (Wilcox 1959). The chicks fledge at about 4 weeks age (Hall 1981).

Piping Plovers begin to flock on neutral feeding areas by early July (Cairns 1982), and by August nearly all have departed for wintering areas (Cuthbert and Wiens 1982). During winter Piping Plovers prefer highly ephemeral sand flats adjacent to beaches (Haig and Oring 1986).

Unregulated hunting during the Market Hunting Era brought this species to the verge of extinction by the early 1900's (Bent 1929), but the population eventually recovered under protection of the Migratory Bird Treaty in 1918. However, the population began another serious decline in the 1940's, this time because extensive development of beachfront areas destroyed or disturbed breeding and wintering habitats (Sidle 1984). Recent surveys indicate fewer than 2000 breeding pairs remaining, distributed about equally in the United States and Canada (Haig 1985). In January 1986, The species was listed as threatened and endangered by the U.S. Fish and Wildlife Service.

Recovery plans for both the interior and Atlantic Coast populations of Piping Plovers have stressed the need for studies during the winter period. Most published literature focuses on the biology and distribution of this species during the breeding season, with virtually no information currently available regarding their wintering ecology (see Haig and Oring 1986). This is significant because Piping Plovers may spend up to 9 months of the year on wintering areas. Thus, a general knowledge of the species' wintering ecology

is critical before an effective management plan can be developed and implemented to restore and maintain Piping Plover populations. Such data must include: (1) the distribution and abundance of wintering populations, (2) winter habitat selection and availability, and (3) information regarding the behavior and habits of wintering populations.

OBJECTIVES

Job A, Objective: to determine habitat selection, movements, and numbers of Piping Plovers wintering in coastal Alabama.

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STUDY AREA

Coastal Alabama was selected as the study site for this project because Christmas Bird Count data from 1970-83 indicated that this area historically supported a large population of wintering Piping Plovers. There were 3 main areas used by plovers during this study (Figure 1): (1) a 3-km beach and mudflat area on the north side of Dauphin Island; (2) Little Dauphin Island, which is located just north of Dauphin Island and is part of the Bon Secour National Wildlife Refuge; and (3) Sand Island, which is located off the southeast coast of Dauphin Island. Little Dauphin was the site most used by Piping Plovers during the 1987 winter because this area provided mudflats used extensively by feeding plovers. Similar mudflat sites on Dauphin Island largely were destroyed by hurricane Elena, which struck on 2 September 1985 (Johnson 1987).

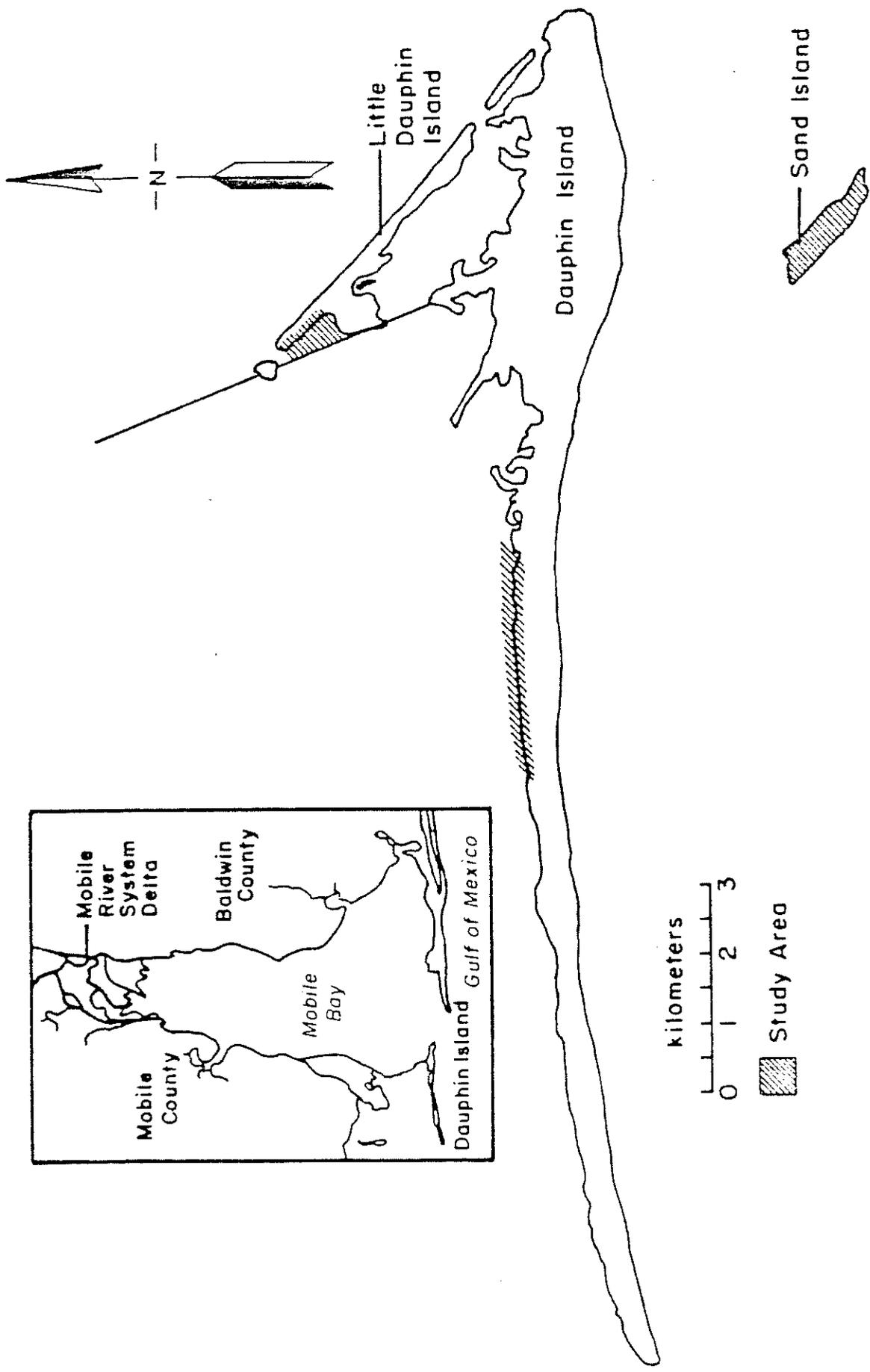


Figure 1. Study area map of main study sites in the Mobile Bay area.

MATERIALS AND METHODS

Piping Plovers were captured from 14-28 January 1987 on Little Dauphin Island (N=12) and Dauphin Island (N=4). All birds were captured using mist nets set on sandflats and mudflats exposed during low tide. Each bird was fitted with a miniature (2.5 gm), back-mounted radio transmitter having a theoretical life of 40-60 days. The transmitter harness was constructed with latex tubing, which eventually deteriorates and causes the radio to detach from the birds.

Telemetry data were obtained daily (28 January-1 March) from Dauphin Island and Little Dauphin Island at approximately 2-hr intervals from 0600-1800 hrs and at 3 to 5-hr intervals from 1800-0600 hrs. Data from Sand Island were collected by ground tracking from 1700 to 0900 hrs on 10-11 and 13-14 February and during 3 aerial searches of the entire study area on 4, 12, and 18 February. Aerial surveys covered the Mobile Bay shoreline and associated islands south of Interstate 10 as well as the Ft. Morgan Peninsula, the study area, and Petit Bois Island. Ground locations were made using a portable receiver and 5-element yagi antenna whereas aerial locations were obtained using 2 slide-mounted antennae on a Cessna 152. Signal reception from the air was less than 0.4 km while ground reception ranged from 20-100 m.

Habitat conditions were categorized by estimating the percentage of exposed sandflats and mudflats relative to maximum exposure under ideal conditions (i.e., extreme low tides accompanied by a north wind). Habitat conditions were thus classified as poor (< 25% exposure), average (25-75% exposure), and good (> 75% exposure).

RESULTS AND DISCUSSION

A total of 594 radio locations of 14 Piping Plovers was obtained from 28 January to 1 March 1987 (Table 1); 2 birds were found dead before useable data were obtained. Of these locations, 80.5% were obtained from Little Dauphin Island, 9.9% from Dauphin Island, 6.6% from the Gulf side of Dauphin Island, and 3.0% from Sand Island. Of the locations on Little Dauphin Island (N=478) 50% occurred during poor mudflat conditions, 15% during average conditions, and 35% during good conditions (Table 1).

Piping Plover locations appeared to be primarily a response to availability of foraging areas. For example, from 28 January through 1 February good mudflat exposure occurred on Dauphin Island and Little Dauphin Island and 12 of 14 radio-marked plovers were located on these areas (Table 2). Conversely, as habitat conditions deteriorated due to rising tides, only 2 plovers could be located on these sites by 4 February and only 4 others were located on the remaining study area. However, as habitat conditions improved from 7-12 February 13 of 14 plovers again were located on study sites, primarily Little Dauphin Island.

This pattern indicates that plovers concentrate when and where feeding conditions are optimal, but otherwise disperse within the Bay. For example, when habitat conditions were poor on main feeding areas (Dauphin and Little Dauphin Island) we could only locate a maximum of 4 birds during aerial searches and these were nearly always on the Gulf side of Dauphin Island. The short range of radios (0.4 km) may have restricted our ability to locate dispersed individuals, but the possibility exists that birds scatter widely during poor habitat conditions. Johnson (1987) noted a departure of Piping Plovers from these same study sites when hurricane Elena destroyed feeding sites in September 1985.

TABLE 1. Sandflat and mudflat conditions during 594 radio-locations of Piping Plovers from 28 January through 1 March 1987.

Bird Number	Dauphin Island			Little Dauphin Island			Sand Island			Dauphin Island (Gulf Side)		
	Poor	Average	Good	Poor	Average	Good	Poor	Average	Good	Poor	Average	Good
.074	-	-	-	2	2	2	4	2	1	-	-	-
.179	-	-	-	2	2	7	1	-	-	-	-	-
.227	-	-	-	22	8	22	-	-	-	-	-	-
.283	-	-	-	37	10	22	-	-	-	-	-	-
.329	-	-	-	40	6	9	-	-	-	-	-	-
.380	-	-	-	52	11	27	-	-	-	-	-	-
.427	3	3	9	7	2	3	1	-	-	1	-	-
.477	-	-	-	34	12	26	-	-	-	-	-	-
.530	-	-	-	-	-	3	2	-	-	-	-	-
.568	-	-	-	5	2	2	2	2	-	-	-	-
.623	14	4	9	5	5	13	1	-	-	35	1	1
.684	7	2	8	7	3	8	-	-	-	1	-	-
.725	-	-	-	2	-	9	-	-	-	-	-	-
.774	-	-	-	25	8	14	2	-	-	-	-	-
Totals	24	9	26	240	71	167	13	4	1	37	1	1

Date	Tide ^a	Time	.974	.179	.887	.203	.388	.380	.387	.477	.830	.081	.051	.080	.270	.270	14
16	0.4	1904				2	0		2	1					3		14
17	0.3	2132				2	1			2							7
18	0.3	0544	1		1	3	2	1	1	3					1		14
19	0.1	0001			1		3	2		2					1		14
20	-0.1	0215			2	4	1	3		1							15
21	-0.4	0334						7							3		10
22	-0.6	0431				1									4		5
23	-0.7	0528			6	8	7			6					6		33
24	-0.8	0619			4	1	5			4					5		19
25	-0.7	0705				3	8			5					8		24
26	-0.5	0747				2	9			3					9		23
27	-0.3	0812			3		1			2					5	1	12
28	0.0	0822													6		6
March 1															2		2

^aTide height recorded as ± mean sea level at low tide.

Overall, the preponderance of radio-locations on Little Dauphin Island (81%) would indicate that this area is the primary feeding site of wintering Piping Plovers using Mobile Bay at this time. Indeed, under optimal mudflat exposure on Little Dauphin Island, 40, 47, and 50 plovers were censused at the site during the study period; the maximum number on all areas combined was 58. Habitat preference indices also indicate that plovers use areas where mudflat conditions are good (Table 3). For example, 53% of all locations occurred under poor mudflat conditions, 14% under average conditions, and 33% under good conditions (Table 4). However, during the evening period (1800-0600 hrs) 88% of all locations occurred under poor habitat conditions.

Habitat conditions during the 199 potential sampling periods recorded good mudflat/sandflat conditions only 19% of the time whereas poor conditions were in evidence 71% (Table 5). Thus, because preference is high during the limited availability of good habitat conditions, protection of these areas from disturbance would seem a prudent management practice for wintering Piping Plovers in Mobile Bay and elsewhere. Plover locations were fewer from 1800-0600 hrs versus 0600-1800 hrs (Table 4), and few birds were located consistently at night. Thus, most birds currently using study areas during daylight hours probably are roosting alone or in small groups and were not detected consistently. These findings suggest that further research is needed to determine the habitats used by plovers when mudflat conditions are poor as well as to determine roosting habits of this species during winter.

TABLE 3. Habitat preference of Piping Plovers wintering in coastal Alabama, 28 February through 1 March 1987.

Habitat Condition	Use(%)	Availability(%)	Preference ^a
Poor	53.0	70.9	-0.14
Average	14.1	10.5	0.15
Good	32.8	18.6	0.28

^a Preference equals $\frac{\text{percentage use} - \text{percentage availability}}{\text{percentage use} + \text{percentage availability}}$ (Ivlev 1961).

TABLE 4. Exposed sandflat and mudflat conditions during 594 radio-locations of Piping Plovers from 28 February through 1 March 1987.

Time	Poor		Average		Good	
	Number	%	Number	%	Number	%
0600- 1800	234	46.6	75	14.9	193	38.4
1800- 0600	81	88.0	9	9.8	2	2.2
Totals	315	53.0	84	14.1	195	32.8

TABLE 5. Exposed sandflat and mudflat conditions during 199 potential sampling periods of Piping Plovers, 28 February through 1 March 1987.

Time	Habitat Conditions					
	Poor		Average		Good	
	Number	%	Number	%	Number	%
0600-1800	90	65.7	17	12.4	30	21.9
1800-0600	51	82.3	4	6.4	7	11.3
Totals	141	70.9	21	10.5	37	18.6

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