

AREAL EXTENT OF WETLANDS ABOVE AND BELOW  
THE 10-FOOT CONTOUR LINE IN ALABAMA

by:

Catherine E. Rathbun  
Mary C. Watzin  
James B. Johnston  
U.S. Fish and Wildlife Service  
National Wetlands Research Center  
1010 Gause Blvd.  
Slidell, LA 70458

and

Patrick E. O'Neil  
Geological Survey of Alabama  
P.O. Box 0, University Station  
Tuscaloosa, AL 35486

This report should be cited as:

Rathbun, C.E., M.C. Watzin, J.B. Johnston, P.E. O'Neil. 1987. Areal extent of wetlands above and below the 10-foot contour line in Alabama. U.S. Fish Wildl. Serv. NWRC Open File Rep. 86-3. 9 pp.

GA  
54 201  
1000  
R.  
1927  
1001

## CONTENTS

	<u>Page</u>
INTRODUCTION .....	1
METHODS .....	2
Sensitive habitat mapping procedures .....	2
Measurements of wetlands above and below the 10-foot contour line .....	4
RESULTS AND DISCUSSION .....	5
LITERATURE CITED .....	9

## INTRODUCTION

Alabama's coastal region includes large expanses of bottomland hardwood forest, wide marshes, extensive shallow water flats, and two large coastal barriers. These wetland habitats are vital for Alabama's numerous fish and wildlife species. For example, the Mobile Delta is an important wintering waterfowl habitat for many species, including the American coot (Fulica americana) and the wood duck (Aix sponsa) (Friend et al. 1981). Mobile Bay, one of the Nation's largest estuaries, serves as a nursery ground for many fish and shellfish species such as the Atlantic croaker (Micropogonias undulatus) and the brown shrimp (Penaeus aztecus). Commercial fisheries in coastal Alabama had a value exceeding \$40 million in 1983.<sup>1</sup> In addition to fish and wildlife support, these wetlands also serve as buffers against the physical force of waves, winds and tides, and trap and remove nutrients and contaminants from the water column.

Undeniably, Alabama's wetland habitats are ecologically important. They are, however, also commercially valuable. Mobile Bay has been extensively dredged for navigation and numerous wetlands have been filled for port development and other commercial activities. Coastal areas have also recently become the focus of oil and gas exploration and development. The demand for residential development in wetland areas is increasing, particularly around cities and towns and along the beaches. Unfortunately, the use of wetlands for these purposes usually results in their damage or destruction. This damage or destruction eliminates important fish and wildlife habitats and diminishes other ecological functions of the wetland.

Alabama's Coastal Zone Management (CZM) program, first approved and implemented in 1979 and revised in 1982, was designed to provide a framework for coastal planning and regulation that would minimize conflict between the many users of coastal wetlands. The CZM legislation defines the 10-ft elevation contour line as the inland boundary of the coastal zone. This particular boundary was agreed upon after considerable debate and compromise during the legislative hearings. Wetlands in the coastal zone are protected by various regulations.

In 1983, the Geological Survey of Alabama and the U.S. Fish and Wildlife Service (FWS) conducted a mapping study of the Alabama coastal region in order to locate particularly sensitive habitats and to identify zones of active shoreline change. Sensitive habitats were defined in that study as those

---

<sup>1</sup>Based on statistics available from National Fisheries Statistics Program, National Marine Fisheries Service, Washington, D.C.

vulnerable to the physical and chemical stresses resulting from development. According to this definition, most of Alabama's coastal wetlands were considered to be sensitive habitats. When that mapping study was completed, it became apparent that a significant amount of wetlands in the coastal region are above the 10-ft contour, and therefore outside the legal coastal zone. These wetlands are unprotected by CZM legislation. The objective of the follow-up study presented in this report is to approximate and compare the areal extent of wetlands in coastal Alabama that fall above the 10-ft contour line to those that fall below the contour line.

## METHODS

### SENSITIVE HABITAT MAPPING PROCEDURES

Estimates of wetland area above and below the 10-ft contour were obtained from the sensitive-habitat maps prepared in the original study by the Geological Survey of Alabama and the FWS. These 27 sensitive habitat maps contain information about wetland habitat types and locations, socioeconomic features, and shoreline change. Each map corresponds to one U.S. Geological Survey (USGS) 7.5 min topographic quadrangle. The maps depict areas surrounding Mobile Bay and include most of the Alabama coastal zone (Figure 1). Specific wetland habitat types that were included on the sensitive-habitat maps were summarized from the FWS National Wetland Inventory (NWI) classification system (Cowardin et al. 1979). They are:

1. Forested wetland. Two NWI classifications are included in this habitat type: palustrine forested (PFO) and scrub-shrub areas (PSS). These classifications include a variety of nonemergent freshwater wetland habitats ranging from bottomland hardwoods and tupelo-bay swamps to wet pine savannahs and associated mesic woods and bogs. Palustrine habitats are extensive in and around Perdido Bay, Mississippi Sound and the Mobile River Delta.
2. Marsh. Two types of emergent habitats are designated in this category: nonfresh and fresh marsh. Nonfresh marsh includes estuarine emergents (NWI classes E1EM, E2EM); fresh marsh includes palustrine and lacustrine emergents (PEM, LEM) and mixed scrub-shrub and emergent (PSS/EM) classes. The greatest threats to marsh habitats in coastal Alabama are dredging, filling, and erosion.
3. Beach-dune complex. The NWI classifications included here are marine beach bar (M2BB) and associated upland beach-dune (UBD) areas. These habitats are extensively used for recreation, but are also critical habitat for several threatened or endangered wildlife species such as the Arctic peregrine falcon (Falco peregrinus tundrius) and the Atlantic loggerhead sea turtle (Caretta caretta) (U.S. Fish and Wildlife Service 1985). Extensive residential construction is the greatest threat to these habitats.

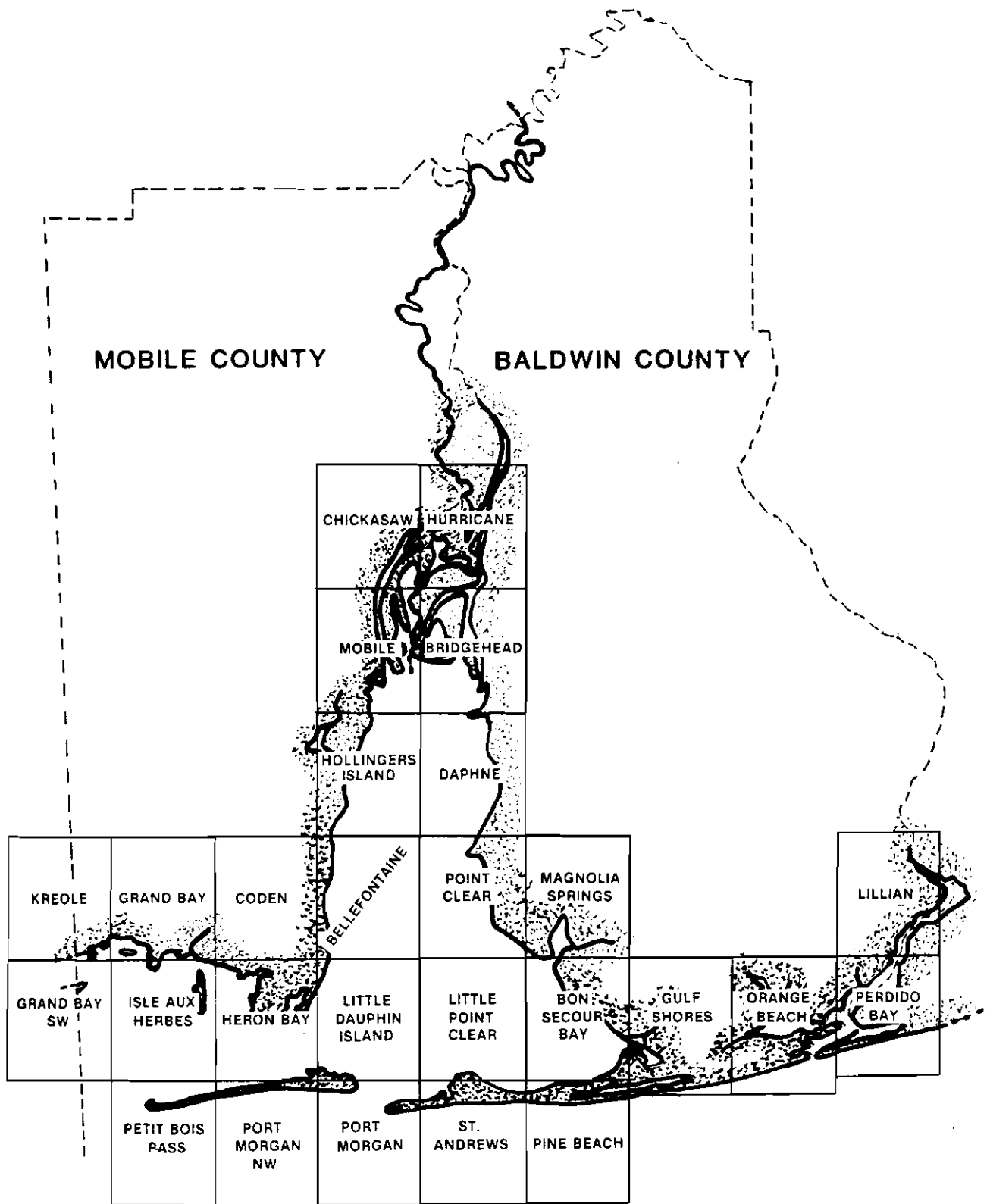


Figure 1. Location of the twenty-seven 7.5 min quadrangles depicting areas surrounding Mobile Bay and including the Alabama coastal zone.

4. Flats. NWI classifications include estuarine and palustrine flats (E2FL, PFL). Sand and mud flats are considered sensitive habitats because of their role in rapid nutrient recycling and as major feeding areas for top carnivores within estuarine food webs.
5. Submerged aquatic vegetation (SAV). NWI classifications selected for this habitat include estuarine aquatic bed (E1AB, E2AB) and marine aquatic bed (M1AB, M2AB). In coastal Alabama, SAV is restricted to the quiet waters along shorelines and has a limited distribution. SAV is extremely sensitive to changes in the physical or chemical character of coastal waters.
6. Reefs. The NWI classification type used was estuarine reefs (E1RF2), i.e., oyster reefs. Oyster reefs were included because of their importance to the coastal economy. Oysters are particularly vulnerable to physical and chemical changes in their habitat because they are sessile.

In addition to the wetland habitats listed above, several other specific areas were also considered sensitive: wildlife refuges, State parks, bird sanctuaries, waterfowl concentration areas, and bird colonies. A list of the socioeconomic features (such as parks and refuges), as well as a complete explanation of the calculation of the shoreline change values that appear on the maps can be obtained from either the FWS National Wetlands Research Center in Slidell, Louisiana, or the Geological Survey of Alabama.<sup>2</sup>

The sensitive habitats were mapped by the Geological Survey of Alabama. Wetland habitats were initially color-coded by type on paper copies of NWI maps (1:24,000 scale). Other sensitive areas were then superimposed on these wetland maps. After these paper maps were checked, the information was hand-transferred to stable-base mylar overlays and each sensitive-habitat polygon was appropriately labeled.

FWS mapping conventions were used in drawing and labeling habitat polygons. To simplify the maps, two other mapping conventions were used. Small islands (<10 acres) of nonsensitive habitat surrounded by sensitive habitat were considered sensitive; conversely, small islands of sensitive habitat (<10 acres) surrounded by nonsensitive habitat were considered nonsensitive.

#### MEASUREMENT OF WETLANDS ABOVE AND BELOW THE 10-FOOT CONTOUR LINE

The area of wetland habitat above and below the 10-ft contour line was planimetered at the FWS National Wetlands Research Center in Slidell, with a Salmoiraghi model-236 planimeter. The smallest area this device measures is about 1.8 acres (0.0029 mi<sup>2</sup>). Each wetland polygon was traced until three

---

<sup>2</sup>For addresses, see title page.

successive planimeter readings were within one increment of each other (one increment = 0.0029 mi<sup>2</sup>). The following wetland habitat types above and below the 10-ft contour line were planimetered: forested wetland, fresh and nonfresh marsh, and beach-dune complex. Flats, SAV, and reefs were not planimetered because they occur mostly in intertidal and subtidal areas that are only found below the 10-ft contour line. Although flats and SAV associated with palustrine areas could occur both above and below the 10-ft contour line, these areas were uncommon and therefore, were not planimetered.

Paper copies reproduced from the final mylar sensitive habitat maps were used for planimetering. Elevations were transferred to these work maps from mylar copies of USGS topographic quadrangles. The accuracy of acreage figures generated by planimetering on paper maps is limited because paper is not scale stable (i.e., it can stretch or shrink with age). These paper work maps are also not geographically correct to USGS standards because they are third generation copies. The mapping convention of excluding wetlands <10 acres in size also introduced error into the acreage figures.

## RESULTS AND DISCUSSION

Copies of the 27 sensitive-habitat maps are housed both at the Geological Survey of Alabama and the FWS National Wetlands Research Center. These maps include all of the sensitive habitat polygons, shoreline change notations, and socioeconomic features. Copies of these maps are available from the Geological Survey of Alabama.<sup>3</sup>

The areal extent of wetlands above and below the 10-ft contour line is presented in Tables 1 and 2. The relative percentages of wetlands above and below the 10-ft contour are also presented. These percentages should be quite comparable, but we emphasize again that the acreage figures are only general estimates because of the limits of the techniques employed. Despite this fact, the data in Table 1 have interesting implications for Alabama's CZM legislation. As previously mentioned, the inland limit of CZM authority was placed at the 10-ft contour. The data show that approximately 28% (46,509 acres) of Alabama's coastal wetlands are above the 10-ft contour line and are thus excluded from CZM protection. Most of this excluded wetland (41,888 acres) is forested and is located in the area depicted by the Chickasaw, Grand Bay, Coden, Magnolia Springs, Gulf Shores, and Lillian quadrangles (Table 2). The area shown by the Coden quad is especially rich in forested wetland above the 10-ft contour line, containing approximately 12,122 acres. About half of all fresh marsh (4,358 acres), located in 18 of the study's 27 quadrangles, is above the 10-ft contour line. Almost all of the nonfresh marsh is below the 10-ft contour line so this habitat type is adequately protected under CZM authority.

---

<sup>3</sup>Maps can be purchased from the Publication Sales Office, Geological Survey of Alabama, P. O. Box 0, University Station, Tuscaloosa, AL 35486 (205-349-2852) for the cost of reproduction.



Table 1. Sensitive wetland areas above and below the 10-ft contour line in coastal Alabama.

Wetland habitat type	Total		Above 10-ft contour line			Below 10-ft contour line		
	mi <sup>2</sup>	acres	mi <sup>2</sup>	acres	percent	mi <sup>2</sup>	acres	percent
Forested wetland	182.65	116,896	65.45	41,888	25.32	117.20	75,008	45.34
Fresh marsh	13.76	8,806	6.81	4,358	2.63	6.95	4,448	2.70
Nonfresh marsh	55.49	35,514	0.07	45	0.03	55.42	35,469	21.44
Beach-dune complex	6.58	4,211	0.34	218	0.13	6.24	3,994	2.41
TOTAL	258.48	165,427	72.67	46,509	28.11	185.81	118,919	71.89

Since 1979, Alabama's CZM legislation has provided a fairly good basis for managing and protecting most of Alabama's coastal resources. However, significant wetlands lie above the 10-ft contour line and, therefore, are excluded from CZM protection. Some of these excluded wetlands may have a different composition than that of the wetlands below the 10-ft contour line. For example, much of the fresh marsh above the 10-ft contour line tends to be pitcher-plant bog or mixed pitcher-plant bog and scrub-shrub. This is in contrast to the fresh marsh below the 10-ft contour line which is more likely to be a truly emergent marsh of alligator grass (Alternanthera philoxeroides), duck potato (Sagittaria falcatta), or cattails (Typha spp.) (Stout 1979). Forested wetland above the 10-ft contour line may be pine savannah and tupelo-bay forests rather than true bottomland hardwood communities of maples, bays, and oaks. The ecological values of pitcher-plant bogs and pine savannahs are not as well known as the values of emergent marshes and bottomland hardwood forests. However, these wetlands are thought to be important in ground water recharge, water storage, and water purification. The red-cockaded woodpecker (Picoides borealis), an endangered species found in Alabama, is dependant upon pine trees for its nesting cavities (Smith 1984).

The ecological role played by wetlands above the 10-ft contour line may be different than the role played by wetlands below the 10-ft contour line, however, both are important to the ecology of Alabama's coastal zone and thus both deserve protection. Any further legal action defining or having an effect on the CZM regulation process should consider this.

Table 2. Wetland areas (mi<sup>2</sup>) by quadrangle (1 mi<sup>2</sup> = 640 acres). See Figure 1 for location of quads.  
 Key: FW-Fresh Wetland; FM-Fresh Marsh; NFM-Nonfresh Marsh; BD-Beach-Dune Complex; FL-Flat.

Quad name	Above (mi <sup>2</sup> )				Below (mi <sup>2</sup> )				Total
	FW	FM	NFM	BD	FW	FM	NFM	BD	
Chickasaw	6.19	0.38	--	--	19.68	0.16	2.21	--	22.05
Hurricane	1.55	0.01	--	--	35.01	0.36	2.88	--	38.25
Mobile	1.62	0.40	--	--	1.45	1.15	2.77	--	5.37
Bridgehead	1.01	0.01	0.01	--	4.49	0.09	13.35	--	17.93
Hollingers Island	1.09	0.11	0.01	--	1.61	0.10	2.52	--	4.23
Daphne	0.55	0.02	--	--	0.04	--	--	--	0.04
Kreole	2.87	0.52	--	--	2.45	0.40	1.82	--	4.67
Grand Bay	9.72	0.76	--	--	5.53	0.28	3.21	--	9.02
Coden	18.94	2.68	0.01	--	3.66	0.40	1.40	--	5.46
Bellefontaine	1.98	0.13	0.01	--	1.16	0.06	0.64	--	1.86
Point Clear	1.65	0.04	--	--	2.34	0.17	--	--	2.51
Magnolia Springs	3.99	0.17	--	--	5.55	0.10	0.70	--	6.35
Grand Bay SW	--	--	--	--	--	--	0.01	--	0.01
Isle aux Herbes	--	--	--	--	--	--	1.22	0.01	1.23
Heron Bay	--	--	--	--	2.55	0.08	10.80	0.20	13.63
Little Dauphin Island	--	--	--	--	0.63	0.07	0.72	0.11	1.53
Little Point Clear	--	--	--	--	--	--	0.81	--	0.81
Bon Secour Bay	1.42	0.04	--	--	5.76	0.04	0.96	--	6.76
Petit Bois Pass	--	--	--	--	--	0.02	0.73	--	0.75
Fort Morgan NW	--	--	--	--	--	0.01	0.42	0.66	1.09
Fort Morgan	--	--	--	--	0.09	0.28	0.22	0.94	1.53
St. Andrews Bay	--	0.01	--	0.06	1.43	0.28	1.05	1.36	4.12
Pine Beach	0.48	0.02	--	0.28	1.19	0.20	0.33	1.12	2.84
Gulf Shores	4.71	0.70	--	--	7.37	1.21	3.21	0.84	12.63
Orange Beach	2.84	0.18	0.02	--	6.12	0.98	2.03	0.97	10.10
Perdido Bay	0.10	--	--	--	0.18	--	0.30	0.03	0.51
Lillian	4.74	0.63	0.01	--	8.91	0.51	1.11	--	10.53
Total	65.45	6.81	0.07	0.34	117.20	6.95	55.42	6.24	185.81



## LITERATURE CITED

- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish Wildl. Serv. FWS/OBS-79/31. 103 pp.
- Friend, J.H., M. Lyon, N. Garret, J.L. Borom, J. Ferguson, and G.C. Lloyd. 1981. Alabama coastal region ecological characterization. Volume 3: a socioeconomic study. U.S. Fish Wildl. Serv. FWS/OBS-81/41. 367 pp.
- Smith, M.F. Jr., ed. 1984. Ecological characterization atlas of coastal Alabama: map narrative. U.S. Fish Wildl. Serv. FWS/OBS-82/46; Minerals Manage. Serv. MMS 84-0052. 198 pp. + 30 maps.
- Stout, J.P. 1979. Marshes of the Mobile Bay estuary: status and evaluation. Pages 113-122 in H. A. Loyacano, Jr. and J. P. Smith, eds. Symposium on the natural resources of the Mobile Bay estuary, Alabama, May, 1979. Sponsored by: Alabama Coastal Area Board, Mississippi-Alabama Sea Grant Consortium, U.S. Fish and Wildlife Service. U.S. Army Corps of Engineers, Mobile District.
- U.S. Fish and Wildlife Service. 1985. Endangered and threatened species of the Southeastern United States: endangered species redbook. Region 4, Atlanta, Georgia. 94 pp.

<b>REPORT DOCUMENTATION PAGE</b>		<b>1. REPORT NO.</b> Open File Report 86-3	<b>2.</b>	<b>3. Recipient's Accession No.</b>
<b>4. Title and Subtitle</b> Aereal Extent of Wetlands Above and Below the 10-foot Contour Line in Alabama			<b>5. Report Date</b> April 1987	
<b>7. Author(s)</b> Catherine E. Rathbun <sup>1</sup> , Mary C. Watzin <sup>1</sup> , James B. Johnston <sup>1</sup> Patrick E. O'Neill <sup>2</sup>			<b>8. Performing Organization Rept. No.</b>	
<b>9. Performing Organization Name and Address</b> <sup>1</sup> U.S. Fish and Wildlife Service National Wetlands Research Center 1010 Gause Blvd. Slidell, LA 70458			<b>10. Project/Task/Work Unit No.</b>	
<sup>2</sup> Geological Survey of Alabama P. O. Box 0 University Station Tuscaloosa, AL 35486			<b>11. Contract(C) or Grant(G) No.</b> (C) (G)	
<b>12. Sponsoring Organization Name and Address</b> U.S. Fish and Wildlife Service National Wetlands Research Center 1010 Bause Blvd. Slidell, LA 70458			<b>13. Type of Report &amp; Period Covered</b>	
<b>15. Supplementary Notes</b>			<b>14.</b>	
<b>16. Abstract (Limit: 200 words)</b>  Alabama's coastal region includes large expanses of wetlands. These wetlands are the sites of intense competition for a variety of uses. Alabama's Coastal Zone Management (CZM) legislation defines the 10-foot elevation contour line as the inland boundary of the coastal zone. This study examined the extent of wetlands above and below the 10-foot contour line in twenty-seven 7½-minute quadrangles in coastal Alabama. About 28% of the wetlands in these quadrangles fell above the 10-foot contour line and thus are not protected by CZM legislation. While these wetlands tended to differ from those below the 10-foot contour line in vegetative composition, they nonetheless do have significant ecological values. Any further legal action defining or having an effect on the CZM regulation process should consider this.				
<b>17. Document Analysis a. Descriptors</b>  Coastal Zone Management                      Habitat Wetlands    Maps Alabama				
<b>b. Identifiers/Open-Ended Terms</b>				
<b>c. COSATI Field/Group</b>				
<b>18. Availability Statement</b>  Unlimited availability		<b>19. Security Class (This Report)</b> Unclassified		<b>21. No. of Pages</b> 9
		<b>20. Security Class (This Page)</b> Unclassified		<b>22. Price</b>

# TAKE PRIDE *in America*



**U.S. DEPARTMENT OF THE INTERIOR**  
**FISH AND WILDLIFE SERVICE**



As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.