

A STUDY DESIGN TO DETERMINE THE PRESENT LEVELS
OF BIRDS AND MAMMALS IN THE ALABAMA COASTAL ZONE*

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ABSTRACT

Pertinent bibliographical citations have been compiled for determining population trends in the Alabama coastal zone. Faunal lists of birds and mammals are documented. A sampling methodology for determining trends in bird and mammal populations is detailed for the Alabama coastal area. Sampling periods, locations, frequencies, work schedule, the number and type of personnel, line item budget recommendations and other methodological considerations are discussed.

FINAL REPORT

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TABLE OF CONTENTS

I	Introduction	1
II	Literature review	4
	A. Birds	5
	B. Mammals	7
III	Faunal lists	9
	A. Check list of coastal Alabama birds	10
	B. Check list of coastal Alabama mammals	20
IV	Sampling methodology - birds	23
	A. Instructions for conducting mainland and water routes	24
	B. Instructions for conducting plot surveys	29
	C. Instructions for conducting specialty surveys	30
V	Sampling methodology - mammals	31
	A. Instructions for conducting specialty surveys	36
VI	Other methodological considerations	37
	A. Work schedule	38
	B. Personnel recommendations	43
	C. Budget-line item recommendations	45
VII	Appendix	46
	A. Bird survey	
	1. Mainland and water route survey	
	2. Field summary sheet for mainland and water route surveys	
	3. Stop description form	
	B. Mammal survey sheets	
	1. Dolphin survey sheet	
	C. Maps	
	1. Route surveys	

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I INTRODUCTION

A sound management and research plan for birds and mammals is needed because of increased alteration and destruction of natural habitat along the Alabama Gulf Coast. This research plan should have the following two components: 1) the capability to identify and to monitor major habitat types. These major habitat units should be classified according to their vegetative composition and to their ecological sensitivity, and 2) the capability to inventory populations and to determine their levels. An inventory determines what species are in a given area. Population studies determine population levels at a given point. Inventory data is required before valid population studies can be made. Both inventory and population studies depend upon a sampling program that will systemically assess wildlife populations along permanent transects; assay vegetation units and allow surveys to be conducted on a periodic basis whenever required.

Information for the first component has already been published in the comprehensive analysis of habitat types by Vittor and Stout, "Delineation of ecological critical areas in the Alabama coastal zone." This important work describes vegetative units below the 50 ft. contour line, and provides a basis for monitoring future habitat changes. Data derived from the development of the second component, as proposed in this document, would enable biologists to solve many of the following problems that still persist in the Alabama coastal area.

Answers are vitally needed relative to the completion of life history and habitat studies for endangered and threathened species. Emphasis should be given to research on the value of wildlife and wildlife habitat to humans. These socio-economic areas are important as attempts are made to provide environmental educational opportunities for people. Nature walks, bird study, esthetics and the economic and indirect benefits of wildlife habitat as well as human health values could be improved. By monitoring bird and mammal populations attention can be given to methods of preventing damage and reducing hazards to people from wildlife. Concerns about damage control and nuisance animals, e.g. transmission of disease such as rabies, wildlife hazards at airports, and alligator-nutria-muskrat control can be dealt with more objectively. Harvest data is non existant concerning the management of game, non game and furbearing mammals in the Mobile Delta regions. Concentrations of wintering waterfowl in the upper bay region and in the Fort Morgan penisula area can be watched so that oil spills and other chemical damage to these birds can be anticipated. The calving and feeding grounds of dolphins could be plotted so that more can be learned of their occurrence in Alabama waters. Post breeding dispersal areas and movements of Brown Pelicans and wading birds in Portersville Bay area can be monitored to ensure their survival at a vulnerable time during late summer. Population data could document a need for additional wildlife habitat. Land acquisition is expensive, but alternatives to purchase may be found in preserving easements, road right of ways and the dedication of permanent open spaces in urban and urbanizing areas. Population studies would also provide a vehicle for the development of ordinances to encourage the establishment of urban wildlife habitat. In such fashion, spoil areas, and sewage disposal and cooling ponds can be used in positive ways to enhance wildlife habitats where ordinarily

the land would not be suitable for multi-purpose programs. Areas that receive heavy sediment loads and excessive surface water run off during the spring can serve as excellent wildlife habitat if they function as shallow marshes that are maintained within a series of dikes. Population data would aid in solving these problems by identifying areas of concentration and habitat preference of birds and mammals.

The proposal concerns the second component of the management and research plan. Bibliographies of works which relate to determining present population levels are enumerated. Faunal lists of birds and mammals are given. Their occurrence in the coastal regions have been documented. A design for the sampling methodology including the sampling periods, locations, frequencies, work schedule, the number and type of personnel, line-item budget recommendations and other methodological considerations are discussed.

II LITERATURE REVIEW

More current field work has been accomplished on the birds of the Alabama coastal region than has been compiled for the mammals. The northern gulf coast has classically been a focal point for ornithological studies during the spring and fall migration periods. As a result of this concentrated interest, two state bird books have been written. Copious records also have been published in the Christmas Count and Season Reports of the National Audubon publications. There have been two state symposia on endangered and threatened birds. The U. S. Fish and Wildlife Service has, for the last 16 years, instituted a breeding bird survey for North America and Canada. These breeding bird surveys have been run for 12 of these 16 years along the Alabama coast. They offer the most current source of information relative to methodological procedures, as well as documenting trends for Alabama gulf coastal bird life for 12 continuous years.

The mammals in the coastal region are less well known than the birds. In 1921, Howell in his A biological survey of Alabama documented the occurrence of certain mammals in Alabama. A Ph.D. dissertation (Holliman, 1963) attempted to update this survey. Other than these works there are only scattered distribution records and no significant methodological procedures described that are directly applicable for determining population trends in the coastal region. Two state projects, nos. W-44 and W-35-22 detail field methods relative to population studies that occurred up state. Linzey's (1970) work represents the latest attempt to complete a mammal inventory for the Alabama coast. There have also been two state symposia on endangered and threatened mammals.

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III FAUNAL LISTS

Presently 365 birds and 54 mammals have been documented as occurring from the Alabama coastal area. Endangered species (E) are those species in danger of extinction throughout all or a significant portion of their range in Alabama. Endangered species are those whose prospects for survival are in immediate jeopardy. An endangered species must have help, or extinction and/or extirpation from Alabama will probably follow. Threatened species (T) are those species which are likely to become endangered within the foreseeable future throughout all or a significant portion of their range in Alabama. Special Concern (S) are those species which must be continually monitored because eminent degrading factors, their limited distribution in Alabama or other physical or biological characteristics may cause them to become threatened or endangered in the foreseeable future. Endangered Species marked with both an "E" and an "*" are listed in the Federal Register and are also on the state list as being endangered. Those without an "*", but marked with either an "E", "T", or "S" are only on the state list of endangered and threatened species.

A. CHECK LIST OF COASTAL ALABAMA BIRDS
(After Imhof, 1976)

Order Gaviiformes - Loons

Family Gaviidae - Loons

<u>Gavia immer</u> (Brunnich)	Common Loon
<u>Gavia arctica</u> (Linnaeus)	Arctic Loon
<u>Gavia stellata</u> (Pontoppidan)	Red-throated Loon

Order Podicipediformes - Grebes

Family Podicipedidae - Grebes

<u>Podiceps grisegena</u> (Boddaert)	Red-necked Grebe
<u>Podiceps auritus</u> (Linnaeus)	Horned Grebe
<u>Podiceps nigricollis</u> Brehm	Eared Grebe
<u>Aechmophorus occidentalis</u> (Lawrence)	Western Grebe
<u>Podilymbus podiceps</u> (Linnaeus)	Pied-billed Grebe

Order Procellariiformes - Tube-nosed swimmers

Family Procellariidae - Shearwaters and Fulmars

<u>Puffinus diomedea</u> (Scopoli)	Cory's Shearwater
<u>Puffinus gravis</u> (O'Reilly)	Greater Shearwater
<u>Puffinus griseus</u> (Gmelin)	Sooty Shearwater
<u>Puffinus lherminieri</u> Lesson	Audubon's Shearwater

Family Hydrobatidae - Storm Petrels

<u>Oceanites oceanicus</u> (Kuhl)	Wilson's Storm Petrel
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Order Pelicaniformes - Totipalmate Swimmers

Family Phaethontidae - Tropicbirds

<u>Phaethon lepturus</u> Daudin	White-tailed Tropicbird
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Family Pelicanidae - Pelicans

<u>Pelecanus erythrorhynchos</u> Gmelin	White Pelican
*(E) <u>Pelecanus occidentalis</u> Linnaeus	Brown Pelican

Family Sulidae - Boobies and Gannets

<u>Sula dactylatra</u> Lesson	Blue-faced Booby
<u>Sula leucogaster</u> (Boddaert)	Brown Booby
<u>Morus bassanus</u> (Linnaeus)	Gannet

Family Phalacrocoracidae - Cormorants

<u>Phalacrocorax carbo</u> (Linnaeus)	Great Cormorant
<u>Phalacrocorax auritus</u> (Lesson)	Double-crested Cormorant

Family Anhingidae - Anhingas

<u>Anhinga anhinga</u> (Linnaeus)	Anhinga
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Family Fregatidae - Frigatebirds
Fregata magnificens Mathews

Magnificent Frigatebird

Order Ciconiiformes - Deep-water Waders

Family Ardeidae - Herons and Bitterns

<u>Ardea herodias</u> Linnaeus	Great Blue Heron
<u>Butorides virescens</u> (Linnaeus)	Green Heron
(S) <u>Florida caerulea</u> (Linnaeus)	Little Blue Heron
<u>Bubulcus ibis</u> Linnaeus	Cattle Egret
(T) <u>Dichromanassa rufescens</u> (Gmelin)	Reddish Egret
<u>Casmerodius albus</u> (Linnaeus)	Great Egret
<u>Egretta thula</u> (Molina)	Snowy Egret
<u>Hydranassa tricolor</u> (Muller)	Louisiana Heron
(S) <u>Nycticorax nycticorax</u> (Linnaeus)	Black-crowned Night Heron
<u>Nyctanassa violacea</u> (Linnaeus)	Yellow-crowned Night Heron
<u>Ixobrychus exilis</u> (Gmelin)	Least Bittern
<u>Botaurus lentiginosus</u> (Rackett)	American Bittern

Family Ciconiidae - Storks and Wood Ibises

(S) <u>Mycteria americana</u> Linnaeus	Wood Stork
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Family Threskiornithidae - Ibises and Spoonbills

<u>Plegadis falcinellus</u> (Linnaeus)	Glossy Ibis
<u>Plegadis chihi</u> (Vieillot)	White-faced Ibis
<u>Eudocimus albus</u> (Linnaeus)	White Ibis
<u>Ajaia ajaja</u> (Linnaeus)	Roseate Spoonbill

Order Anseriformes - Lamellate-billed Swimmers

Family Anatidae - Swans, Geese, and Ducks

<u>Cygnus olor</u> (Gmelin)	Mute Swan
<u>Olor columbianus</u> (Ord)	Whistling Swan
<u>Branta canadensis</u> (Linnaeus)	Canada Goose
<u>Anser albifrons</u> (Scopoli)	White-fronted Goose
<u>Chen caerulescens</u> (Linnaeus)	Snow Goose
<u>Dendrocygna bicolor</u> (Vieillot)	Fulvous Tree Duck
<u>Anas platyrhynchos</u> Linnaeus	Mallard
<u>Anas rubripes</u> Brewster	Black Duck
(T) <u>Anas fulvigula</u> Ridgway	Mottled Duck
<u>Anas strepera</u> Linnaeus	Gadwall
<u>Anas acuta</u> Linnaeus	Pintail
<u>Anas bahamensis</u> Linnaeus	Bahama Duck
<u>Anas crecca</u> Gmelin	Green-winged Teal
<u>Anas discors</u> Linnaeus	Blue-winged Teal
<u>Anas querquedula</u> Linnaeus	Carganey Teal
<u>Anas cyanoptera</u> Vieillot	Cinnamon Teal
<u>Anas americana</u> Gmelin	American Wigeon
<u>Anas cylpeata</u> Linnaeus	Northern Shoveler
<u>Aix sponsa</u> (Linnaeus)	Wood Duck
<u>Aythya americana</u> (Eyton)	Redhead
<u>Aythya collaris</u> (Donovan)	Ring-necked Duck
<u>Aythya valisineria</u> (Wilson)	Canvasback

<u>Aythya marila</u> (Linnaeus)	Greater Scaup
<u>Aythya affinis</u> (Eyton)	Lesser Scaup
<u>Bucephala clangula</u> (Linnaeus)	Common Goldeneye
<u>Bucephala albeola</u> (Linnaeus)	Bufflehead
<u>Clangula hyemalis</u> (Linnaeus)	Oldsquaw
<u>Histrionicus histrionicus</u> (Linnaeus)	Harlequin Duck
<u>Melanitta deglandi</u> (Bonaparte)	White-winged Scoter
<u>Melanitta perspicillata</u> (Linnaeus)	Surf Scoter
<u>Melanitta nigra</u> (Linnaeus)	Black Scoter
<u>Oxyura jamaicensis</u> (Gmelin)	Ruddy Duck
<u>Lophodytes cucullatus</u> (Linnaeus)	Hooded Merganser
<u>Mergus merganser</u> Linnaeus	Common Merganser
<u>Mergus serrator</u> Linnaeus	Red-breasted Merganser

Order Falconiformes - Vultures and Diurnal Birds of Prey

Family Cathartidae - New World Vultures

<u>Cathartes aura</u> (Linnaeus)	Turkey Vulture
<u>Coragyps atratus</u> (Bechstein)	Black Vulture

Family Accipitridae - Kites, Eagles, and Hawks

<u>Elanus leucurus</u> (Vieillot)	White-tailed Kite
(S) <u>Elanoides forficatus</u> (Linnaeus)	Swallow-tailed Kite
<u>Ictinia mississippiensis</u> (Wilson)	Mississippi Kite
(S) <u>Accipiter striatus</u> Vieillot	Sharp-shinned Hawk
<u>Accipiter gentilis</u> (Linnaeus)	Goshawk
(S) <u>Accipiter cooperii</u> (Bonaparte)	Cooper's Hawk
<u>Buteo jamaicensis</u> (Gmelin)	Red-tailed Hawk
(S) <u>Buteo lineatus</u> (Gmelin)	Red-shouldered Hawk
<u>Buteo platypterus</u> (Vieillot)	Broad-winged Hawk
<u>Buteo swainsoni</u> Bonaparte	Swainson's Hawk
<u>Buteo brachyurus</u> Vieillot	Short-tailed Hawk
<u>Buteo lagopus</u> (Pontoppidan)	Rough-legged Hawk
(E) <u>Aquila chrysaetos</u> (Linnaeus)	Golden Eagle
* (E) <u>Haliaeetus leucocephalus</u> (Linnaeus)	Bald Eagle
<u>Circus cyaneus</u> (Linnaeus)	Marsh Hawk

Family Pandionidae - Ospreys

(E) <u>Pandion haliaetus</u> (Linnaeus)	Osprey
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Family Falconidae - Caracaras and Falcons

* (E) <u>Falco peregrinus</u> Tunstall	Peregrine Falcon
(S) <u>Falco columbarius</u> (Linnaeus)	Merlin
<u>Falco sparverius</u> Linnaeus	American Kestrel

Order Galliformes - Chickenlike Birds

Family Phasianidae - Quails and Pheasants

<u>Colinus virginianus</u> (Linnaeus)	Bobwhite
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Family Meleagrididae - Turkeys

<u>Meleagris gallopavo</u> Linnaeus	Turkey
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Order Gruiformes - Marsh Birds

Family Gruidae - Cranes

(S) <u>Grus canadensis</u> Linnaeus	Sandhill Crane
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Family Rallidae - Rails, Gallinules, and Coots

<u>Rallus elegans</u> Audubon	King Rail
<u>Rallus longirostris</u> Boddaert	Clapper Rail
<u>Rallus limicola</u> Vieillot	Virginia Rail
<u>Porzana carolina</u> (Linnaeus)	Sora
<u>Coturnicops noveboracensis</u> (Gmelin)	Yellow Rail
(S) <u>Laturallus jamaicensis</u> (Gmelin)	Black Rail
<u>Porphyryla martinica</u> (Linnaeus)	Purple Gallinule
<u>Gallinula chloropus</u> (Linnaeus)	Common Gallinule
<u>Fulica americana</u> Gmelin	American Coot

Order Charadriiformes - Shore Birds, Gulls, and Auks

Family Haematopodidae - Oystercatchers

(S) <u>Haematopus palliatus</u> Temminck	American Oystercatcher
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Family Charadriidae - Plovers and Turnstones

<u>Charadrius semipalmatus</u> Bonaparte	Semipalmated Plover
<u>Charadrius melodus</u> Ord	Piping Plover
(E) <u>Charadrius alexandrinus</u> Linnaeus	Snowy Plover
<u>Charadrius wilsonia</u> Ord	Wilson's Plover
<u>Charadrius vociferus</u> Linnaeus	Killdeer
<u>Charadrius montanus</u> Townsend	Mountain Plover
<u>Pluvialis dominica</u> Muller	American Golden Plover
<u>Pluvialis squatarola</u> (Linnaeus)	Black-bellied Plover

Family Scolopacidae - Snipe, Woodcock, and Sandpipers

<u>Arenaria interpres</u>	Ruddy Turnstone
<u>Philohela minor</u> (Linnaeus)	American Woodcock
<u>Capella gallinego</u> (Linnaeus)	Common Snipe
<u>Numenius americanus</u> Bechstein	Long-billed curlew
<u>Numenius phaeopus</u> (Linnaeus)	Whimbrel
<u>Bartramia longicauda</u> (Bechstein)	Upland Sandpiper
<u>Actitis macularis</u> (Linnaeus)	Spotted Sandpiper
<u>Tringa solitaria</u> Wilson	Solitary Sandpiper
<u>Tringa melanoleuca</u> (Gmelin)	Greater Yellowlegs
<u>Tringa flavipes</u> (Gmelin)	Lesser Yellowlegs
<u>Catoptrophorus semipalmatus</u> (Gmelin)	Willet
<u>Calidris canutus</u> (Linnaeus)	Red Knot
<u>Calidris melanotos</u> (Vieillot)	Pectoral Sandpiper
<u>Calidris fuscicollis</u> (Vieillot)	White-rumped Sandpiper
<u>Calidris bairdii</u> (Coues)	Baird's Sandpiper
<u>Calidris minutilla</u> (Vieillot)	Least Sandpiper
<u>Calidris ferruginea</u> (Pontoppidan)	Curlew Sandpiper
<u>Calidris alpina</u> (Linnaeus)	Dunlin
<u>Calidris pusilla</u> (Linnaeus)	Semipalmated Sandpiper
<u>Calidris mauri</u> (Cabanis)	Western Sandpiper
<u>Calidris alba</u> (Pallas)	Sanderling
<u>Limnodromus griseus</u> (Gmelin)	Short-billed Dowitcher
<u>Limnodromus scolopaceus</u> (Say)	Long-billed Dowitcher
<u>Micropalama himantopus</u> (Bonaparte)	Stilt Sandpiper
<u>Tryngites subruficollis</u> (Vieillot)	Buff-breasted Sandpiper
<u>Limosa fedoa</u> (Linnaeus)	Marbled Godwit
<u>Limosa haemastica</u> (Linnaeus)	Hudsonian Godwit

Family Recurvirostridae - Avocets and Stilts

Recurvirostra americana Gmelin
Himantopus mexicanus (Muller)

American Avocet
Black-necked Stilt

Family Phalaropodidae - Phalaropes

Phalaropus fulicarius (Linnaeus)
Steganopus tricolor Vieillot
Lobipes lobatus (Linnaeus)

Red Phalarope
Wilson's Phalarope
Northern Phalarope

Family Stercorariidae - Skuas and Jaegers

Stercorarius pomarinus (Temminck)
Stercorarius parasiticus (Linnaeus)
Stercorarius longicaudus Vieillot

Pomarine Jaeger
Parasitic Jaeger
Long-tailed Jaeger

Family Laridae - Gulls and Terns

Larus hyperboreus Gunnerus
Larus marinus Linnaeus
Larus fuscus Linnaeus
Larus argentatus Pontoppidan
Larus delawarensis Ord
Larus ridibundus Linnaeus
Larus atricilla Linnaeus
Larus pipixcan Wagler
Larus philadelphia (Ord)
Rissa tridactyla (Linnaeus)
Xema sabini (Sabine)
Gelochelidon nilotica Gmelin
Sterna forsteri Nuttall
Sterna hirundo Linnaeus
Sterna dougallii Montague
Sterna fuscata Linnaeus
Sterna anaethetus Scopoli
Sterna albifrons Pallas
Thalasseus maximus (Boddaert)
Thalasseus sandvicensis (Latham)
Hydroprogne caspia (Pallas)
Chlidonsia niger (Linnaeus)
Anous stolidus (Linnaeus)

Glaucous Gull
Great Black-backed Gull
Lesser Black-backed Gull
Herring Gull
Ring-billed Gull
Black-headed Gull
Laughing Gull
Franklin's Gull
Bonaparte's Gull
Black-legged Kittiwake
Sabine's Gull
Gull-billed Tern
Forster's Tern
Common Tern
Roseate Tern
Sooty Tern
Bridled Tern
Least Tern
Royal Tern
Sandwich Tern
Caspian Tern
Black Tern
Noddy Tern

Family Rynchopidae - Skimmers

Rynchops niger Linnaeus

Black Skimmer

Order Columbiformes - Pigeons and Doves

Family Columbidae - Pigeons and Doves

Columba fasciata Say
Columba livia Gmelin
Zenaida asiatica (Linnaeus)
Zenaida macroura (Linnaeus)
Columbina passerina (Linnaeus)

Band-tailed Pigeon
Rock Dove
White-winged Dove
Mourning Dove
Ground Dove

Order Cuculiformes - Cuckoo-like Birds

Family Cuculidae - Cuckoos, Roadrunners, and Anis

Coccyzus americanus (Linnaeus)

Yellow-billed Cuckoo

Coccyzus erythrophthalmus (Wilson)
Crotophaga sulcirostris Swainson

Black-billed Cuckoo
Groove-billed Ani

Order Strigiformes - Nocturnal Birds of Prey

Family Tytonidae - Barn Owls
Tyto alba (Scopoli)

Barn Owl

Family Strigidae - Typical Owls

Otus asio (Linnaeus)
Bubo virginianus (Gmelin)
Nyctea scandiaca (Linnaeus)
Speotyto cunicularia (Molina)
Strix varia Barton
Asio otus (Linnaeus)
Asio flammeus (Pontoppidan)

Screech Owl
Great Horned Owl
Snowy Owl
Burrowing Owl
Barred Owl
Long-eared Owl
Short-eared Owl

Order Caprimulgiformes - Oil-birds and Goatsuckers

Family Caprimulgidae - Goatsuckers
Caprimulgus carolinensis Gmelin
Caprimulgus vociferus Wilson
Chordeiles minor (Forster)

Chuck-will's-widow
Whip-poor-will
Common Nighthawk

Order Apodiformes - Swifts and Hummingbirds

Family Apodidae - Swifts
Chaetura pelagica (Linnaeus)

Chimney Swift

Family Trochilidae - Hummingbirds
Archilochus colubris (Linnaeus)
Selasphorus rufus (Gmelin)

Ruby-throated Hummingbird
Rufous Hummingbird

Order Coraciiformes - Kingfishers

Family Alcedinidae - Kingfishers
Megaceryle alcyon (Linnaeus)

Belted Kingfisher

Order Piciformes - Woodpecker

Family Picidae - Woodpeckers
Colaptes auratus (Linnaeus)
Dryocopus pileatus (Linnaeus)
Centurus carolinus (Linnaeus)
Melanerpes erythrocephalus (Linnaeus)
Sphyrapicus varius (Linnaeus)
Dendrocopus villosus (Linnaeus)
Dendrocopus pubescens (Linnaeus)
*(E) Dendrocopus borealis (Vieillot)

Common Flicker
Pileated Woodpecker
Red-bellied Woodpecker
Red-headed Woodpecker
Yellow-bellied Sapsucker
Hairy Woodpecker
Downy Woodpecker
Red-cockaded Woodpecker

Order Passeriformes - Passerines

Family Tyrannidae - New World Fly Catchers

<u>Tyrannus tyrannus</u> (Linnaeus)	Eastern Kingbird
<u>Tyrannus dominicensis</u> (Gmelin)	Gray Kingbird
<u>Tyrannus melancholicus</u> Vieillot	Tropical Kingbird
<u>Tyrannus verticolis</u> Say	Western Kingbird
<u>Muscivora forficata</u> (Gmelin)	Scissor-tailed Flycatcher
<u>Myiarchus crinitus</u> (Linnaeus)	Great Crested Flycatcher
<u>Myiarchus cinerascens</u> (Lawrence)	Ash-throated Flycatcher
<u>Sayornis phoebe</u> (Latham)	Eastern Phoebe
<u>Sayornis saya</u> (Bonaparte)	Say's Phoebe
<u>Empidonax flaviventris</u> (Baird and Baird)	Yellow-bellied Flycatcher
<u>Empidonax virescens</u> (Vieillot)	Acadian Flycatcher
<u>Empidonax traillii</u> (Audubon)	Willow Flycatcher
<u>Empidonax alnorum</u> Brewster	Alder Flycatcher
<u>Empidonax minimus</u> (Baird and Baird)	Least Flycatcher
<u>Contopus virens</u> (Linnaeus)	Eastern Wood Pewee
<u>Nuttallornis borealis</u> (Swainson)	Olive-sided Flycatcher
<u>Pyrocephalus rubinus</u> (Boddaert)	Vermilion Flycatcher

Family Alaudidae - Larks

<u>Eremophila alpestris</u> (Linnaeus)	Horned Lark
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Family Hirundinidae - Swallows

<u>Iridoprocne bicolor</u> (Vieillot)	Tree Swallow
<u>Riparia riparia</u> (Linnaeus)	Bank Swallow
<u>Stelgidopteryx ruficollis</u> (Vieillot)	Rough-winged Swallow
<u>Hirundo rustica</u> Linnaeus	Barn Swallow
<u>Petrochelidon pyrrhonota</u> (Vieillot)	Cliff Swallow
<u>Progne subis</u> (Linnaeus)	Purple Martin

Family Corvidae - Crows, Magpies, Jays

<u>Cyanocitta cristata</u> (Linnaeus)	Blue Jay
<u>Corvus brachyrhynchos</u> Brehm	Common Crow
<u>Corvus ossifragus</u> Wilson	Fish Crow

Family Paridae - Titmice

<u>Parus carolinensis</u> Audubon	Carolina Chickadee
<u>Parus bicolor</u> Linnaeus	Tufted Titmouse

Family Sittidae - Nuthatches

<u>Sitta carolinensis</u> Latham	White-breasted Nuthatch
<u>Sitta canadensis</u> Linnaeus	Red-breasted Nuthatch
<u>Sitta pusilla</u> Latham	Brown-headed Nuthatch

Family Certhiidae - Creepers

<u>Certhia familiaris</u> Linnaeus	Brown Creeper
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Family Troglodytidae - Wrens

<u>Troglodytes aedon</u> Vieillot	House Wren
<u>Troglodytes troglodytes</u> (Linnaeus)	Winter Wren
(S) <u>Thryomanes bewickii</u> (Audubon)	Bewick's Wren
<u>Thryothorus ludovicianus</u> (Latham)	Carolina Wren
<u>Telmatodytes palustris</u> (Wilson)	Long-billed Marsh Wren

<u>Cistothorus platensis</u> (Latham)	Short-billed Marsh Wren
<u>Salpinctes obsoletus</u> (Say)	Rock Wren
Family Mimidae - Thrashers and Mockingbirds	
<u>Mimus polyglottos</u> (Linnaeus)	Mockingbird
<u>Dumetella carolinensis</u> (Linnaeus)	Gray Catbird
<u>Toxostoma rufum</u> (Linnaeus)	Brown Thrasher
<u>Oreoscoptes montanus</u> (Townsend)	Sage Thrasher
Family Turdidae - Thrushes	
<u>Turdus migratorius</u> (Linnaeus)	American Robin
<u>Hylocichla mustelina</u> (Gmelin)	Wood Thrush
<u>Catharus guttatus</u> (Pallas)	Hermit Thrush
<u>Catharus ustulatus</u> (Nuttall)	Swainson's Thrush
<u>Catharus minimus</u> (Lafresnaye)	Gray-checked Thrush
<u>Catharus fuscescens</u> (Stephens)	Veery
<u>Sialia sialis</u> (Linnaeus)	Eastern Bluebird
Family Sylviidae - Gnatcatchers and Kinglets	
<u>Polioptila caerulea</u> (Linnaeus)	Blue-gray gnatcatcher
<u>Regulus satropa</u> Lichtenstein	Golden-crowned Kinglet
<u>Regulus calendula</u> (Linnaeus)	Ruby-crowned Kinglet
Family Motacillidae - Wagtails and Pipits	
<u>Anthus spinoletta</u> (Linnaeus)	Water Pipit
<u>Anthus spragueii</u> (Audubon)	Sprague's Pipit
Family Bombycillidae - Waxwings	
<u>Bombycilla cedrorum</u> Vieillot	Cedar Waxwing
Family Laniidae - Shrikes	
<u>Lanius ludovicianus</u> Linnaeus	Loggerhead Shrike
Family Sturnidae - Starlings	
<u>Sturnus vulgaris</u> Linnaeus	Starling
Family Vireonidae - Vireos	
<u>Vireo griseus</u> (Boddaert)	White-eyed Vireo
<u>Vireo belii</u> Audubon	Bell's Vireo
<u>Vireo flavifrons</u> Vieillot	Yellow-throated Vireo
<u>Vireo solitarius</u> (Wilson)	Solitary Vireo
<u>Vireo altiloques</u> (Vieillot)	Black-whiskered Vireo
<u>Vireo olivaceus</u> (Linnaeus)	Red-eyed Vireo
<u>Vireo philadelphicus</u> (Cassin)	Philadelphia Vireo
<u>Vireo gilvus</u> (Vieillot)	Warbling Vireo
Family Parulidae - Wood Warblers	
<u>Mniotilta varia</u> (Linnaeus)	Black-and-White Warbler
<u>Protonotaria citrea</u> (Boddaert)	Prothonotary Warbler
(S) <u>Limnothlypis swainsonii</u> (Audubon)	Swainson's Warbler
<u>Helmitheros vermivorus</u> (Gmelin)	Worm-eating Warbler
<u>Vermivora crysoptera</u> (Linnaeus)	Golden-winged Warbler
<u>Vermivora pinus</u> (Linnaeus)	Blue-winged Warbler
*(E) <u>Vermivora bachmanii</u> (Audubon)	Bachman's Warbler
<u>Vermivora peregrina</u> (Wilson)	Tennessee Warbler
<u>Vermivora celata</u> (Say)	Orange-crowned Warbler
<u>Vermivora ruficapilla</u> (Wilson)	Tennessee Warbler

<u>Parula americana</u> (Linnaeus)	Northern Parula
<u>Dendroica petechia</u> (Linnaeus)	Yellow Warbler
<u>Dendroica magnolia</u> (Wilson)	Magnolia Warbler
<u>Dendroica tigrina</u> (Gmelin)	Cape May Warbler
<u>Dendroica caerulescens</u> (Gmelin)	Black-throated Blue Warbler
<u>Dendroica coronata</u> (Linnaeus)	Yellow-rumped Warbler
<u>Dendroica nigrescens</u> (Townsend)	Black-throated Gray Warbler
<u>Dendroica virens</u> (Gmelin)	Black-throated Green Warbler
<u>Dendroica cerulea</u> (Wilson)	Cerulean Warbler
<u>Dendroica fusca</u> (Muller)	Blackburnian Warbler
<u>Dendroica dominica</u> (Linnaeus)	Yellow-throated Warbler
<u>Dendroica pensylvanica</u> (Linnaeus)	Chestnut-sided Warbler
<u>Dendroica castanea</u> (Wilson)	Bay-breasted Warbler
<u>Dendroica striata</u> (Forster)	Blackpoll Warbler
<u>Dendroica pinus</u> (Wilson)	Pine Warbler
<u>Dendroica discolor</u> (Vieillot)	Prairie Warbler
<u>Dendroica palmarum</u> (Gmelin)	Palm Warbler
<u>Seiurus aurocapillus</u> (Linnaeus)	Ovenbird
<u>Seiurus noveboracensis</u> (Gmelin)	Northern Waterthrush
<u>Seiurus motacilla</u> (Vieillot)	Louisiana Waterthrush
<u>Oporornis formosus</u> (Wilson)	Kentucky Warbler
<u>Oporornis agilis</u> (Wilson)	Connecticut Warbler
<u>Oporornis philadelphia</u> (Wilson)	Mourning Warbler
<u>Geothlypis trichas</u> (Linnaeus)	Common Yellowthroat
<u>Icteria virens</u> (Linnaeus)	Yellow Breasted Chat
<u>Wilsonia citrina</u> (Boddaert)	Hooded Warbler
<u>Wilsonia pusilla</u> (Wilson)	Wilson's Warbler
<u>Wilsonia canadensis</u> (Linnaeus)	Canada Warbler
<u>Setophaga ruticilla</u> (Linnaeus)	American Redstart

Family Ploceidae - Weaver Finches
Passer domesticus (Linnaeus)

House Sparrow

Family Icteridae - Blackbirds
Dolichonyx oryzivorus (Linnaeus)
Sturnella magna (Linnaeus)
Sturnella neglecta Audubon
Xanthocephalus xanthocephalus (Bonaparte)
Agelaius phoeniceus (Linnaeus)
Icterus spurius (Linnaeus)
Icterus galbula (Linnaeus)
Euphagus carolinus (Muller)
Euphagus cyanocephalus (Wagler)
Cassidix major (Gmelin)
Quiscalus quiscula (Linnaeus)
Molothrus ater (Boddaert)

Bobolink
Eastern Meadowlark
Western Meadowlark
Yellow-headed Blackbird
Red-winged Blackbird
Orchard Oriole
Northern Oriole
Rusty Blackbird
Brewer's Blackbird
Boat-tailed Grackle
Common Grackle
Brown-headed Cowbird

Family Thraupidae - Tanagers
Piranga ludoviciana (Wilson)
Piranga olivacea (Gmelin)
Piranga rubra (Linnaeus)

Western Tanager
Scarlet Tanager
Summer Tanager

Family Fringillidae - Grosbeak-, Finches, Sparrows, and Buntings

Cardinalis cardinalis (Linnaeus)
Pheucticus ludovicianus (Linnaeus)

Cardinal
Rose-breasted Grosbeak

<u>Pheucticus melanocephalus</u> (Swainson)	Black-headed Grosbeak
<u>Guiraca caerulea</u> (Linnaeus)	Blue Grosbeak
<u>Passerina cyanea</u> (Linnaeus)	Indigo Bunting
<u>Passerina ciris</u> (Linnaeus)	Painted Bunting
<u>Spiza americana</u> (Gmelin)	Dickcissel
<u>Hesperiphona vespertina</u> (Cooper)	Evening Grosbeak
<u>Carpodacus purpureas</u> (Gmelin)	Purple Finch
<u>Spinus pinus</u> (Wilson)	Pine Siskin
<u>Spinus tristis</u> (Linnaeus)	American Goldfinch
<u>Chlorura chlorura</u> (Audubon)	Green-tailed Towhee
<u>Pipilo erythrophthalmus</u> (Linnaeus)	Rufous-sided Towhee
<u>Calanospiza melanocorys</u> Stejneger	Lark Bunting
<u>Passerculus sandwichensis</u> (Gmelin)	Savannah Sparrow
<u>Ammodramus savannarum</u> (Gmelin)	Grasshopper Sparrow
<u>Ammodramus henslowii</u> (Audubon)	Henslow's Sparrow
<u>Ammospiza leconteii</u> (Audubon)	Le Conte's Sparrow
<u>Ammospiza caudacuta</u> (Gmelin)	Sharp-tailed Sparrow
<u>Ammospiza maritima</u> (Wilson)	Seaside Sparrow
<u>Poocetes gramineus</u> (Gmelin)	Vesper Sparrow
<u>Chondestes grammacus</u> (Say)	Lark Sparrow
(S) <u>Ainophila aestivalis</u> (Lichtenstein)	Bachman's Sparrow
<u>Junco hyemalis</u> (Linnaeus)	Dark-eyed Junco
<u>Spizella passerina</u>	Chipping Sparrow
<u>Spizella pallida</u> (Bechstein)	Clay-colored Sparrow
<u>Spizella pusilla</u> (Wilson)	Field Sparrow
<u>Zonotrichia querula</u> (Nuttall)	Harris' Sparrow
<u>Zonotrichia leucophrys</u> (Forster)	White-crowned Sparrow
<u>Zonotrichia albicollis</u> (Gmelin)	White-throated Sparrow
<u>Passerella iliaca</u> (Merrem)	Fox Sparrow
<u>Melospiza lincolni</u> (Audubon)	Lincoln's Sparrow
<u>Melospiza georgiana</u> (Latham)	Swamp Sparrow
<u>Melospiza melodia</u> (Wilson)	Song Sparrow
<u>Calcarius lapponicus</u> (Linnaeus)	Lapland Longspur
<u>Calcarius pictus</u> (Swainson)	Smith's Longspur

B. CHECK LIST OF COASTAL MAMMALS
(Holliman, in press)

Order Marsupialia - Opossum

Family Didelphidae - New World Opossums

Didelphis marsupialis pigra Bangs Opossum

Order Insectivora - Insectivores

Family Soricidae - Shrews

Blarina brevicauda carolinensis (Bachman) Short-tailed Shrew

Cryptotis parva parva (Say) Least Shrew

Family Talpidae - Moles

Scalopus aquaticus howelli Jackson Eastern Mole

Order Chiroptera - Bats

Family Vespertilionidae - Vespertilionid Bats

(S) Myotis a. austroriparius (Rhoads) Southeastern Myotis

Lasiurus b. borealis (Muller) Red Bat

Lasiurus seminolus (Rhoads) Seminole Bat

(S) Lasiurus intermedius floridanus (H. Allen) Yellow Bat

Lasiurus c. cinereus (Palisot de Beauvois) Hoary Bat

Nycticeius h. humeralis (Rafinesque) Evening Bat

Family Molossidae - Molossid Bats

Tadarida brasiliensis cynocephala (Le Conte) Brazilian Free-tailed Bat

Order Edentata - Armadillo

Family Dasypodidae - Armadillos

Dasypus novemcinctus mexicanus Peters Nine-banded Armadillo

Order Lagomorpha - Hares and Rabbits

Family Leporidae - Hares and Rabbits

(S) Sylvilagus p. palustris (Bachman) Marsh Rabbit

Sylvilagus floridanus mallurus (Thomas) Eastern Cottontail

Sylvilagus aquaticus littoralis Nelson Swamp Rabbit

Order Rodentia - Rodents

Family Sciuridae - Squirrels

Sciurus carolinensis carolinensis Gmelin Gray Squirrel

(S) Sciurus carolinensis fuliginosus Bachman Bayou Gray Squirrel

Sciurus niger bachmani Lowery and Davis Backman Fox Squirrel

Glaucomys volans saturatus A. H. Howell Southern Flying Squirrel

Family Geomyidae - Pocket Gopher

Geomys pinetis mobilensis Merriam Southeastern Pocket Gopher

Family Castoridae - Beavers

Castor canadensis carolinensis Rhoads

Beaver

Family Cricetidae - New World Rats and Mice

Oryzomys p. palustris (Harlan)

Marsh Rice Rat

Peromyscus polionotus polionotus (Wagner)

Oldfield Mouse

(E) P. p. ammobates Bowen

White-fronted Beach Mouse

(E) P. p. trissyllepsis Bowen

Floral Beach Mouse

Peromyscus g. gossypinus (Le Conte)

Cotton Mouse

Ochrotomys nuttalli auerolus (Audubon and Bachman)

Golden Mouse

Sigmodon h. hispidus (Say and Ord)

Hispid Cotton Rat

Neotoma floridana rubida Bangs

Eastern Wood Rat

Ondatra zibethicus rivalicicus (Bangs)

Louisiana Muskrat

Family Muridae - Old World Rats and Mice

Rattus r. rattus (Linnaeus)

Black Rat

Rattus r. alexandrinus (E. Geoffroy Saint-Hilaire)

Black Rat

Rattus r. frugivorus (Rafinesque)

Black Rat

Rattus n. norvegicus (Berkenhout)

Norway Rat

Mus musculus brevirostris Waterhouse

House Mouse

Family Capromyidae - Capromyids

Mayocastor coypus bonariensis (E. Geoffroy St.-Hilaire) Nutria

Order Cetacea - Cetaceans

Family Delphinidae - Delphinids

Tursiops truncatus (Montagu)

Atlantic Bottle-nosed Dolphin

Globicephala sp. (probably macrorhyncha Gray)

Short-finned Pilot Whale
or Blackfish

Order Carnivora - Carnivores

Family Canidae - Canids

Canis latrans

Coyote

Vulpes fulva fulva (Desmarest)

Red Fox

Urocyon cinereoargenteus floridanus (Rhoads)

Gray Fox

Family Ursidae - Bears

(E) Ursus americanus floridanus (Merriam)

Florida Black Bear

Family Procyonidae - Procyonids

Procyon lotor varius (Nelson and Goldman)

Raccoon

Family Mustelidae - Mustelids

Mustella frenata olivacea (Howell)

Long-tailed Weasel

Mustella vison mink (Peale and Palisot de Beauvois)

Mink

Spilogale p. putorius (Linnaeus)

Spotted Skunk

Mephitis mephitis elongata (Bangs)

Striped Skunk

Lutra c. canadensis (Schreber)

River Otter

Family Felidae - Cats

(E) Felis concolor cougar (Bangs)

Eastern Cougar

Lynx rufus floridanus (Rafinesque)

Bobcat

Order Pinnipedia - Pinnipeds

Family Otariidae - Eared Seals

Zalophus californianus (Lesson)

California Sea Lion

Order Sirenia - Sirens

Family Trichechidae - Manatees

Trichechus manatus latirostris (Harlan)

Manatee or Sea Cow

Order Artiodactyla - Deer

Family Cervidae - Cervids

Odocoileus v. virginianus (Zimmermann)

White-tailed Deer

Odocoileus v. osceola (Bangs)

White-tailed Deer

IV SAMPLING METHODOLOGY-BIRDS

The inventory of birds has already been summarized by Imhof (1976). To determine the population levels of birds in the coastal area 7 routes totaling approximately 168 miles have been proposed for the mainland and along water ways. (See Appendix for maps). The mainland routes circumscribe Mobile and Portersville Bays. The water routes extend from the northern limit of the 10 ft. contour line to the 3 mile seaward boundary of the coastal zone. The mainland routes conform to existing roadways and transect habitats that are characteristic of the coastal zone. The water routes conform to the Tombigbee-Mobile river system and transects the Mobile River estuary and off shore water along a north-south axis. These route surveys will be staffed by professional biologists.

A plot survey will be made on Dauphin Island, and will be run concurrently with the route surveys. This seasonal data will supplement that gained by the route surveys. Dauphin Island, because of its central position on the Alabama gulf coast, is the focal point for both migrants as well as winter and summer residents. Only diversity data, not number of birds, will be gathered from Dauphin Island. This quarterly check list will be used to determine if birds are missed on the route surveys. These plot surveys could be staffed by knowledgeable amateur field naturalists.

Two specialty surveys will be made. One will involve a census of brown pelicans during late summer to determine the post breeding bird population level and the other will determine the productivity of the heron and egret rookery on Cat Island, Portersville Bay during the breeding season. These specialty surveys will be staffed by professional biologists.

A. INSTRUCTIONS FOR CONDUCTING MAINLAND AND WATER ROUTES

This survey is patterned after the Breeding Bird Surveys of the U. S. Fish and Wildlife Services (1979). These efforts have accumulated density and diversity data over a contiguous 12 years period which can be used as a base line for the breeding bird surveys proposed in this document. Each route should be run four times each year during: 1) January; 2) April; 3) June and 4) October. This sequence will allow a sample to be obtained from the winter, summer and migrating populations. After the first year this program will be evaluated to determine whether or not routes should be run 4 times each year. There is a possibility that routes could be run twice each year, once during the summer and once during the winter and still provide the necessary data for a management program. It is important to select a date within each of these months as near as possible to the first date each route was run. The starting point is stop number 1. (See Appendix for a sample of Stop Description.) At the proper starting time (30 minutes before local sunrise), start counting birds at the marked starting point. Weather data and odometer readings should be recorded before starting. All stops are located at approximately $\frac{1}{2}$ mile intervals. Descriptions of all stops should be rechecked each year to compensate for physical changes of habitat. One and only one observer should count. Counting should be done from a stationary point. In the case of water routes, successive stops will be made on opposite sides of the river. Stops on the bay route will be determined by the position of buoys marking the ship channel. Every bird seen within $\frac{1}{2}$ mile and every bird heard by the one observer should be counted and recorded during the 3 minutes at each stop. Do not exceed 3 minutes at each stop. Birds seen between stops or before and after the three minutes should not be recorded.

It should take no longer than 4 to 4½ hours for terrestrial and river routes. Bay and gulf routes, because of their nature, will take longer. Only estimate flocks too large to count in the brief time they are seen. Be careful not to count individuals known or strongly suspected to have been counted at a previous stop. Any bird known to be a late or early record for that particular season should be included and marked on the summary sheet as such. Species recorded that are not found on the form should be added at the bottom of the sheet. Use the field and summary sheets provided (See Appendix). Record the start and finish time for each page of the field sheets and use the small blocks for odometer readings and individual stop times. Use a dark pencil on field and summary sheets. Record weather data at start and finish as follows:

Wind Speed Codes:
(Enter Beaufort numbers only)

<u>Beaufort Number</u>	<u>Wind Speed m.p.h.</u>	<u>Indicators of Wind Speed</u>
0	less than 1	Smoke rises vertically
1	1 to 3	Wind directions shown by smoke drift
2	4 to 7	Wind felt on face; leaves rustle
3	8 to 12	Leaves, small twigs in constant motion; light flag extended
4	13 to 18	Raises dust and loose paper; small branches are moved
5	19 to 24	Small trees sway; crested wavelets on inland waters

Sky Condition Codes:
(enter Beaufort numbers only)

0	Clear or few clouds
1	Partly cloudy (scattered) or variable sky

- 2 Cloudy (broken) or overcast
- 4 Fog or smoke
- 5 Drizzle
- 7 Snow
- 8 Showers

To be comparable, routes must be run under satisfactory weather conditions: good visibility, little or no precipitation, light winds. Occasional light drizzle or a very brief shower may not affect bird activity, but fog, steady drizzle, or prolonged rains should be avoided. Surveys preferably should be made on mornings when the wind is less than 8 m.p.h. and not taken if the winds exceed 12 m. p.h.

Upon completion of the route, the data should be transferred from the Field Sheet to the Summary Sheet. The species total for each of the 5 Field Sheets should be entered under the appropriate page total column on the Summary Sheets. The sum of these 5 columns should then be entered in the total individual column. The number of stops at which each species was seen should be entered in the stops per species column. Mean values will be computed for each species to determine population trends.

Route Descriptions (See Appendix)

Route name - Gulf Shores

Route no. 1	Length in miles	31.0
Segment a	Number of stops	63

This route begins at Fort Morgan and extends eastward on Alabama highway 180, turns south immediately west of Lake Shelby to Alabama highway 182 to the Alabama-Florida state line.

Route name - East Bay-Mobile Bay

Route no. 1	Length in miles	20.0
Segment b	Number of stops	40

This route begins at county road number 1 at Fish River point and extends northward on U. S. highway 98 and Co. 11 to Daphne, back on U. S. 98 and then west along Cockran's Causeway (Battleship Parkway) to the Battleship Park area. The Battleship Parkway route will need to be investigated before a preliminary map can be made.

Route name - West Bay

Route no. 2	Length in miles	18
Segment a	Number of stops	36

This route begins at the south end of the Dog River bridge and continues on Alabama highway 163 to the end of the Cedar Point Road.

Route name - Portersville Bay

Route no. 2	Length in miles	15
Segment b	Number of stops	31

This route runs westward on Ala. 188 from Alabama Port at the junction of Ala. 188 and 163. It then turns southward following the Heron Bay Loop Road and then back onto Ala. 188. It proceeds westward turning south on Clark Road which runs to Coden Bay Road and then back to Ala. 188. Turn south immediately after crossing bridge to the Bayou la Batre Bay Road to Bayou la Batre and then northward through the city across bridge, turn left at 1st traffic light. Proceed south along the west side of bayou then westward to the Point aux Pins field station.

Route name - Tombigbee-Mobile Rivers North

Route 3	Length in miles	25
Segment a	Number of stops	51

This route begins at the Washington and Mobile Co. line on the Tombigbee

River and joins the Mobile River continuing southward to the 27 Mile Bluff area.

Route name - Mobile River South

Route no. 3	Length in miles	25
Segment b	Number of stops	51

This route begins at the Bankhead Tunnel at the foot of Government Street and proceeds northward up the Mobile River to south of the 27 Mile Bluff area.

Route name - Bay-Gulf

Route no. 3	Length in miles	34
Segment c	Number of stops	68

This route begins at the north tip of McDuffie Island and extends southward along the ship channel to the 3 mile coastal zone limit. Population data for dolphins should also be collected from this route. (See Appendix for dolphin data sheet and description of specialty survey on page 36).

B. INSTRUCTIONS FOR CONDUCTING PLOT SURVEY

The objective of this survey is to determine the diversity of birds on Dauphin Island on a seasonal basis. This survey will be run concurrently with the route surveys and will serve as a check list to determine the diversity efficiency of the route surveys. Density data will not be gathered. Dauphin Island will be divided into three areas: 1) east end of the island to a line dissecting the island along an axis that coincides with Ala 163. This line connects the Mobile Bay side to the Gulf side with Little Dauphin Island being included in this area: 2) west of this line, including the Portersville Bay side, to the end of the paved road: 3) west of area two to the western end of Dauphin Island. One observer will be assigned to each area and will bird from 30 minutes after official sunrise until 10:00 a.m. All three observers will work their area during the same day at the same time. Efforts should be made as to not count the same bird(s) twice. Weather data will be accumulated by each observer. Field check sheets will be turned in to the coordinator for compilation.

C. SPECIALTY SURVEYS

Brown Pelican Survey:

This will be an aerial survey of the Alabama gulf coast. A helicopter is recommended because coverage can be made at a low altitude so that immature and mature birds can be distinguished. This survey will occur during the last week of August when the post breeding population is at it's highest level. Flight time will be plotted against the number of individuals recorded (e.i. birds per flight hour). Meterological data should be accumulated.

Cat Island Survey:

This will be a survey to determine the number of herons and egrets that utilize this rookery. This census should occur during May. Both diversity and density data will be recorded. Observer time will be plotted against the number of individuals recorded (e.i. birds per observer hour). Meterological data should be accumulated. Transects or census plots are not used in this survey. Care should be taken not to count any individual known or strongly suspected to have been counted previously. The island should be worked systematically so that all habitats are covered.

V. SAMPLING METHODOLOGY - MAMMALS

A current inventory of mammals for the coastal area has not been completed. Holliman (in press) summarizes published literature records and identifies research areas where there is a paucity of information. This inventory data is required before a method of determining population levels of mammals can be proposed.

To complete this inventory an annotated mammal list should be compiled for each of the following study areas. (See CAB contour maps).

<u>Study area number</u>	<u>Name</u>	<u>Location (south of 10 ft. contour)</u>	<u>* Area hectares</u>
1	Point aux Pins	West from the Miss-Ala state line, east to Little River	
2	Bayou la Batre	West from Little River to Fowl River	
3	Heron Bay	Mon Louis Island	
4	Offshore Islands	Marsh Island, Grand Bay Isle Herbs, Cat Island, Marsh Island, Portersville Bay, Dauphin Island	
5	West Mobile Bay	North from East Fowl River to Mobile metropolitan area south on I-10 tunnel	
6	East Mobile Bay	South of I-10 bridge, Spanish Fort, to north shore of intra coastal water way	
7	Gulf Shores	Fort Morgan east to east end of Little Lagoon	
8	Perdido Bay	East end of Little Lagoon to Ala-Fla state line	
9	Chickasaw	North of I-10 bridge, west from Mobile-Baldwin Co. line, south of Saraland	
10	Apalachee River	East of Mobile-Baldwin Co. line, north of I-10 bridge, Spanish Fort, south of study area #12	

*to be completed in Job j.
pp. 40.

11	Satsuma	North of study area 9, west of Mobile-Baldwin Co. line, south of study area 13
12	Carpenter	North of study area 10, east of Mobile-Baldwin Co. line, south of study area 14
13	Chastang	North of study area 11, west of Mobile-Baldwin Co. line, south of western arm of study area 15
14	Stockton	North of study area 12, east of Mobile-Baldwin Co. line, south of study area 15
15	Fort Mimms	West of Mobile-Baldwin Co. line and north of study area 14, east of Mobile-Baldwin Co. line

Inventory data should be recorded for the following habitat types whenever they occur in each study area.

- A. BEACH-SAND DUNE Uniola paniculata (sea oats), Spartina patens (saltmeadow cordgrass), some Distichlis spicata (seashore saltgrass), Hydrocotyl bonariensis (pennywort), Quercus virginica var. maritima (live oak), Pinus elliottii (slash pine), Pinus clausa (sand pine) in Baldwin County only, Serenoa repens (saw palmetto), Ilex vomitoria (yaupon), Ceratiola ericoides (seaside rosemary), Solidago pauciflosculosa (seaside goldenrod).
- B. SALTMARSH Predominantly Spartina alterniflora (smooth cordgrass) with limited amounts of Juncus roemerianus (black needlerush).
- C. BRACKISH-MIXED MARSH Juncus roemerianus, Spartina cynosuroides (giant cordgrass), Distichlis spicata, Borrichia frutescens (sea ox-eye), Scirpus spp. (three-squares), Spartina alterniflora and S. patens.
- D. FRESH-MIXED MARSH Typha angustifolia (narrow-leaf cattail), Typha latifolia (cattail), Sagittaria falcata (duck potato), Zizania aquatica (wild rice), Zizaniopsis miliacea (cutgrass), Alternanthera piloxeroides (alligator grass), Scirpus validus

- (giant bullrush), Scirpus americanus (three-square), Orontium aquaticum (never wet), Phragmites communis (common cane), Cladium jamaicense (saw grass), Panicum virgatum (feather grass), Vigna repens (cow pea).
- E. SALTBUSh - SALTFLAT Baccharis halimifolia (saltbush), Iva frutescens (marsh elder), Salicornia sp. (glasswort), Batis maritima (saltwort), Distichlis spicata, bluegreen algae.
- F. SAVANNAH Spartina patens, Pinus elliotii, Pinus palustris (longleaf pine), Taxodium distichum (cypress), Rhynchospora spp. (sedges), Juncus spp. (rushes), and Andropogon spp. (broom sedges), Sphagnum spp. (mosses), Sarracenia spp. (pitcher plants), Cyrilla racemiflora (leather-wood), Ilex glabra (ink berry), Drosera spp. (sundews), Dichromena colorata (narrow-leaf dichromena).
- G. SWAMP Taxodium distichum and T. ascendens (cypress), Salix nigra (willow), Magnolia virginiana (white bay), Nyssa biflora (black gum), Acer rubrum (red maple), Cliftonia monophylla (titi), Pinus serotina (pond pine).
- H. MIXED BOTTOMLAND FOREST Magnolia grandiflora (southern magnolia), Acer rubrum, Taxodium spp., Salix spp., Carya aquatica (water hickory), Rubus spp. (blackberry), and Vitis aestivalis (wild grape).
- I. MIXED UPLAND FOREST Magnolia grandiflora, Myrica cerifera (wax myrtle), Liquidambar styraciflua (sweet gum), Cornus florida (dogwood), Quercus marilandica (blackjack oak), Quercus nigra (water oak), Ilex opaca (American holly), Carya glabra (pignut hickory), Vitis aestivalis, Rubus spp. Pinus palustris (long-leaf pine), Pinus echinata (short-leaf pine).
- J. PINE Pinus palustris, P. echinata, P. taeda (loblolly pine).

K. URBAN AND SUBURBAN AREAS Areas characterized by industrial, commercial, municipal and/or residential development.

L. MARINE Coastal waters.

M. TRANSITIONAL Bat species may be found associated with all habitat types.

To get to that point where mammal population trends can be roughly estimated, acreage values for the above coastal habitats should be computed. Vittor and Stout (ibid) measured the following acreage for habitat extending inland to the 50-foot contour line.

<u>Habitat Type</u>	<u>Area</u>	
	<u>Hectares</u>	<u>Acres</u>
Beach - Sand Dune	3,801	9,388
Saltmarch	943	2,330
Brackish-mixed Marsh	5,470	13,512
Fresh-mixed Marsh	4,547	11,231
Saltbush-Saltflat	111	273
Savannah	7,284	17,992
Swamp	31,171	76,992
Mixed Bottomland Forest	77,130	190,512
Mixed Upland Forest	20,516	50,674
Pine	6,636	16,391
Urban-suburban areas	4,087+	10,095+
Marine	*	

* An estimate of the area of the marine environment is not given because of difficulty in determining the boundary of the tide lands.

This needs to be done for habitat below the 10-foot contour line. Grid trapping of selected habitat areas should then produce population trend data that could be statistically extrapolated on the basis of the acreage for each

habitat, e.i. mammal species per acre. These trends then, of course, would have to be evaluated in view of the population dynamics of the ecosystem, e.i. to determine possible reasons for cyclic changes - highs and lows. Trapping and collecting field data should occur during the winter months, December through January. Mammal surveys should be accomplished once each year during this time in selected study areas.

A. SPECIALTY SURVEY - DOLPHINS

This will be an aerial survey of the Alabama gulf coast. A helicopter is recommended because coverage can be made at a low altitude so that size range and species determination can be made. This survey will occur during April or May whenever the waters are relatively cool and when there may be an opportunity to observe calving. Flight time will be plotted against the number of individuals recorded (e.i. mammals per flight hour). Meteorological data should be accumulated.

VI OTHER METHODOLOGICAL CONSIDERATIONS

Paramount to any program concerned with inventory and population studies of birds and mammals is the ability to support and maintain field objectives over an extended period of time.

Local colleges and universities may be able to provide certain types of logistical support such as contributing staff time and other "In Kind" type of services. Students through work study programs could serve as assistants and/or truck and boat operators. This kind of aid from local institutions of higher learning would mitigate costs and at the same time allow faculty and students to become more knowledgeable of coastal biology. The Marine Environmental Sciences Consortium could provide a base for operations and transportation for the investigators. The U.S. Corps of Engineers and U. S. Coast Guards could possibly provide logistical support.

Personnel involved in bird route surveys should be qualified field biologists. The validity of the results will depend upon the individuals ability to make correct field identifications and to interpret data in relationships to the constant changes within an ecosystem. This requires an investigator with an academic background, extensive field experience and the ability to solve problems. Personnel involved in bird plot surveys could be amateur naturalists who are knowledgeable with local ornithology.

The effectiveness of the program will depend on the accumulation of data over extended periods of time. "Data gaps" are damaging, particularly where attempts are being made to predict population trends. To this end, budget proposals should be realistic so as to reduce the possibility of deleting and altering any portion of a survey during any one year.

Work schedules should 'dove tail' and allow for the evaluation and review of previous work so that any necessary changes in methodology can be sensibly anticipated.

A. WORK SCHEDULE

The following table lists the work that needs to be accomplished before population level studies are begun. All of the prioritized jobs in Phase I should be completed before Phase II is initiated.

Projected work schedule

Birds- Mammals	Phase	Major area	Specific jobs within each area	Job Priority	Continuing Job	Research or Management (R or M)	Jobs
Birds	I	Mapping	-Establishment and description of mainland route stops	1	No	M	a
			-Establishment and description of river route stops	2	No	M	b
			-Establishment and description of bay-gulf route stops	3	No	M	c
			-Establishment and description of plot surveys	4	No	M	d
	II	Population Level Study	-A preliminary population level study of mainland, river, insular and bay-gulf routes.	1	Yes	R	e
			-A preliminary diversity study of survey plot	2	Yes	R	f
			-Brown Pelican Survey	3	Yes	R	g
			-Cat Island Survey	4	Yes	R	h
Mammals	I	Mapping	-Determination of acreage values for study area below 10-foot contour	1	No	M	i
			-Delineation of study areas and vegetative units	2	No	M	j
		Population Inventory Study	-Population inventories of study areas	3	No	R	k

II	Population Level Study	-A preliminary population level study of a selected study area	1	Yes	R	1
		-Dolphins Survey	2	Yes	R	m

Jobs: These footnotes describe the objectives of each job and an estimate of the basic requirements.

Job a.

Objectives - Ground truth surveys and alignment of existing road and water way maps are to be accomplished so that accurate stop descriptions can be made.

Requirements - Two consultant days, per diem for two days, on site mileage for 200 miles for field work. Two consultant days and drafting supplies for map work and summary report.

Job b.

Objectives - Ground truth surveys and alignment of existing road and water way maps are to be accomplished so that accurate stop descriptions can be made.

Requirements - Four consultant days, per diem for four days, on site mileage for 200 miles, rental for truck, outboard motor, trailer, and services of operator for field work. Two consultant days and drafting supplies for map work and summary report.

Job c.

Objectives - Ground truth surveys and alignment for existing road and water way maps are to be accomplished so that accurate stop descriptions can be made.

Requirements - Two consultant days, per diem for two days, on site mileage for 100 miles, rental for bay boat. Two consultant days and drafting supplies for map work and summary report.

Job d.

Objectives - Aerial photographs and ground truth surveys will be utilized to accurately map area for plot surveys on Dauphin Island.

Requirements - Two consultant days, per diem for two days, on site mileage for 200 miles for field work. Two consultant days and drafting supplies for map, bird list and summary report.

Job e.

Objectives - This will be a single "shakedown" census for all mainland, river, insular and bay-gulf routes. At this time, mileage and stops will be rechecked.

Requirements - Nine consultant days, per diem for nine days, on site mileage for 300 miles, rental for trucks, boats, and boat operators for field work. At this point the methodology of the bird survey will be evaluated. Two consultant days and drafting supplies for production of permanent field lists, summary sheets, and summary report.

Job f.

Objectives - This will be a trial census to gain information concerning species diversity. No quantitative data will be gathered.

Requirements - on site mileage and/or other transportation costs for amateur naturalists. Two consultant days, per diem, transportation costs for field work and summary report.

Job g.

Objectives - This project will attempt to determine the number of brown pelicans in the coastal area. Flights will be made in a helicopter during late August when numbers are at their peak.

Requirements - Two consultant days, per diem, transportation costs for coordinator

for field work and summary report. Helicopter flight time required. This job and job m. may be combined.

Job h.

Objectives - This work will determine the breeding population levels of birds on Cat Island, Portersville Bay.

Requirements - One trip each breeding season to Cat Island. Two consultant days, per diem, transportation costs for field work and summary write up.

Expenses for boat/operator required.

Job i.

Objectives - Vittor and Stout's work (ibid) will be reassessed and re-evaluated in relation to vegetative units seaward of the 10 foot contour line.

Requirements - Five consultant days, per diem for 3 days, mileage or air transportation from investigation home base to Bay St. Louis, Miss. (NASA facility) to use instrumentation and mapping equipment, drafting supplies and summary report.

Job j.

Objectives - Data gained from Job e. will be used in a ground truth survey of study sites.

Requirements - Five consultant days, per diem for 5 days, on site mileage for 500 miles, rental for truck, outboard motor boat, trailer and boat operator for field work. Two consultant days for mapping, supplies, and summary report.

Job k.

Objectives - Attempts will be made to fill data gaps mentioned in Holliman's

work (ibid).

Requirements - The level of support will be determined after the completion of Job j., Phase I. Mammal survey sheets and study area maps should be completed at this time.

Job l.

Objectives - This will be a "trial" census for a selected study area.

Vegetative maps will be rechecked.

Requirements - The level of support will be determined after completion of Job k., Phase I. At this point the methodology of the mammal survey will be evaluated.

Job m.

Objectives - This will be a trial census to gain information relative to the occurrence of dolphins and possibly other aquatic mammals in the coastal region. Quantitative population data along with meteorological information will be completed.

Requirements - Two consultant days, mileage and per diem for field work. Helicopter flight time will be needed.

B. PERSONNEL RECOMMENDATIONS

Ideally, there should be a coordinator to supervise the entire program. A mammalogist and an ornithologist working with the coordinator should staff the route surveys and mammal censuses. Selected amateur naturalist could man the plot surveys.

Coordinator

Job Description: The coordinator will be responsible for coordinating the program, interpreting data, and for preparing and submitting reports. The coordinator will be responsible for selecting the field staff to conduct route and plot surveys and shall be in charge of purchasing equipment and working out the logistical details and support for these surveys. The coordinator will be responsible for determining priorities within the program, under the advisement of the Coastal Area Board Council, and be responsible for setting immediate as well as long range goals for the bird and mammal section.

Qualifications: The coordinator will hold the Ph.D. degree in an area of vertebrate zoology with a speciality either in mammalogy or ornithology. The coordinator should be familiar with the ecology of the birds and mammals of the southeastern United States, and be knowledgeable in the area of field botany. It is recommended that the coordinator be familiar with the Coastal Area Board Program and have an understanding of coastal zone management and the socio-economic implications of coastal land use programs. The coordinator should be qualified to work with endangered species.

Staff Personnel for bird route surveys and mammal census

Job Description: These personnel will conduct the field surveys

and be responsible for gathering the appropriate data and submitting the proper reports to the coordinator. They should work with the coordinator in completing the objectives of the program.

Qualification: The staff who are involved in the field work should hold the Ph.D. or Masters degree or be active in a graduate program in an area of vertebrate zoology with a speciality either in mammalogy or ornithology or other closely related areas. They should be familiar with modern field techniques and should be knowledgeable in the area of field botany. The staff should be qualified to work with endangered species.

Staff Personnel for bird plot surveys

Job Description: Amateur naturalists would be expected to compile a species list (not number) of birds on each plot. They will be selected by the coordinator. They should submit reports directly to the coordinator.

Qualifications: These personnel should be familiar with both visual and audio identification of birds. They should also be familiar with the local area, and should have had some field experience in birding along the Alabama coast.

C. LINE ITEMS FOR PROPOSED BUDGET

The following will constitute line items for each proposed job.

1. Consultant fees:

The coordinator, staff and other professional staff should be paid on the basis of consultant days (CD), with eight hours = one CD, so that portions of a CD can be computed.

2. Per diem:

Food and lodging.

3. Mileage:

a. Onsite and home-base mileage.

b. Home-base mileage.

4. Bay boat rental:

5. Truck/boat trailer:

6. Boat (outboard):

7. Boat operator/truck driver:

8. Equipment:

a. expendable (traps, etc.)

b. non-expendable (binoculars mapping equipment)

9. Reports (typing, paper, printing costs)

a. interim reports

b. final

10. Deposition of specimens in a collection

(cost of preparation and preservation)

11. Other - Herein not covered above.

STOP DESCRIPTION FORM

Route name _____

Route no. _____

Length in miles _____

Segment _____

No. of stops _____

<u>Stop</u>	<u>Mileage</u>	<u>Stop Description</u>
1	0.0	_____

2	0.5	_____

3	1.0	_____

4	1.5	_____

5	2.0	_____

6	2.5	_____

7	3.0	_____

8	3.5	_____

9	4.0	_____

10	4.5	_____

11	5.0	_____

12	5.5	_____

Stop Mileage Stop Description

13 6.0

14 6.5

15 7.0

16 7.5

17 8.0

18 8.5

19 9.0

20 9.5

21 10.0

22 10.5

23 11.0

24 11.5

25 12.0

26 12.5

27 13.0

Stop

Mileage

Stop Description

28

13.5

29

14.0

30

14.5

31

15.0

32

15.5

33

16.0

34

16.5

35

17.0

36

17.5

37

18.0

38

18.5

39

19.0

40

19.5

41

20.0

Stop

Mileage

Stop Description

42

20.5

43

21.0

44

21.5

45

22.0

46

22.5

47

23.0

48

23.5

49

24.0

50

24.5

51

25.0

52

25.5

53

26.0

54

26.5

55

27.0

56

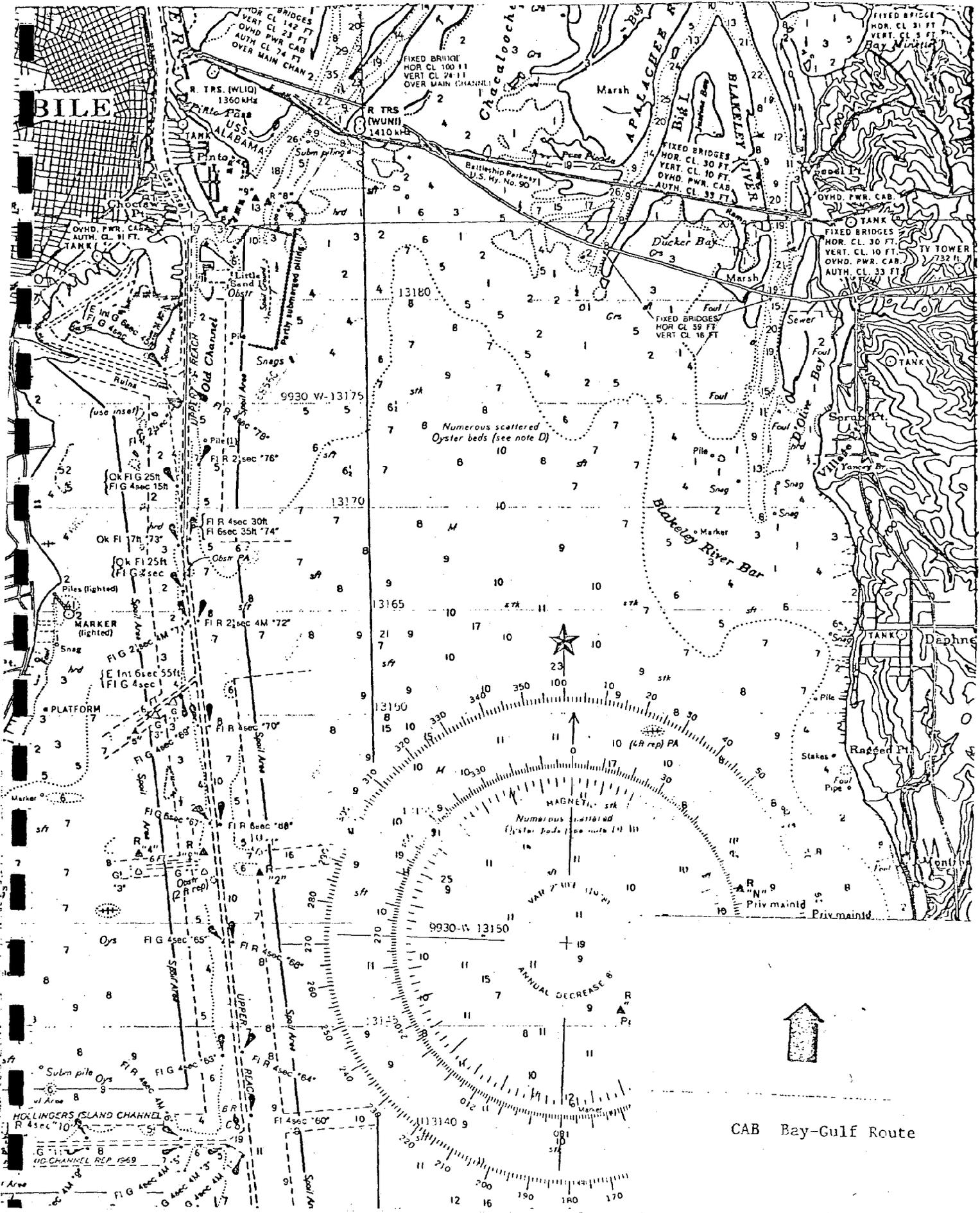
27.5

Mileage

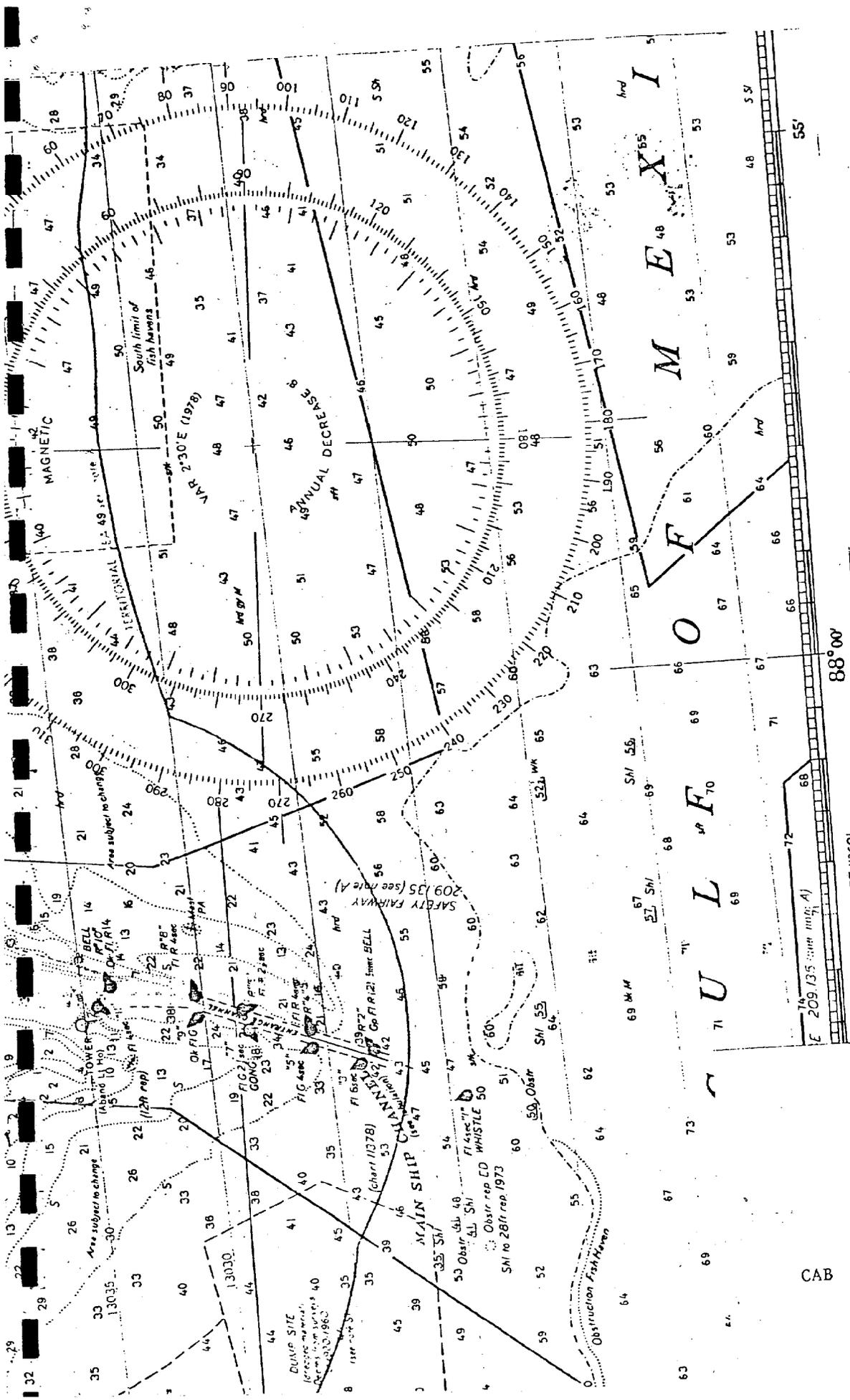
STOP DESCRIPTION

<u>Mileage</u>	<u>STOP DESCRIPTION</u>
28.0	
28.5	
29.0	
29.5	
30.0	
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31.0	
31.5	
32.0	
32.5	
33.0	
33.5	
34.0	

11



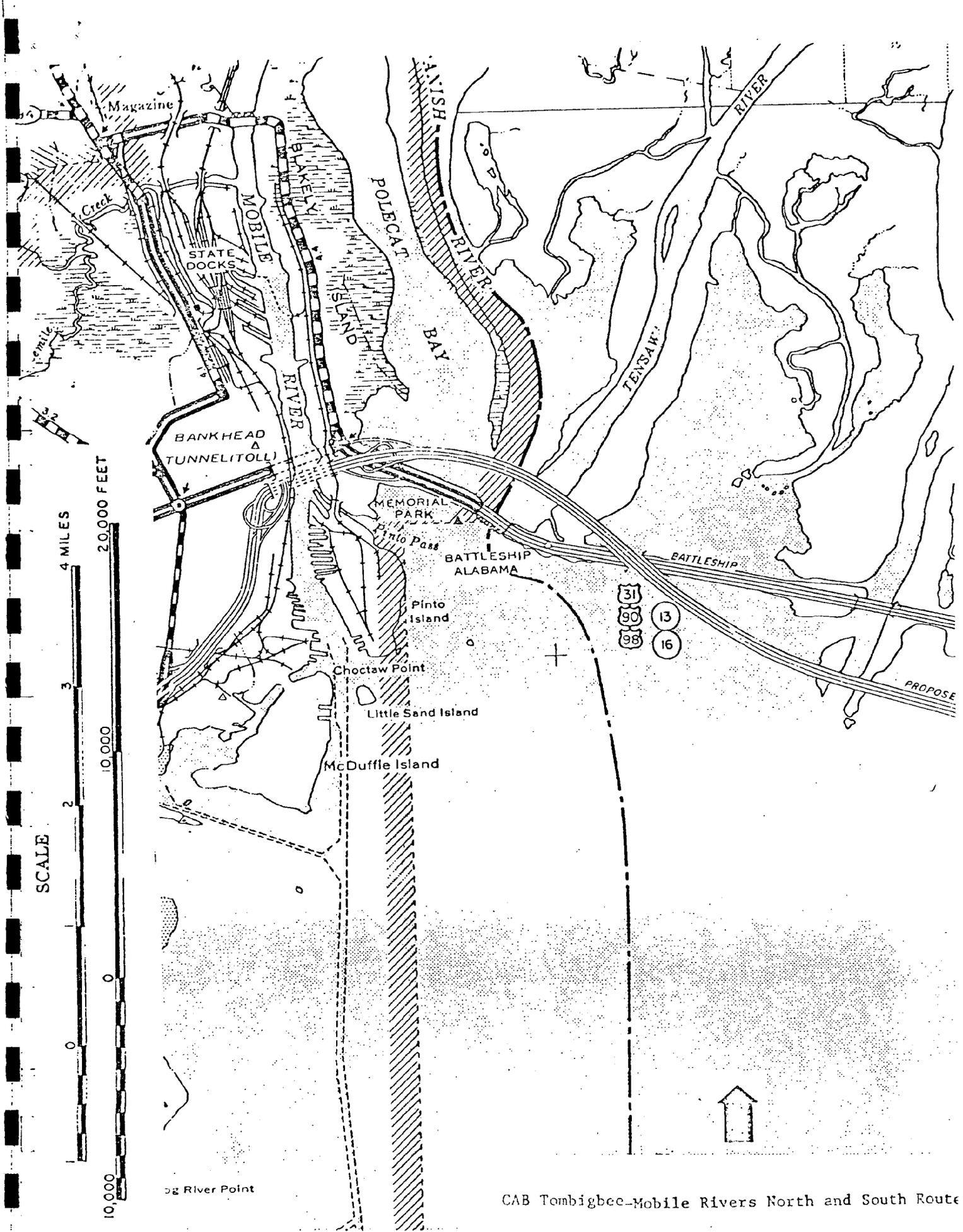
CAB Bay-Gulf Route



CAB Bay-Gulf Route

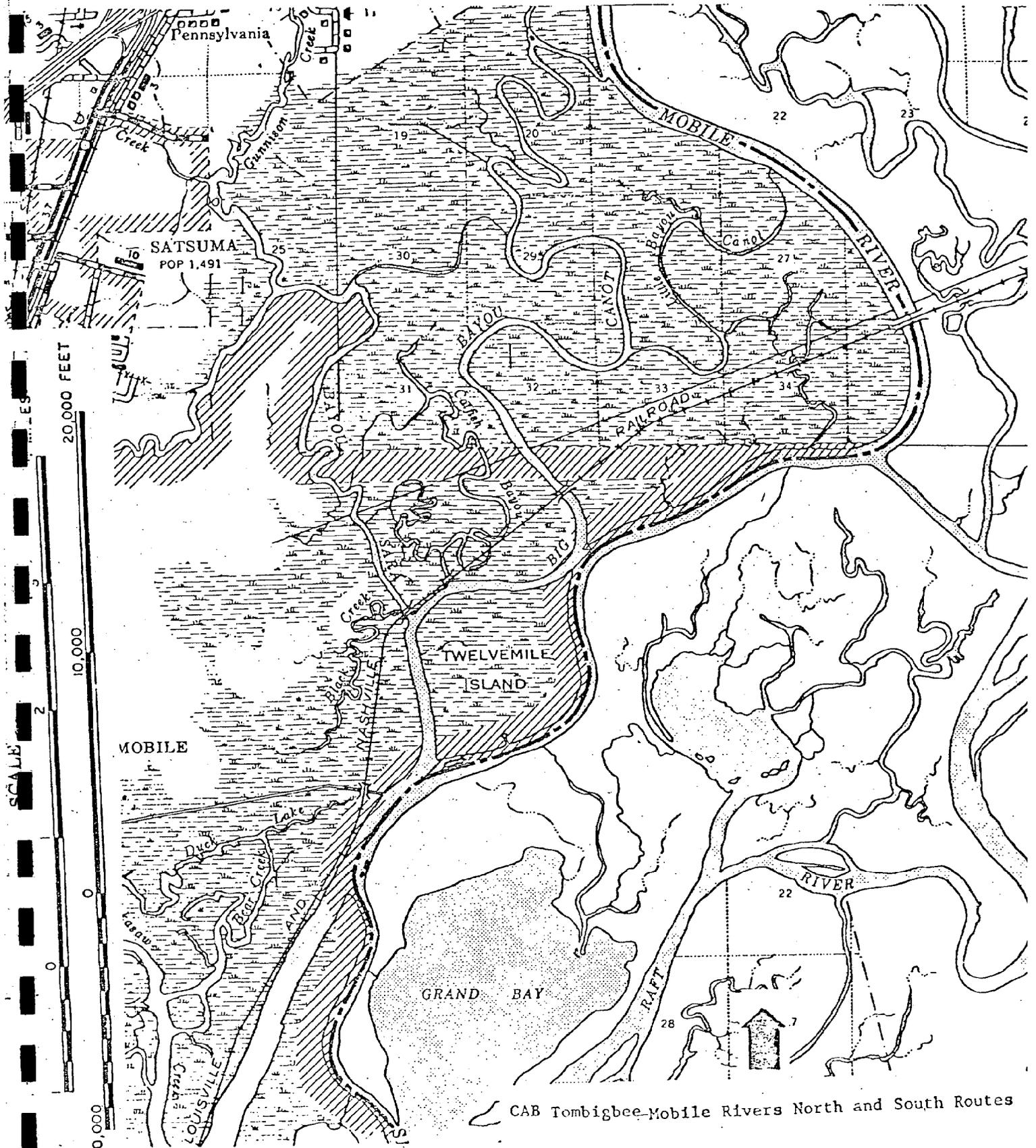
88° 00'

(CONTINUES ON CHART 11360)

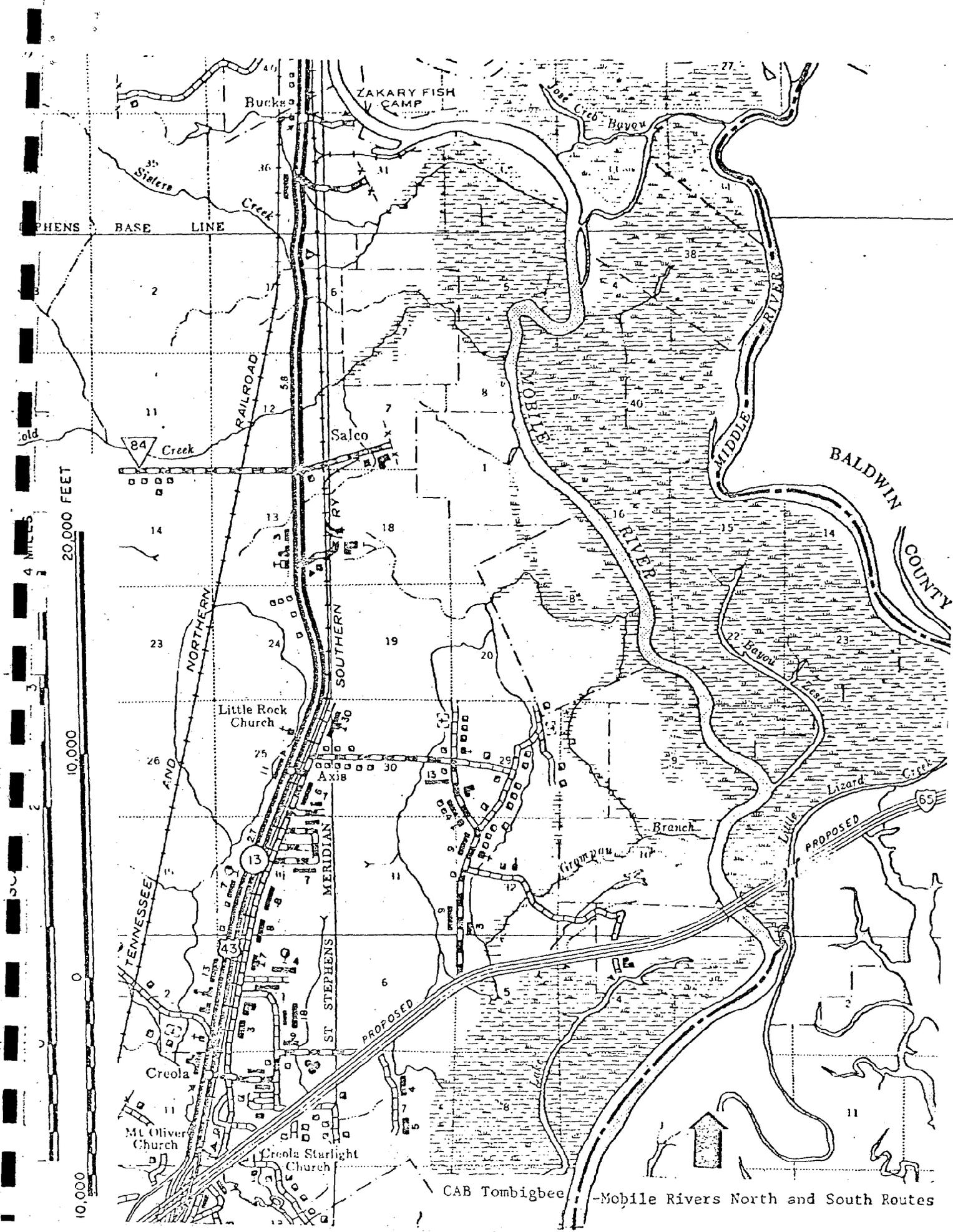


og River Point

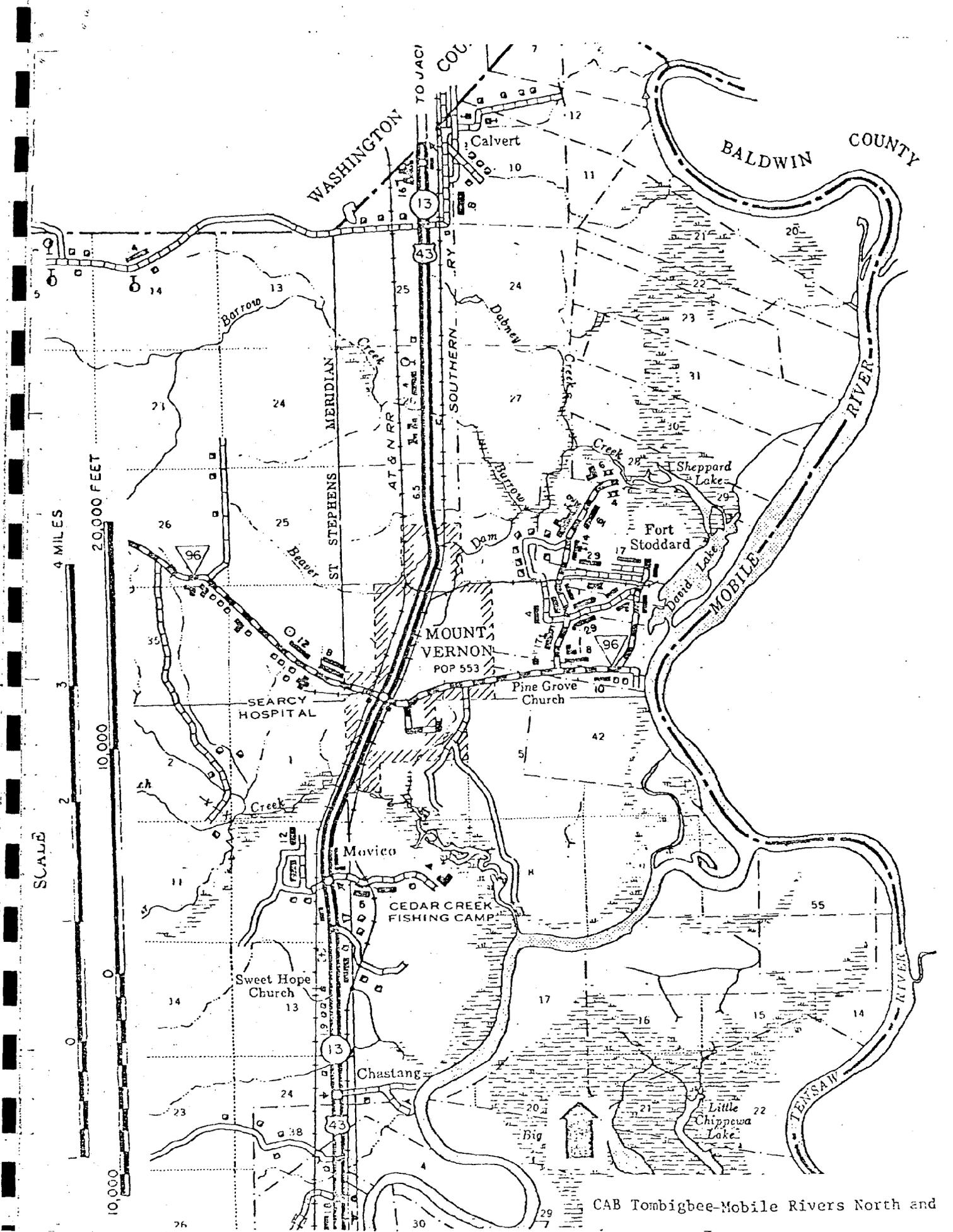
CAB Tombigbee-Mobile Rivers North and South Route



CAB Tombigbee-Mobile Rivers North and South Routes



CAB Tombigbee - Mobile Rivers North and South Routes



CAB Tombigbee-Mobile Rivers North and

100,000

270,000

MOBILE RIVER

GRAND BAY

RAFT BAY

MOBILE RIVER

MOBILE COUNTY

Chickadee Bay

Little Belieu Bay

Lower Bay

Little Belieu Bay

Crab Creek

RAFT RIVER

Oak Bayou

RIVER

Gravine Island

MOBILE RESERVE FLEET

Burnier Lake

James E. Cook Church

Whithouse

Bromley

Creek

FA 3 07

86



CAB Baldwin Co. Side Mobile River

20,000 FEET

000 01

0

000 01

SCALE



53 71

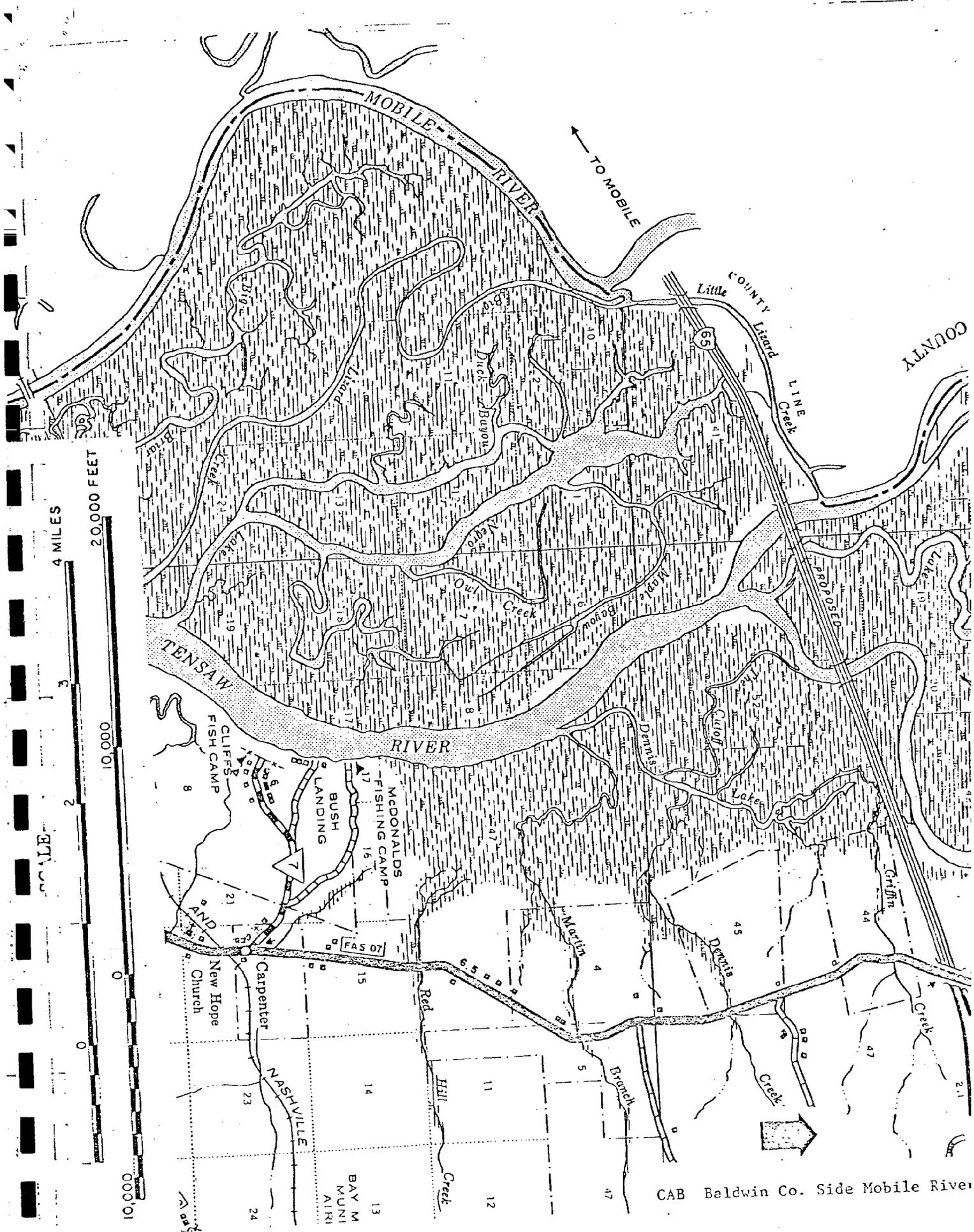
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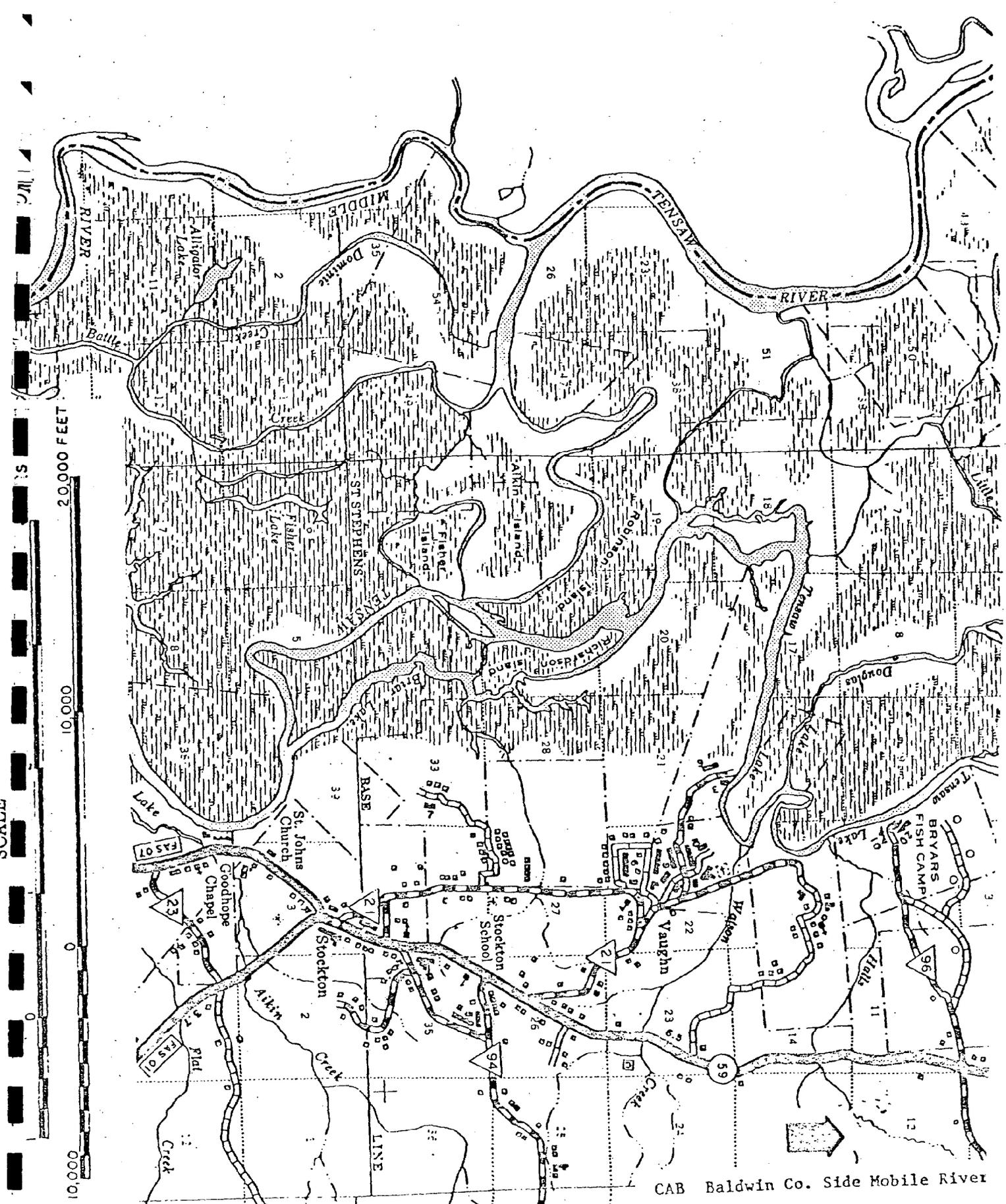
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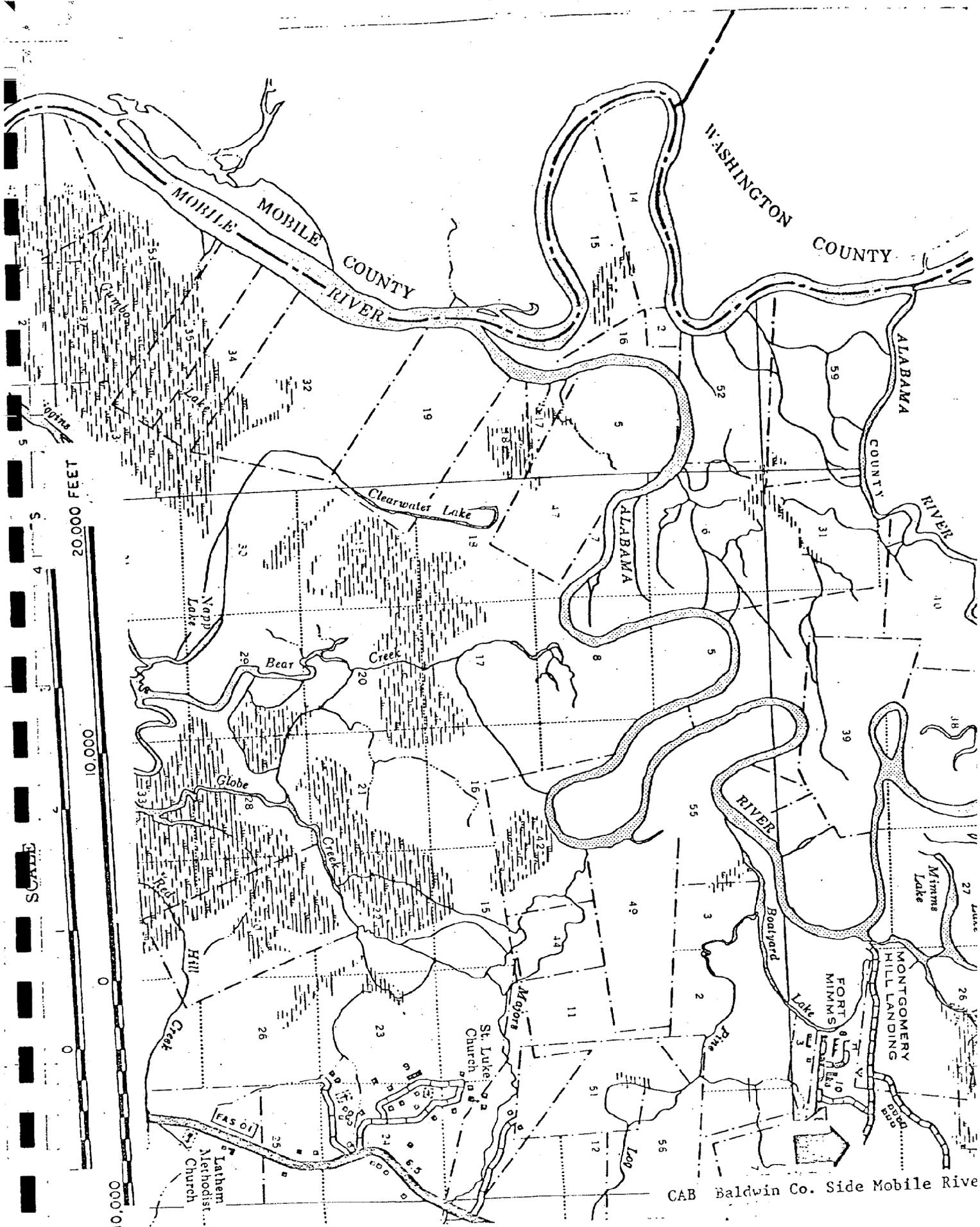
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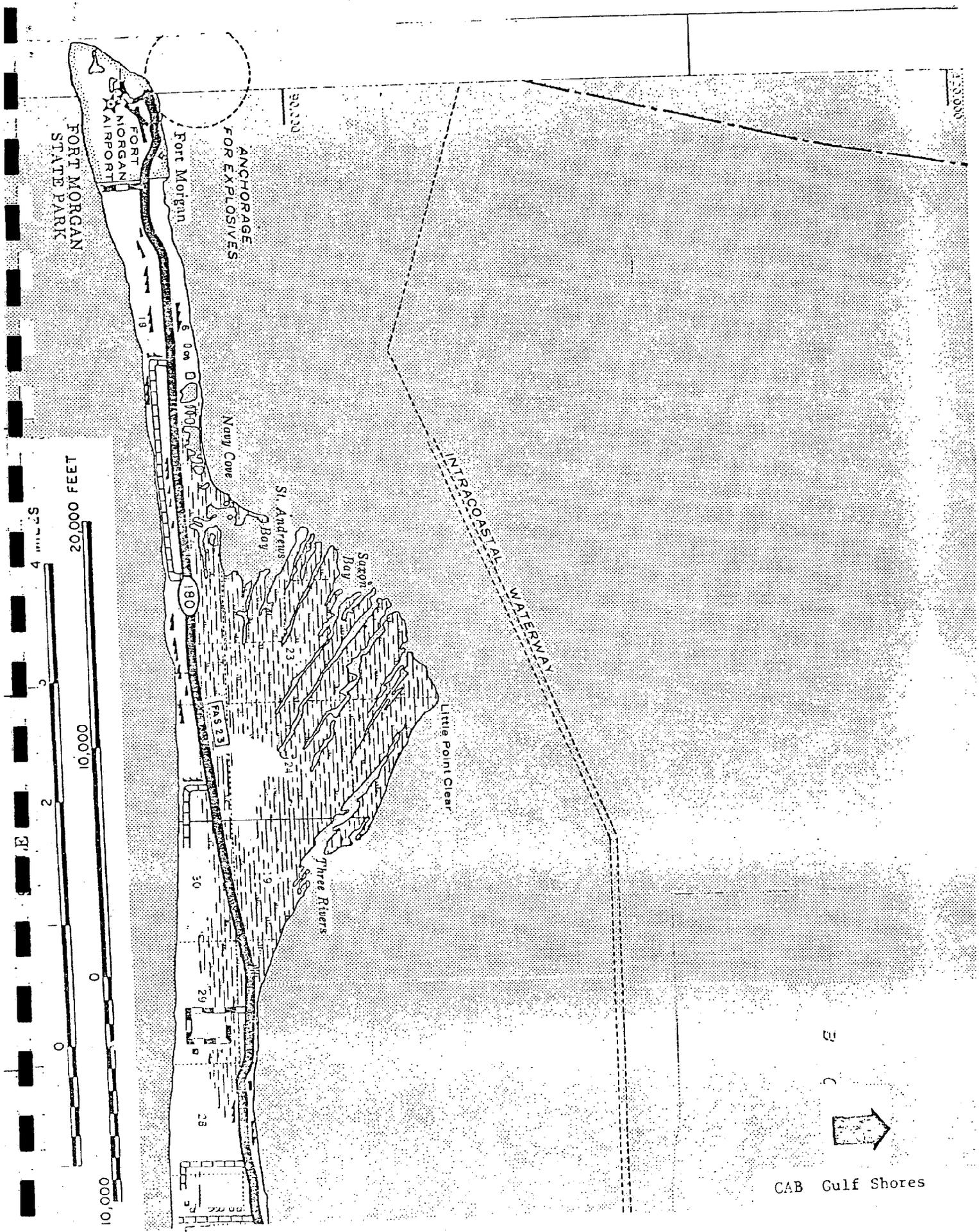
CAB Baldwin Co. Side Mobile River



CAB Baldwin Co. Side Mobile River



CAB Baldwin Co. Side Mobile River



S
C



CAB Gulf Shores

S E C O U R

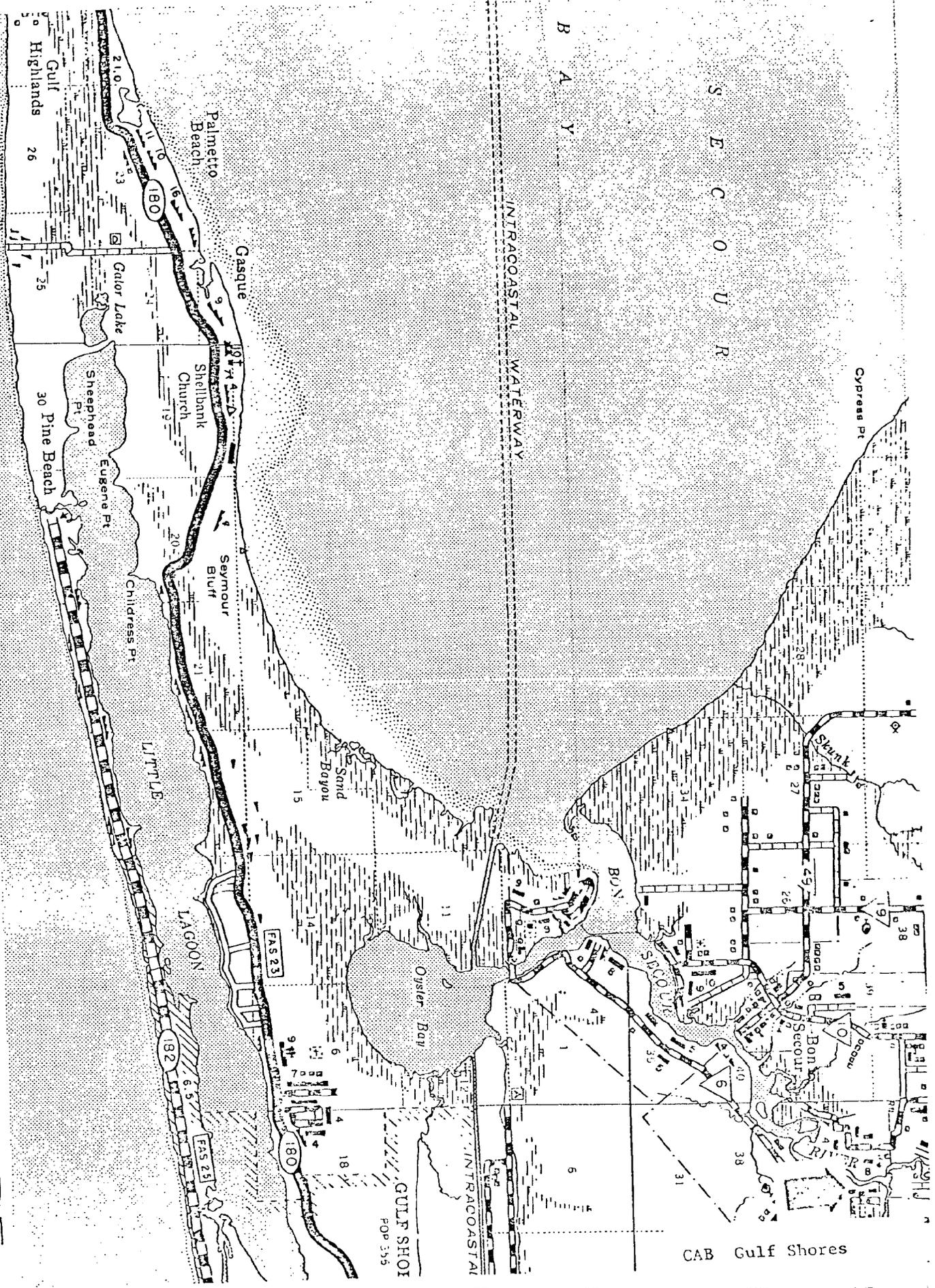
B A Y

INTRACOASTAL WATERWAY

Cypress Pt

Skunk

CAB Gulf Shores



20,000 FEET

000'01

0

000'01

S

W

SCALE

4 MILES

20,000 FEET

10,000

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

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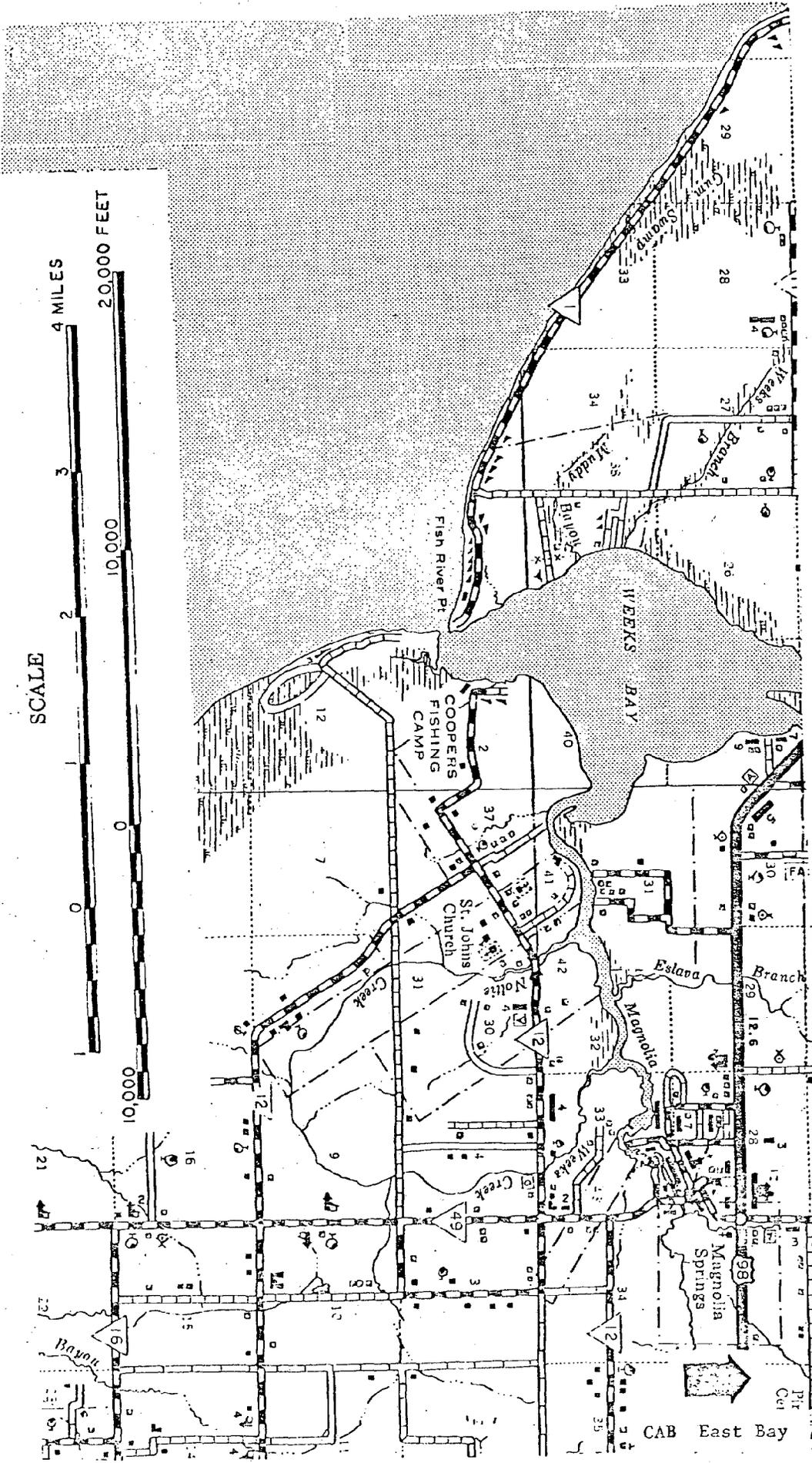
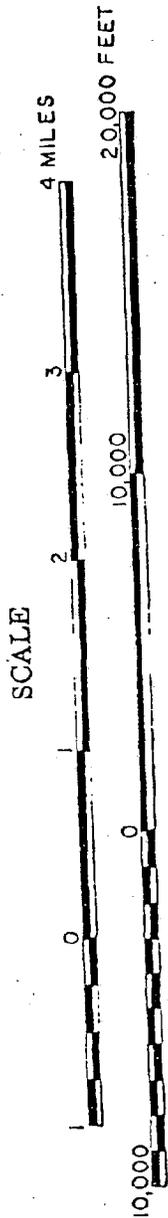
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CAB East Bay

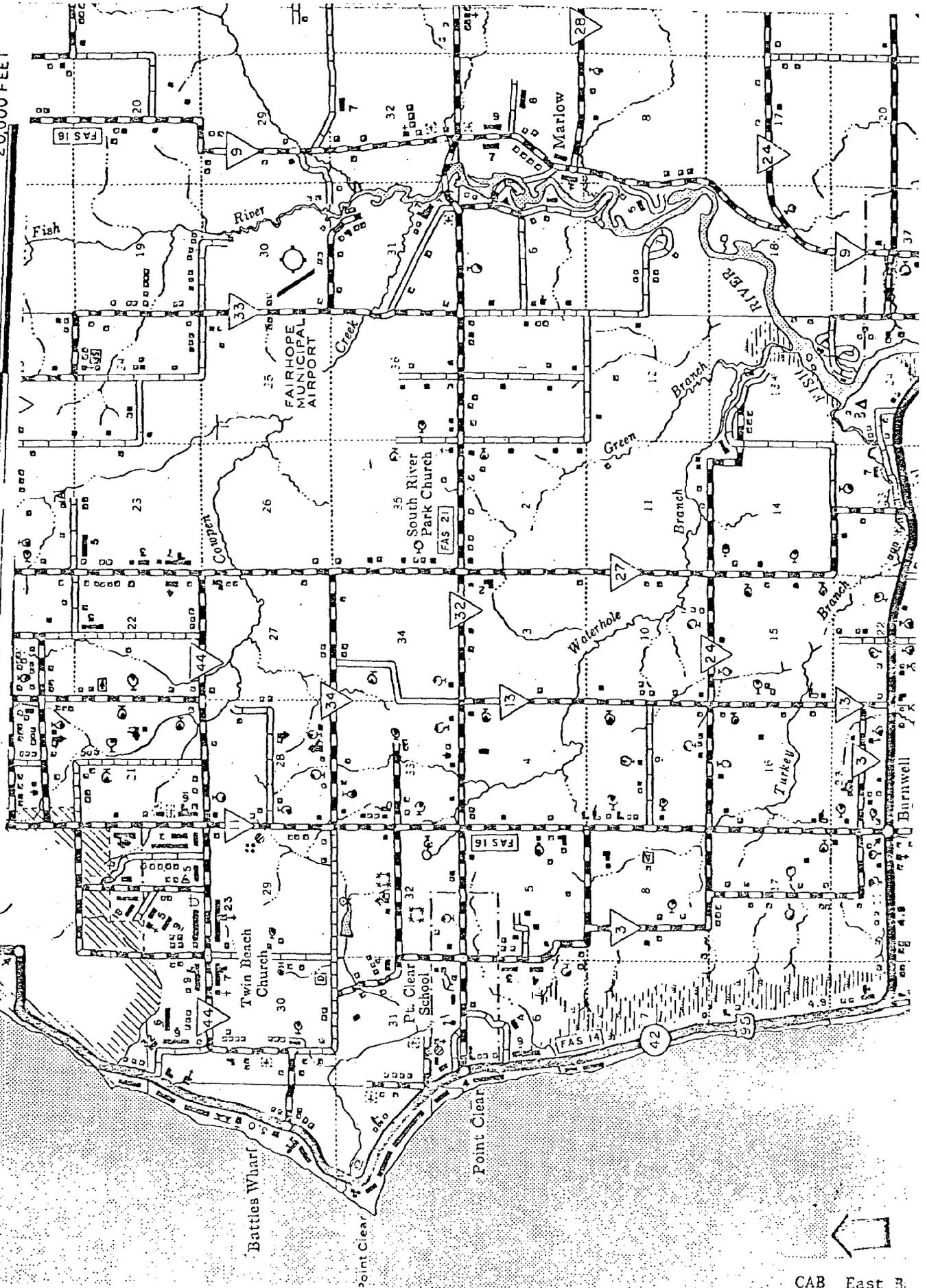
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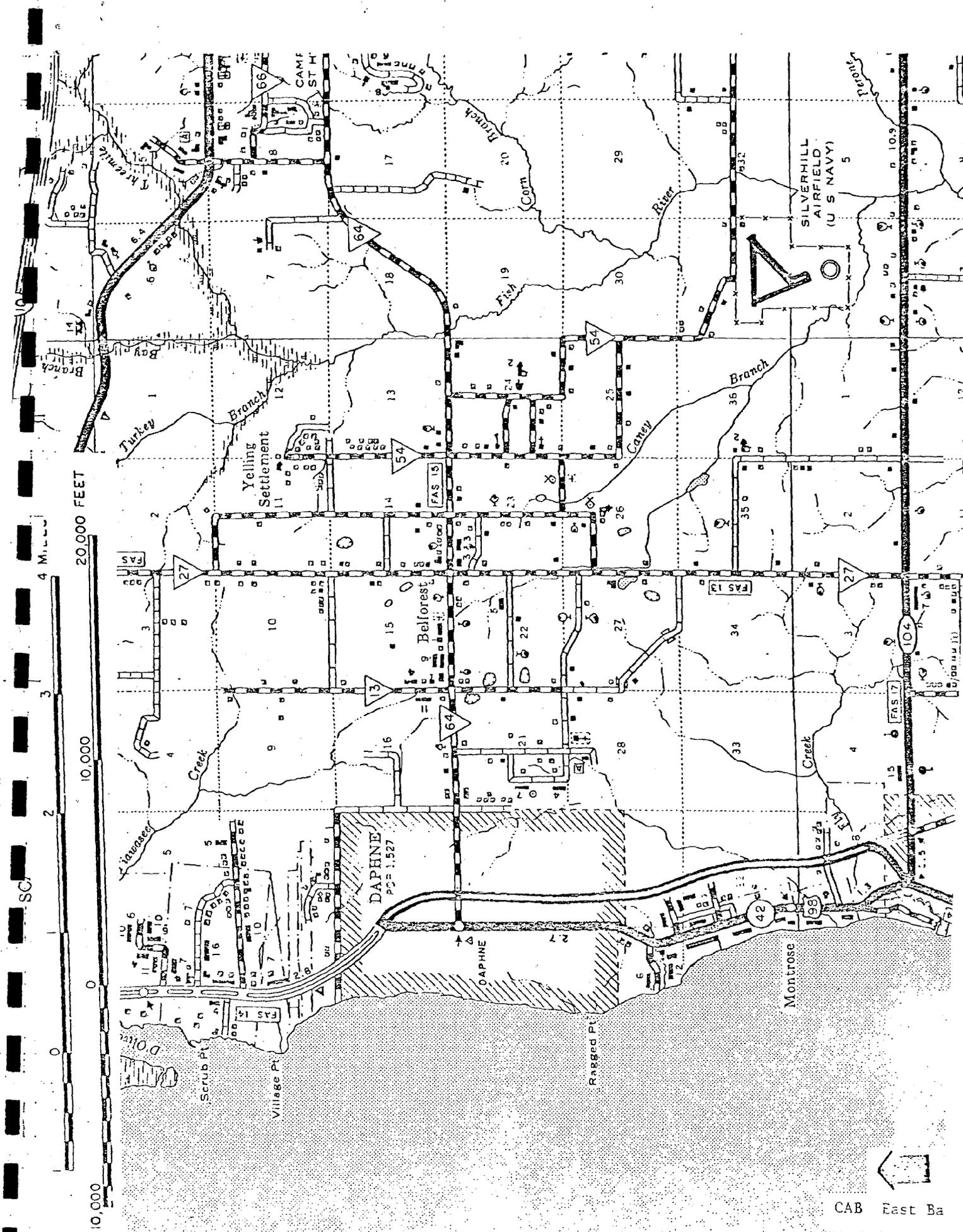
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Belforest

Yelling Settlement

SILVERHILL AIRFIELD
(U S NAVY)

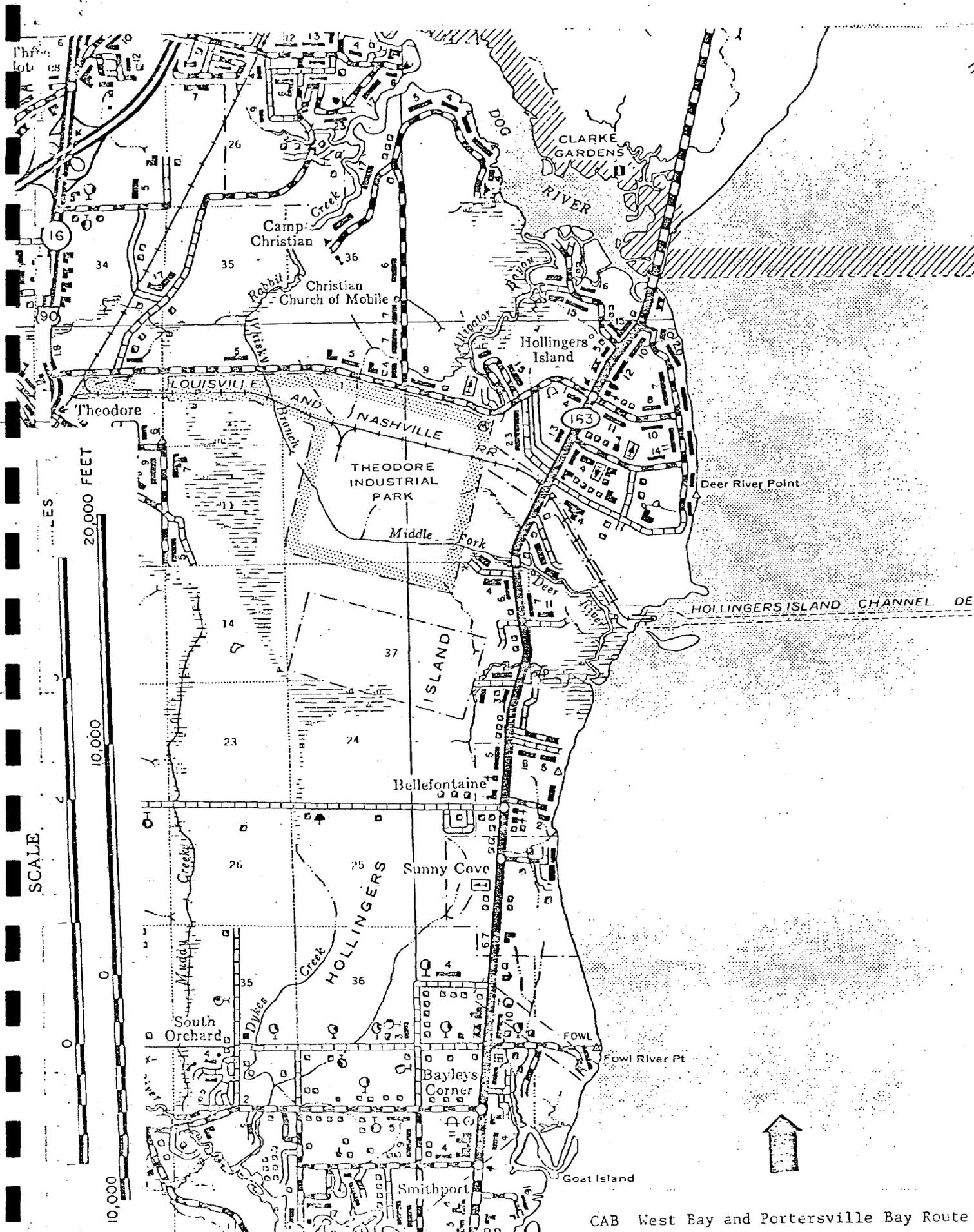
Montrose

Ragged Pt

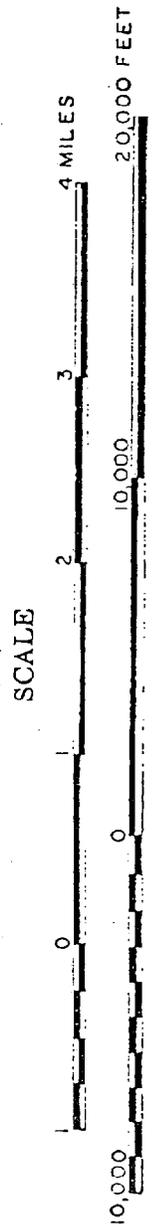
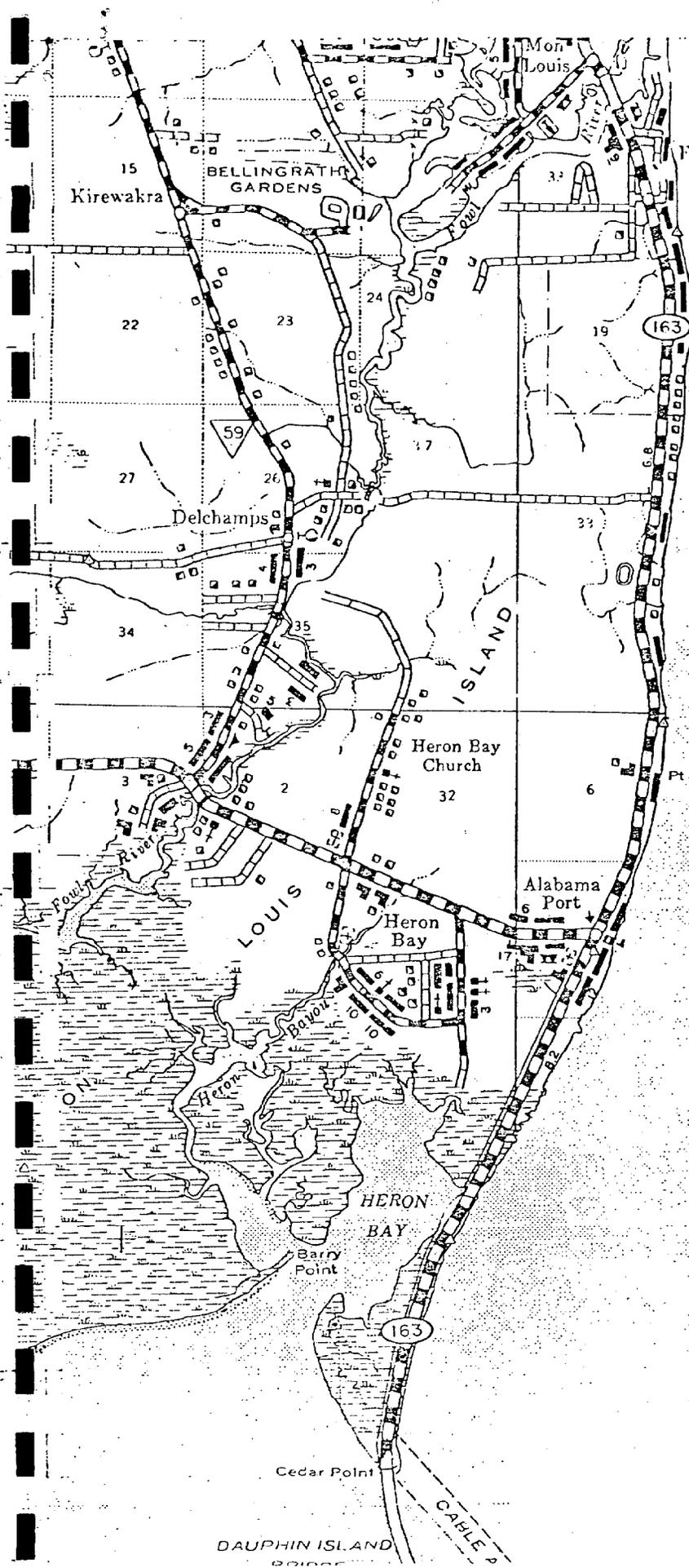
Scrub Pt

Village Pt

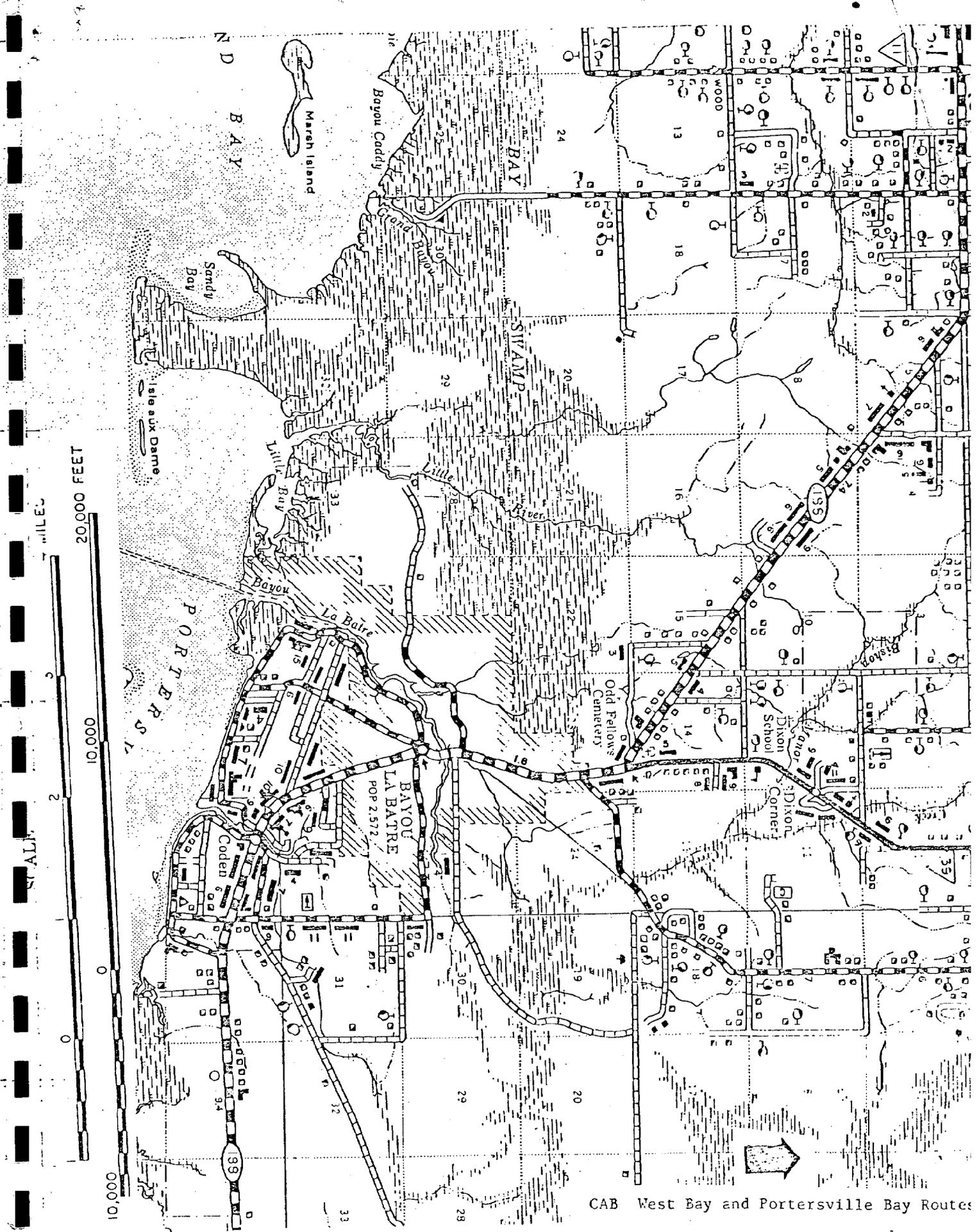
CAB East Ba



CAB West Bay and Portersville Bay Route



CAB West Bay and Portersville Bay Routes



CAB West Bay and Portersville Bay Routes

