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A SURVEY OF THE SEPTEMBER 1979 HURRICANE DAMAGE TO ALABAMA CLAPPER RAIL HABITAT*

Along the northern Gulf Coast, effects of severe storms on wetland habitats are poorly understood, particularly those of clapper rails (*Rallus longirostris*). This project offered an unique opportunity to survey the September 13, 1979 storm damage to Alabama clapper rail marshes. This species ranges along the entire Mississippi Sound area and in the lower reaches of Mobile Bay in isolated pockets wherever *Spartina alterniflora* marshes occur. This wetland is subjected to a limited tidal range (at < 0.5m. daily) and is adjacent to shallow water. During violent storms these marshlands are unprotected from destructive wave and wind forces. A review of the literature reveals that as yet few biological data have been published about the aftershock of Hurricane Frederic.

On the evening of September 13, 1979, the center of this tropical cyclone passed directly between Petit Bois Island, Mississippi and Dauphin Island, Alabama (U.S. Army Corps of Engineers, Mobile District, 1981). Landfall occurred east of Pascagoula, Mississippi with peak gusts of 222 km.p.h. recorded before equipment failure from a Cooperative Hurricane Reporting Network (CHURN) station located on the Dauphin Island bridge. This storm moved northward, causing significant damage to portions of Alabama, Florida, and Mississippi. Most of the destruction of wetland and beach areas was due primarily to the transport of sea water and beach sand northward. The primary dune system from Pensacola, Florida, to Horn Island, Mississippi, was severely altered. Washovers from the

Gulf caused damage to littoral features at Gulf Shores State Park, Little Lagoon, the areas from Little Point Clear to Fort Morgan and the entire western half of Dauphin Island, all in Alabama. The mainland shore of the latter two land masses were eroded extensively, resulting in sand flats and large tidal pools. Elsewhere along the Alabama coast aerial photography and subsequent field observations confirmed scattered sand intrusions and new open water areas in previously uninterrupted wetlands. In Mobile Bay the northward water surge carried detritus and debris into estuarine tributaries. This report gives no quantitative data concerning the loss of wildlife in these marshlands.

Fujita *et al.* (1980) identified approximately 1,500 damage vectors (direction of tree and structural damage) for the north Gulf coastal region. Each was assigned an F-scale category, and plotted on U.S.G.S. topographic maps of 1:250,000 scale. The "Fujita scale" (F-scale) estimates the windspeeds of hurricanes and tornadoes based on the resultant damage occurring to trees and buildings: FO (64-116 km.p.h.) light damage; F1 (117-179 km.p.h.) moderate damage; and F2 (180-251 km.p.h.) considerable damage. Isolines of F-scale values were contoured at 118, 160 and 200 km.p.h. Because there were no trees and man-made structures in the marshes, structural damage could not be used to determine F-scale values. They plotted damage vectors in the mainland coastal zone with numerous isotachs of 200 km.p.h. within the 160 km.p.h. contour. Based on this information windspeed in these marshes could have attained sustained winds up to 160 km.p.h. and possibly higher. *The Damage Map of Hurricane Frederic* (Fujita *et al.*, 1980) did not show damage vectors for small islands and certain coastal Alabama marshes.

The purpose of this paper is to (a)

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make a general comparison of post storm habitat of the clapper rail (*Rallus longirostris*) with that described in an earlier study (Holliman, 1978); and (b) to access water and wind damage on these *Spartina alterniflora* marshes.

METHODS AND MATERIALS

During the period of June 5 to December 6, 1980, seven trips were made to survey the fifteen study areas previously studied in 1978 (Figure 1). Post storm satellite imagery and low-level aerial photography were reviewed before these locations were revisited. Most study areas were reached by boat and then examined on foot. Changes of the shoreline and silting of the mouths of tidal creeks made it impossible to retrace previously set transects at certain study areas. At these localities vegetative patterns along the original transect were examined with 8.5 x 40 binoculars from a boat, and the marsh was entered from another direction. Population estimates of clapper rails were based upon counts

of call notes, rail signs, and visual inspection of habitat conditions. Attempts were made to either flush birds or to solicit calls. Taped calls, using both the eastern clapper "kek" and "clatter" call, were broadcast with a portable Sony TC 9001 tape recorder*. Field trips were made during the early morning hours. Weather data were recorded. If readings exceeded 2 (Beaufort scale) for either sky or wind the count was not made. Damage vectors were determined by plotting the direction of erosion of insular berms and the dislocation or disappearance of plants associated with these berms. These vectors were compared with those mapped by Fujita *et al.* (1980) on the mainland. A single spot check was made in each locality.

RESULTS

A portion of the Table previously published (Holliman, 1978) along with

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Figure 1 — Damage map of study area.

- — Damage vectors of marshland
- — FI value 160 + km.p.h. (Fujita *et al.*, 1980)

- ➔ — FI value 200 + km.p.h. (Fujita *et al.*, 1980)
- ▲ — Location of CHURN Station

data gathered during this study are presented for comparative purposes (Table 1).

line and the sand dune system on the Gulf side. Oyster Bay marsh, positioned inland on the Baldwin County shore, was

Table 1. Characterization of clapper rail study areas before and after storm.

Locality No.	Location	Pre storm				Post storm			
		Juncus %	Other %	Spartina %	Rails/ Hectare	Juncus %	Other %	Spartina %	Rails/ Hectare
1	Bayou la Fourche	90	—	10	1.14	90	—	10	1.24
2	Bull Bay Bayou	85	—	15	.84	85	—	15	.90
3	Marsh Island, Grand Bay	15	5	80	1.72	15	5	80	1.60
4	Point aux Pins	15	10	75	1.51	15	10	75	1.65
5	Little Bay and Little River	30	20	50	1.21	30	20	50	1.30
6	Isle aux Herbs	3	2	95	2.02	3	2	95	2.00
7	Marsh Island Portersville Bay	10	5	85	2.64	10	5	85	2.51
8	Cat Island	30	20	50	1.36	30	20	50	1.28
9	West Fowl River	60	—	40	1.01	60	—	40	1.10
10	Heron Bay Bayou	35	—	65	2.22	40	—	60	1.98
11	West End of Dauphin Island	2	95	3	.12	0	0	0	0
12	Little Dauphin Island	70	5	25	.91	50	5	15	.30
13	Graveline Bay (Airport Marsh)	35	5	60	1.70	35	5	60	1.85
14	St. Andrews Bay								
	Little Point Clear	50	10	40	1.24	50	10	40	1.18
15	Oyster Bay	80	5	15	.32	80	5	15	.30

DISCUSSION

Sand deposition altered wetland topography and subsequently the distribution of *Spartina alterniflora* and clapper rails wherever the Gulf surge occurred. Sand transport on Petit Bois Island, Mississippi was much less severe than on eastern Alabama shores (U.S. Army Corps of Engineers, 1981). This was due to hurricane force winds from the north that counteracted the storm surge from the Gulf. The ENE winds that moved across Dauphin Island probably had little effect upon the Gulf surge.

Deposits of sand were primarily responsible for the reduction and alterations of rail habitat in two study areas. Marshes on Little Dauphin Island and on west Dauphin Island experienced considerable deposition of sand. Graveline Bay marsh also on Dauphin Island was partially sheltered by the existing tree

subjected to easterly winds but experienced little damage. The Little Point Clear marshes also received easterly winds but were apparently protected by elevated beaches separating them. To the west of Mobile Bay northerly winds swept across the wetlands.

With the exception of Cat Island, the surface areas of the other study areas were not reduced. Cat Island lost a 60-75 meter sand and shell rim that extended towards the mainland. Additionally, the berms that faced northward on this island were noticeably eroded with some displacement of saltbush vegetation. On Isle aux Herbs the north berm of the southern half of the island was slightly damaged with noticeable displacement of the line of saltbush plants. Hurricane force winds out of the north likewise caused limited damage to mainland facing berms on the other islands. These same winds however, lessened the chance for more extensive sanding of marshlands on the

Gulf side by counteracting the Gulf surge. Although damage vectors were plotted using berm and saltbush alterations as indicators, there was no accurate method for determining exact windspeed as described by Fujita *et al.* (1980).

Pre-storm population levels of clapper rails occurred where *Spartina alterniflora* marshes were not significantly altered. Little Dauphin Island and west Dauphin Island wetlands were changed and showed a reduction in population levels. The size of the other marshes was not significantly reduced by sand deposits or debris. *Spartina alterniflora* regrowth on Little Dauphin Island is already under way in areas of light sanding. The clapper rail population on this island will likely return to pre-storm levels. The emerging *Spartina alterniflora* marsh on the western end of Dauphin Island, if left unaltered by drainage ditches, will ultimately revert to its original condition. Coastal marshes in the north Gulf of Mexico have been exposed to similar storms and have survived or recovered and are one of the more adaptable of our ecosystems, with the capability of recovering rapidly from such natural phenomena.

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