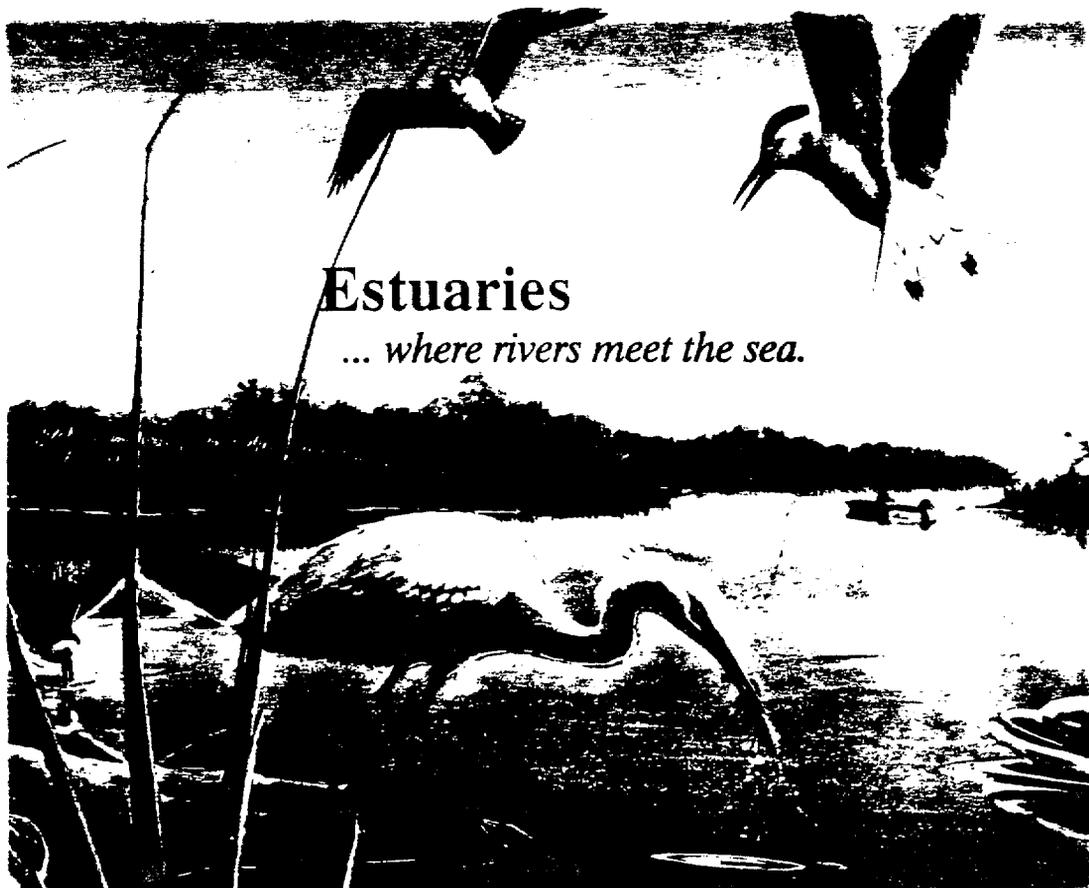


NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

SITE CATALOGUE

1990 EDITION



Estuaries

... where rivers meet the sea.

U.S. DEPARTMENT OF COMMERCE

*National Oceanic and Atmospheric Administration
National Ocean Service
Office of Ocean and Coastal Resource Management
Marine and Estuarine Management Division
Washington, D.C.*

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ESTUARINE
RESEARCH



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The National Estuarine Research Reserve System

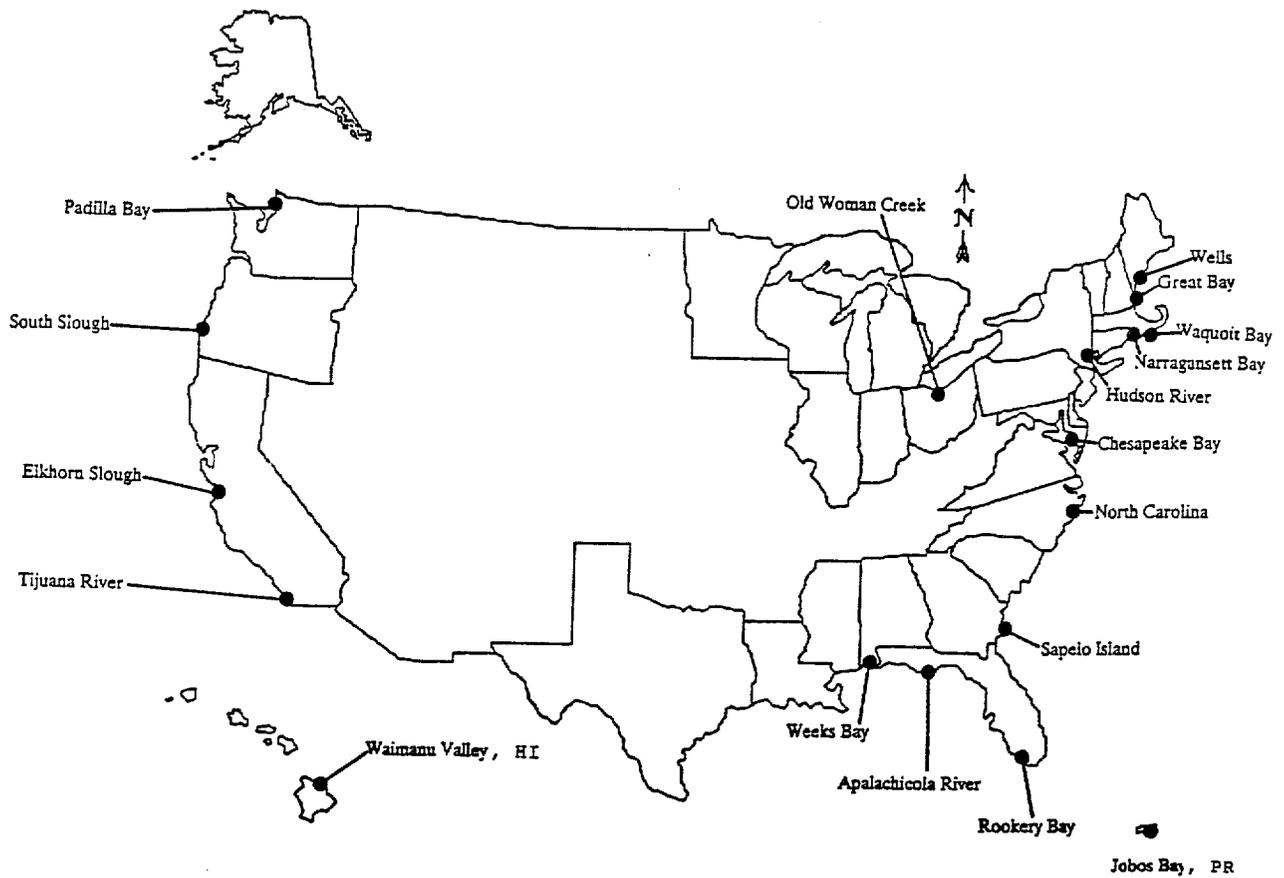
Section 315 of the Coastal Zone Management Act of 1972, 16 U.S.C. 1461, establishes the National Estuarine Research Reserve System (formerly known as the National Estuarine Sanctuary Program) to provide financial assistance awards on a fifty-fifty matching basis to states to acquire, develop and operate estuarine areas as natural field laboratories. These areas are used primarily for long-term scientific and educational programs that provide information essential to coastal management decisionmaking.

The System is administered by the Marine and Estuarine Management Division (MEMD), National Ocean Service, within the National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Eighteen National Estuarine Research Reserves, protecting approximately 267,000 acres of estuarine lands and waters, have been established in the System. Four additional sites are being considered for inclusion in the System. These sites are located in Delaware, New York, South Carolina and Virginia. The designated Reserves are described in this catalogue. Detailed information concerning the individual sites can be obtained from the sites or from the MEMD at (202) 673-5126 or by writing to MEMD at 1825 Connecticut Avenue, N.W., Suite 714, Washington, DC 20235.

Highlights of recent System and individual Reserve activities are summarized in *Status Reports* issued by the MEMD on a periodic basis. To be added to the mailing list for *Status Reports*, contact the MEMD.



The National Estuarine Research Reserve System



Marine and Estuarine Management Division
Office of Ocean and Coastal Resource Management
National Ocean Service
1825 Connecticut Ave., NW
Washington, DC 20235

GULF/CARIBBEAN REGION

Apalachicola

Jobos Bay

Rookery Bay

Weeks Bay



APALACHICOLA NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1979

LOCATION: The Apalachicola National Estuarine Research Reserve is located in northwest Florida, approximately 90 miles southwest of Tallahassee.

SITE DESCRIPTION: The Reserve encompasses 193,758 acres of land and water, making it the largest of the 18 existing National Estuarine Research Reserves. Included in the Reserve are two barrier islands and a portion of a third, portions of the Apalachicola River and adjoining uplands, and Apalachicola Bay.

The Reserve includes a 12,358 acre National Wildlife Refuge on St. Vincent Island, the 2,300 acre Cape St. George State Reserve, and 1,883 acre State Park on the eastern tip of St. George Island. The Reserve encompasses a variety of habitats: fresh and salt water marshes, swamp forests, barrier sand beaches, upland forests, and the open waters of the bay and river.

SIGNIFICANT PLANT AND ANIMAL SPECIES: The Reserve is home to over 1,300 species of plants, 36 of which are threatened or endangered, including the Ogeechee Tupelo tree which is found on St. Vincent's Island at the western end of the Reserve. Atlantic sturgeon, bluestripe shiner, shoal and suwanee bass are among the 116 species of fish found within the Reserve. The Reserve is one of the more important bird habitats in the southeastern United States. The species list includes 283 species with 25 designated as threatened, endangered, or species of special concern. Mammals of threatened or endangered designation include the Florida panther, black bear, Florida and Southeastern weasel, Florida and southern mink, and several species of bats, including the Indiana and Gray bat.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: On-site programs include publications, audio-visual presentations and library, guest speaker programs, college classes, teacher education, citizen support organization activities, a reprint library, public seminars, and cultural events.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Among the off-site programs, the Reserve offers classroom presentations, audio-visual presentations, teacher education, and field trips. The 7th-12th grade program called Project Estuary, originally developed by the Reserve, is conducted by the school systems in the five-county region bordering the Reserve.

RESEARCH PROGRAM: Three main in-house projects are: Red fish population dynamics, colonial nesting shorebirds--Least Tern and Black Skimmer--data collecting, and Molluscan inventory.

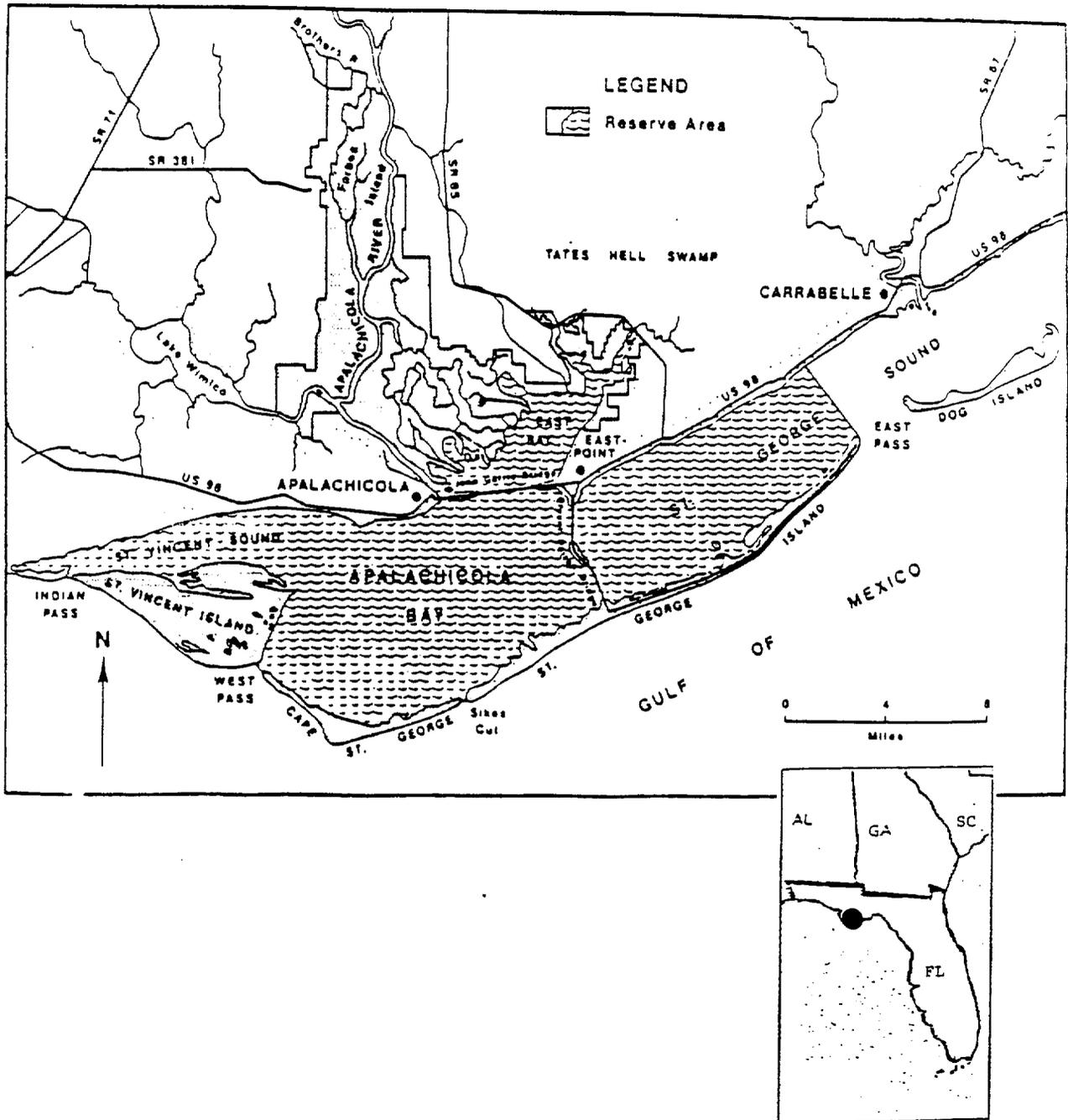
VOLUNTEER PROGRAM: Volunteers are recruited and trained to fulfill specific tasks identified by the Reserve. The volunteer program is coordinated with activities of the citizen support organizations.

FACILITIES: The Reserve headquarters is located near Scipio Creek on 7th Street in the city of Apalachicola. It includes displays, a research laboratory and a reference library. Overnight stays within the Reserve at the Marshall House in the Cape St. George State Reserve are available for education and research groups.

FOR ADDITIONAL INFORMATION CONTACT:

Apalachicola National Estuarine Research Reserve
261 7th Street
Apalachicola, Florida 32320
(904) 653-8063

Map 1 - Apalachicola National Estuarine Research Reserve



JOBOS BAY NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1981

LOCATION: The Jobos Bay Reserve is located on the southern coastal plain of the island of Puerto Rico. The main access road to the Reserve is State Highway 3.

SITE DESCRIPTION: The Reserve covers nearly 2,800 acres. For management purposes the Reserve has been divided into three units: Mar Negro, Cayos Caribes, Seagrass Beds/ Punta Colchones.

Mar Negro is characterized by mangrove fringe which protects the shoreline and lagoons and channels. Cayos Caribes is a chain of 17 tear-shaped islets. This area is of particular interest because of its proximity and interaction with seagrass beds, mangroves, and coral reef. North of the Reserve are commercial sugarcane farms. To the east and west of the Reserve is the Aguirre State Forest.

SIGNIFICANT PLANT AND ANIMAL SPECIES: Three hundred West Indian Manatees are known to forage within the Cayos Caribes area of the Reserve. This is thought to be the second largest population of manatees in Puerto Rico. Sea turtles are often found in the seagrass beds in Jobos Bay.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Field trips of the Reserve are offered to educational institutions and environmental or public interest groups. A series of curriculum materials are available to teachers on the various estuarine habitats occurring in the Reserve.

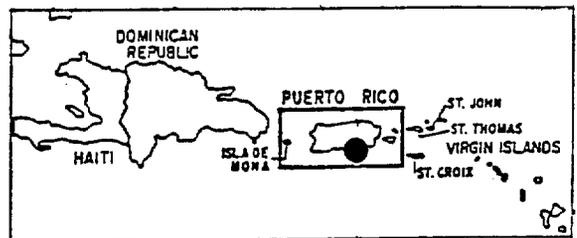
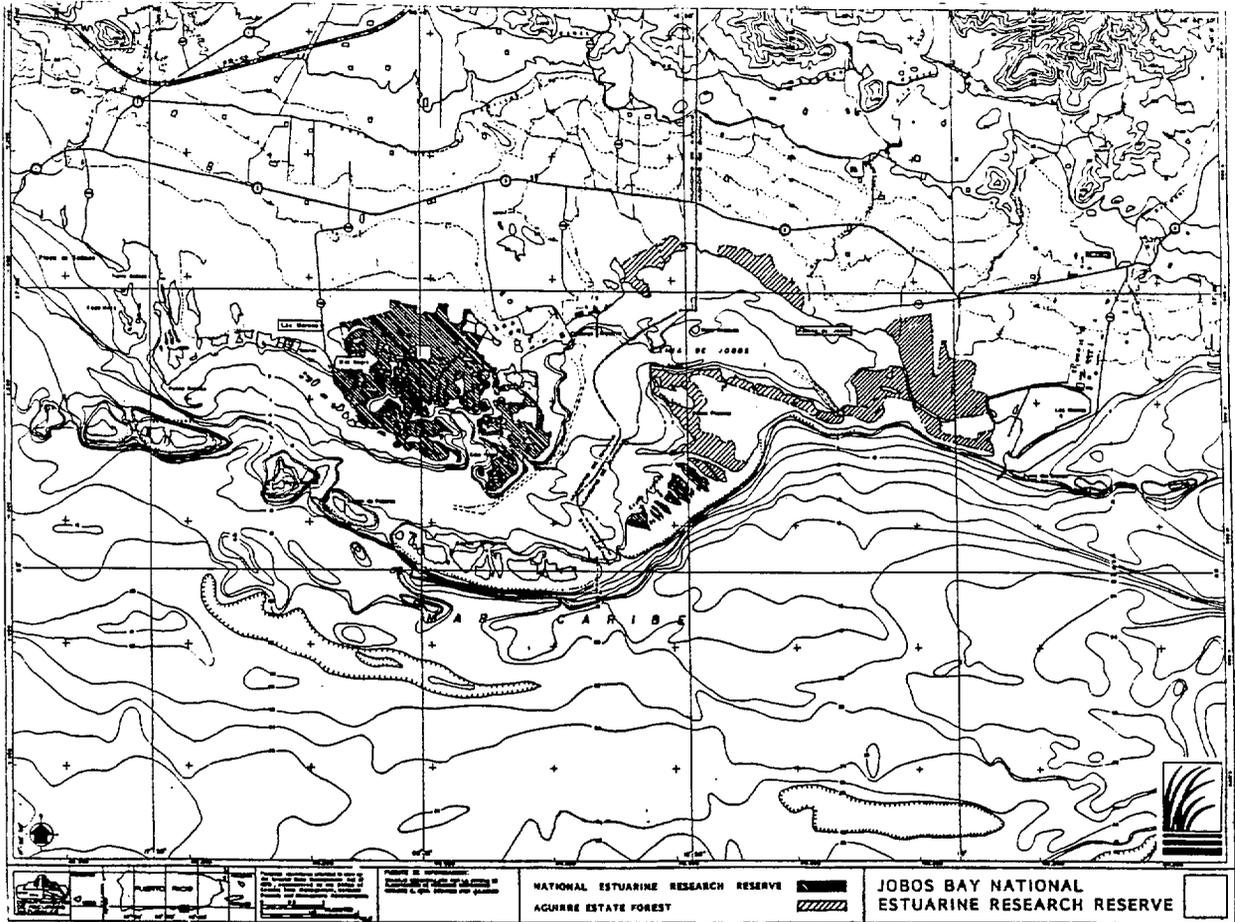
OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: The Reserve has a weekly radio program on station WHOY (1210 AM) that reaches the Guayama and Salinas communities. The Reserve also offers an out-reach program to schools, communities, and organizations throughout Puerto Rico that provides a general introduction to estuarine systems with particular emphasis on the resources of Jobos Bay.

FACILITIES: The Reserve currently contains an administrative office and a nature-viewing boardwalk. Development of a research and educational facility is in the design phase, and construction is expected to begin in 1990.

FOR ADDITIONAL INFORMATION CONTACT:

Jobos Bay National Estuarine Research Reserve
Post Office Box 1170
Guayama, Puerto Rico 00655
(809) 864-0105

Map 2 - Jobos Bay National Estuarine Research Reserve



ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1978

LOCATION: The Rookery Bay National Estuarine Research Reserve is located on the Gulf coast of Florida approximately 150 miles south of the Tampa-St. Petersburg metropolitan area and 5 miles south of the city of Naples.

SITE DESCRIPTION: Rookery Bay is one of the few remaining pristine mangrove estuaries in North America. The Reserve encompasses approximately 9,400 acres of land and water surrounding Rookery Bay and Henderson Creek. Estuarine habitats within the Reserve include mangrove forests, marshes, sea grasses and open water. The Reserve's uplands are composed of pine woodlands, seasonal wetlands and scrub oak habitat.

SIGNIFICANT PLANT AND ANIMAL SPECIES: The estuarine waters are rich in recreationally and commercially important fish and shellfish. In addition, approximately 150 species of birds have been recorded at the site. Protected species found in the Reserve include the West Indian manatee, Florida panther, bald eagle, gopher tortoise and indigo snake. The Reserve's extensive mangrove forests and coastal hardwood hammocks contain unique and significant plant assemblages.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: The Reserve offers field trips and classroom instruction and laboratory programs for high schools, colleges and the public. Special training workshops are held periodically for teachers and environmental professionals. In addition, the Briggs Nature Center, operated by The Conservancy, Inc., offers a variety of programs including canoe trips and boardwalk tours.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Efforts focus on adult education courses, interpretive exhibits at community events and slide presentations. Publications include a newsletter, Coastal Zone Management bulletin, and a field guide.

RESEARCH PROGRAM: Research currently underway includes the study of wading birds, habitat preferences of fishes and invertebrates, primary and secondary productivity in mangrove ecosystems and stone crab biology. Staff are collecting data to analyze the fish populations in the Reserve.

MONITORING PROGRAM: Long-term programs exist for monitoring water quality, compiling a bird census, and recording tide and meteorological conditions. The Reserve also has a geographic information system and remote sensing program.

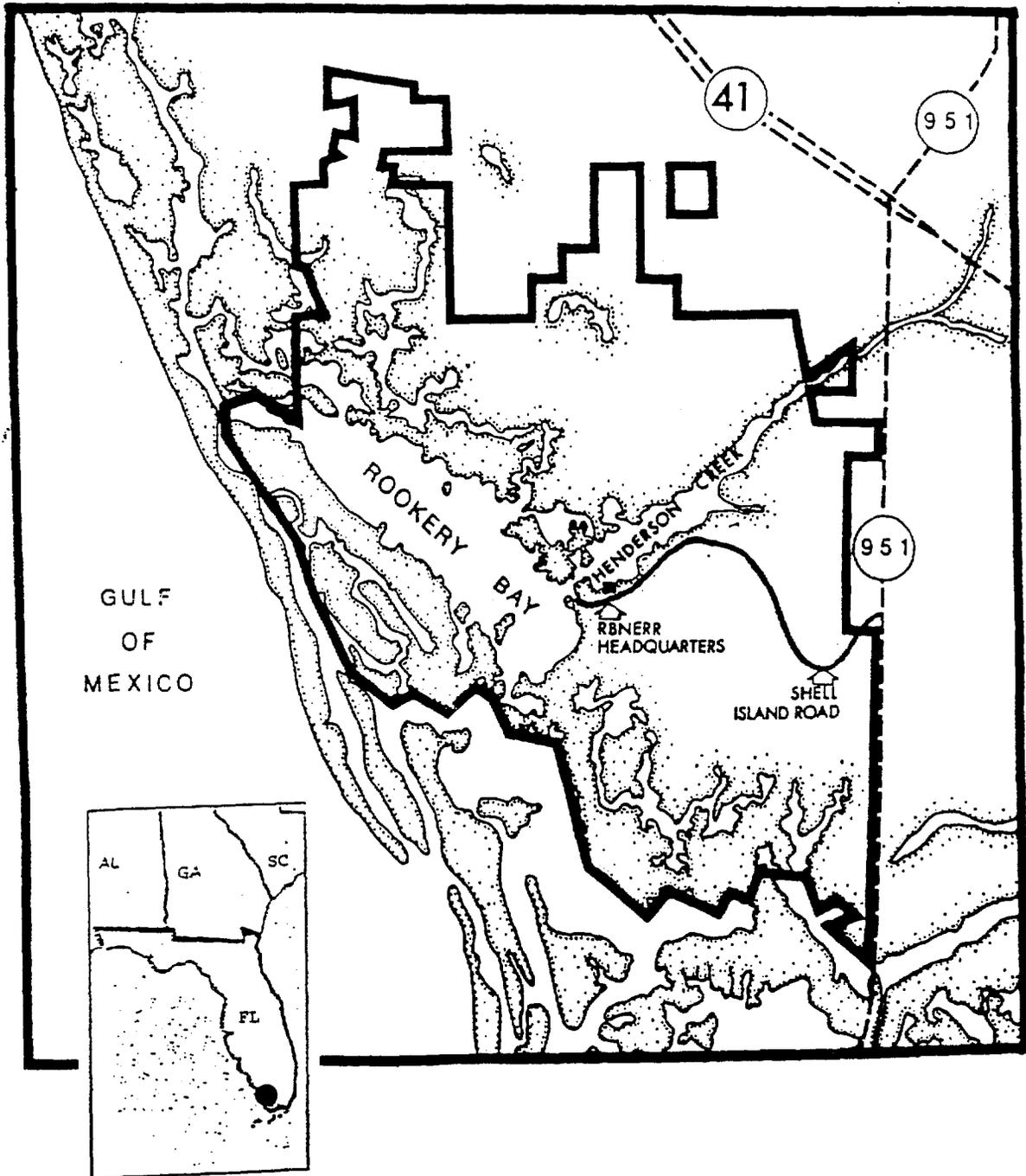
VOLUNTEER PROGRAM: The Friends of Rookery Bay, Inc., supports research and education through fundraising and volunteer efforts. Projects include sponsoring gopher tortoise research, regional science fairs, manatee awareness and special events.

FACILITIES: The Reserve headquarters includes a research laboratory, classroom, office space and small library. The Reserve has six boats used for research, education and law enforcement activities. Primitive nature trails through mangrove and upland habitats are used in education programs. The Briggs Nature Center operates within the Reserve and has a boardwalk, classroom, and exhibit area.

FOR ADDITIONAL INFORMATION CONTACT:

Rookery Bay National Estuarine Research Reserve
10 Shell Island Road
Naples, Florida 33942
(813) 775-8845

Map 3 - Rookery Bay National Estuarine Research Reserve



WEEKS BAY NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1986

LOCATION: The Weeks Bay National Estuarine Research Reserve is located along the eastern shore of Mobile Bay in Baldwin County, Alabama, 30 miles southeast of the City of Mobile.

SITE DESCRIPTION: The Reserve encompasses 3,028 acres of land and water in and around Weeks Bay. Weeks Bay is a small estuarine embayment comprised of open, shallow waters and forested wetlands. The forested wetlands are known as moist pine forest. This area forms an extensive strip between floodplain swamps and upland pine-oak forest, and is diverse and rich in species.

SIGNIFICANT PLANT AND ANIMAL SPECIES: The endangered Alabama shovelnose sturgeon is found in Weeks Bay. There are three endangered snakes found in the Reserve: the Eastern indigo snake, the Black pine snake, and the Florida pine snake. The endangered Florida black bear is also found there. Birds found within the Reserve include the brown pelican, bald eagle, osprey, peregrine falcon, snowy plover, and red-cockaded woodpecker.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Guided walks on a nature trail are conducted including identification of plant and animal life and discussions of different habitats encountered such as upland forest, marsh and open water areas. Nature trails are equipped with written guide and plant labels for self-guided walks. Seining is performed in the shallow areas of the Bay and species identification follows. Educational brochures, "Reptiles and Amphibians of Weeks Bay," and "Mammals and Birds of Weeks Bay," are available at the Reserve.

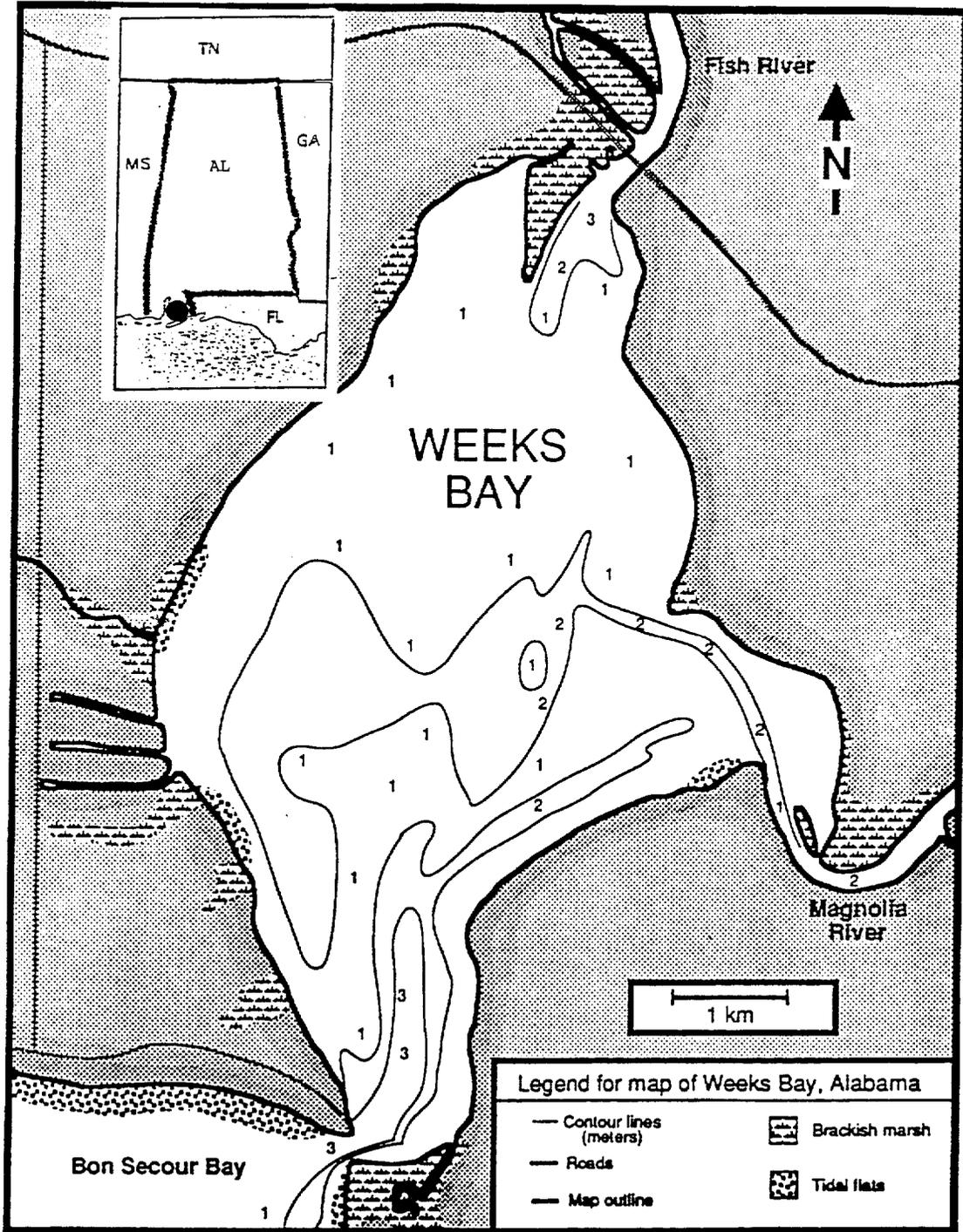
OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: The Reserve offers presentations to teachers, school groups, and the general public. "Estuarine Habitats and Values" is a slide program dealing with various estuarine-based habitats and economic, cultural, aesthetic and environmental values. "Touch Lab" targets kindergartners through 6th graders. This project consists of preserved samples of species found in and around Weeks Bay with discussion of life history and hands-on time.

FACILITIES: Public facilities at the Reserve include a nature trail, shore-side observation deck, and a raised catwalk over a wetlands habitat. Establishment of a permanent on-site research and education center is planned for 1990.

FOR ADDITIONAL INFORMATION CONTACT:

Weeks Bay National Estuarine Research Reserve
Department of Conservation and Natural Resources
Marine Resources Division
10936-B U.S. Highway 98
Fairhope, AL 36532
(205) 928-9792

Map 4 - Weeks Bay National Estuarine Research Reserve



PACIFIC REGION

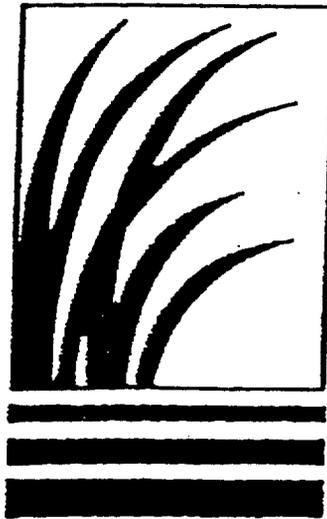
Elkhorn Slough

Padilla Bay

South Slough

Tijuana River

Waimanu



ELKHORN SLOUGH NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1980

LOCATION: The Elkhorn Slough National Estuarine Research Reserve is located on the central California coast roughly halfway between the cities of Santa Cruz and Monterey. The Reserve is managed by the California Department of Fish and Game.

SITE DESCRIPTION: The Reserve encompasses 1,330 acres of wetland and upland habitat. Elkhorn Slough is the second largest salt marsh in California. The main channel of the slough is more than seven miles long with over 3000 acres of mudflat and tidal channels. Surrounding habitats include coastal dunes, grasslands, oak woodlands, freshwater ponds and maritime chaparral. Hundreds of species of invertebrates, fishes, and birds are found at the Reserve. The channels and tidal creeks are nursery grounds for the young of many species of fish. It is also a critical stopover on the Pacific flyway. Resident marine mammals include harbor seals, sea lions, and sea otters.

SIGNIFICANT PLANT AND ANIMAL SPECIES: Pickleweed is the dominant vascular plant in the salt marsh that flanks hundreds of acres of mudflat and channel. Three types of woodlands are found in the Reserve: the oak woodland, Monterey pine, and eucalyptus.

The Elkhorn Slough area supports several species of fauna that are endangered. These include: California brown pelican, California least tern, Santa Cruz long-toed salamander, American peregrine falcon and California clapper rail.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: The Reserve conducts teacher training programs to prepare teachers to lead field trips to the site. The Reserve also sponsors specialized workshops for educators wanting more in-depth training in estuarine science. Regularly scheduled interpretive walks are conducted by volunteer docents and staff for school groups as well as the public. Schedules of special events, activities, and public lectures are announced. Brochures and fliers on various subjects are published and distributed. The area is also designated a California Wildlands site under a new program dedicated to education and interpretation instituted by the California Department of Fish and Game.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Off-site activities include sponsorship of major public symposia and conferences on the "State of the Bay," participation in local fairs and events with staffed booths, lectures to local service clubs, libraries, and other organizations. Radio and television programs have highlighted Reserve programs and purposes. Reserve staff has sponsored and judged school science fairs and participated in several Symposia for educators, focusing on teaching environmental and scientific issues. The non-profit Elkhorn Slough Foundation helps support research and education both on- and off-site.

RESEARCH PROGRAM: Research includes work funded by NOAA as well as graduate research carried out by students from the Moss Landing Marine Laboratories, UCSC Long Marine Laboratory, and Stanford's Hopkins Marine Station. Research interests have ranged from studies on fish populations to work on erosion and sedimentation in the slough watershed.

MONITORING PROGRAM: Monitoring programs are performed by several different groups. State Mussel Watch monitors compounds in mussel tissue from *Mytilus edulis* collected from the Reserve and throughout the watershed. A water monitoring project has been established on the Reserve and utilizes volunteers in the data collection process. A National Weather Service weather station has been established on site and complements the station maintained by the Moss Landing Marine Laboratories nearby. Aerial photographs of the entire slough area are taken yearly. Every five to seven years, high resolution infrared aerial photographs are taken.

VOLUNTEER PROGRAM: Currently, nearly 100 people volunteer their time on the Reserve and around the slough. Volunteers participate in a 7-week training program in the natural and cultural history of the slough and the logistics of the program. Volunteers provide interpretive services on-site, help in staffing the visitor

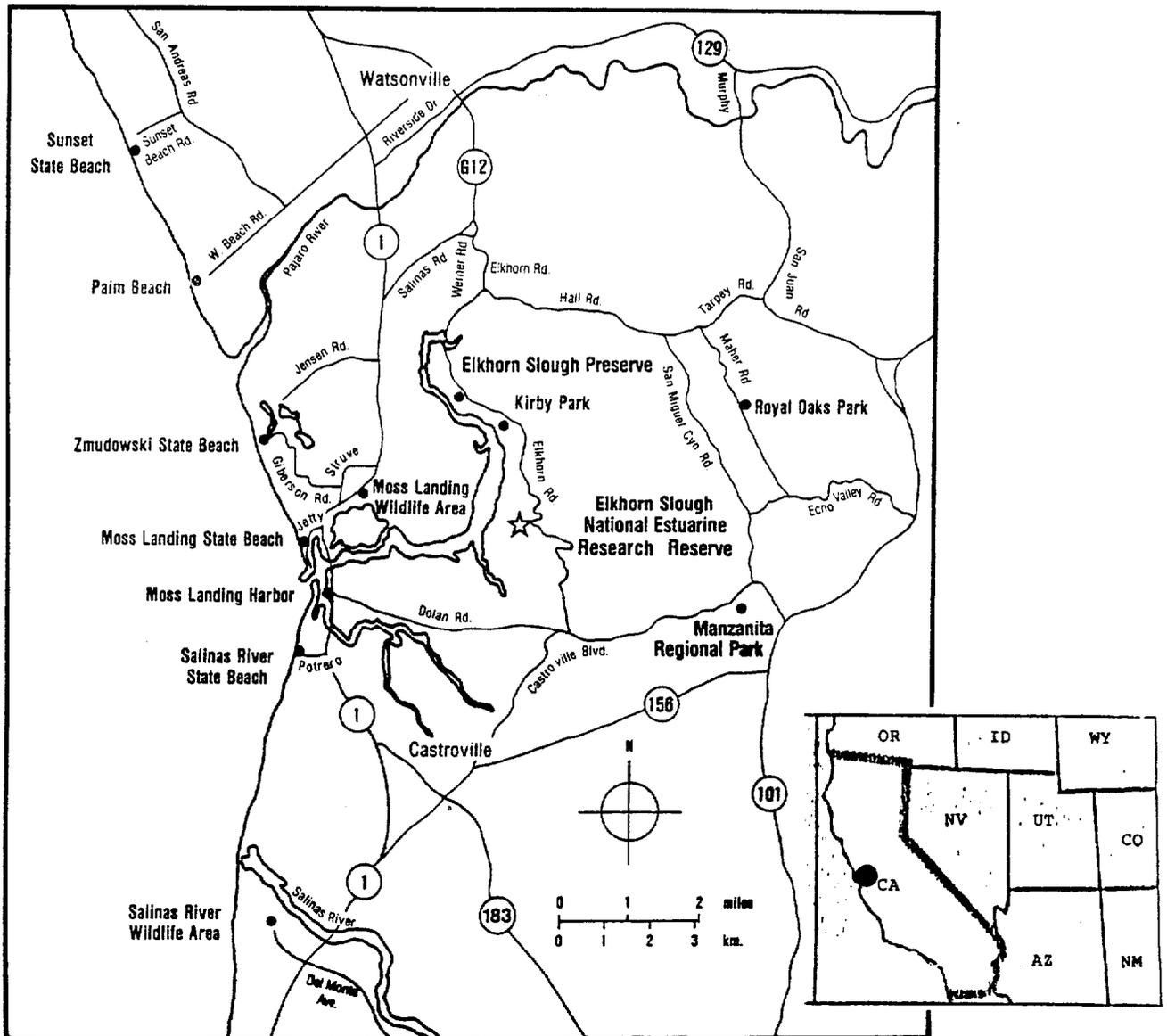
center, operate the Reserve bookstore, assist with research projects, maintain trails, assist in bookkeeping chores, sponsor special projects, assist in designing and maintaining exhibits, serve as members of the Reserve Advisory Committee and as members of the Board of Directors of the non-profit organization established to protect the slough, the Elkhorn Slough Foundation.

FACILITIES: Public facilities at the Reserve include a Visitors Center containing exhibits, a library, and a bookstore. Self-guided hiking trails are also open to the public. On-site research facilities include a small laboratory and weather station. Expansion of this facility is planned for 1990.

FOR ADDITIONAL INFORMATION CONTACT:

Elkhorn Slough National Estuarine Research Reserve
 1700 Elkhorn Road
 Watsonville, CA 95076
 (408) 728-2822

Map 5 - Elkhorn Slough National Estuarine Research Reserve



PADILLA BAY NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1980

LOCATION: The Padilla Bay National Estuarine Research Reserve, located in Skagit County, is 50 miles north of Seattle and 6 miles east of Anacortes, Washington.

SITE DESCRIPTION: Of Padilla Bay's more than 11,600 acres, the Reserve contains approximately 2,500 which include eelgrass meadows, subtidal sand and mud, plus 64 acres of upland grassland and forest.

SIGNIFICANT PLANT AND ANIMAL SPECIES: Padilla Bay contains the largest contiguous seagrass meadow in the Pacific Northwest and is a nursery area for several species of flatfish, salmon, and Dungeness crab. Herring and baitfish use Padilla Bay as a spawning and nursery area. Resident harbor seals haul out and pup at the Reserve. Padilla Bay's mud and sand are home to polychaete worms, and hardshell and softshell clams. The Reserve is an important feeding and resting area for black brant and other migratory bird species.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: School programs and curriculum for pre-kindergarten through the 8th grade have been instituted. Youth programs and general audience workshops and classes (some for college credit) are offered on a regular basis. The Interpretive Center houses exhibits and saltwater aquaria. There are approximately 3 miles of interpretive trails.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Staff speak at the request of regional groups. A portable display describing education and research is exhibited at conferences and workshops.

RESEARCH PROGRAM: Staff from several universities, state government departments, and Reserve staff have focused research on the seagrasses, mudflats, crabs, juvenile fish and food organisms of young fish. Rates of production have been measured and several important controlling factors and trophic links identified.

MONITORING PROGRAM: The monitoring program requires an initial characterization of the estuary and has begun with the identification of the important plant and animal communities. It is continuing with a characterization of hydrocarbons in the Reserve.

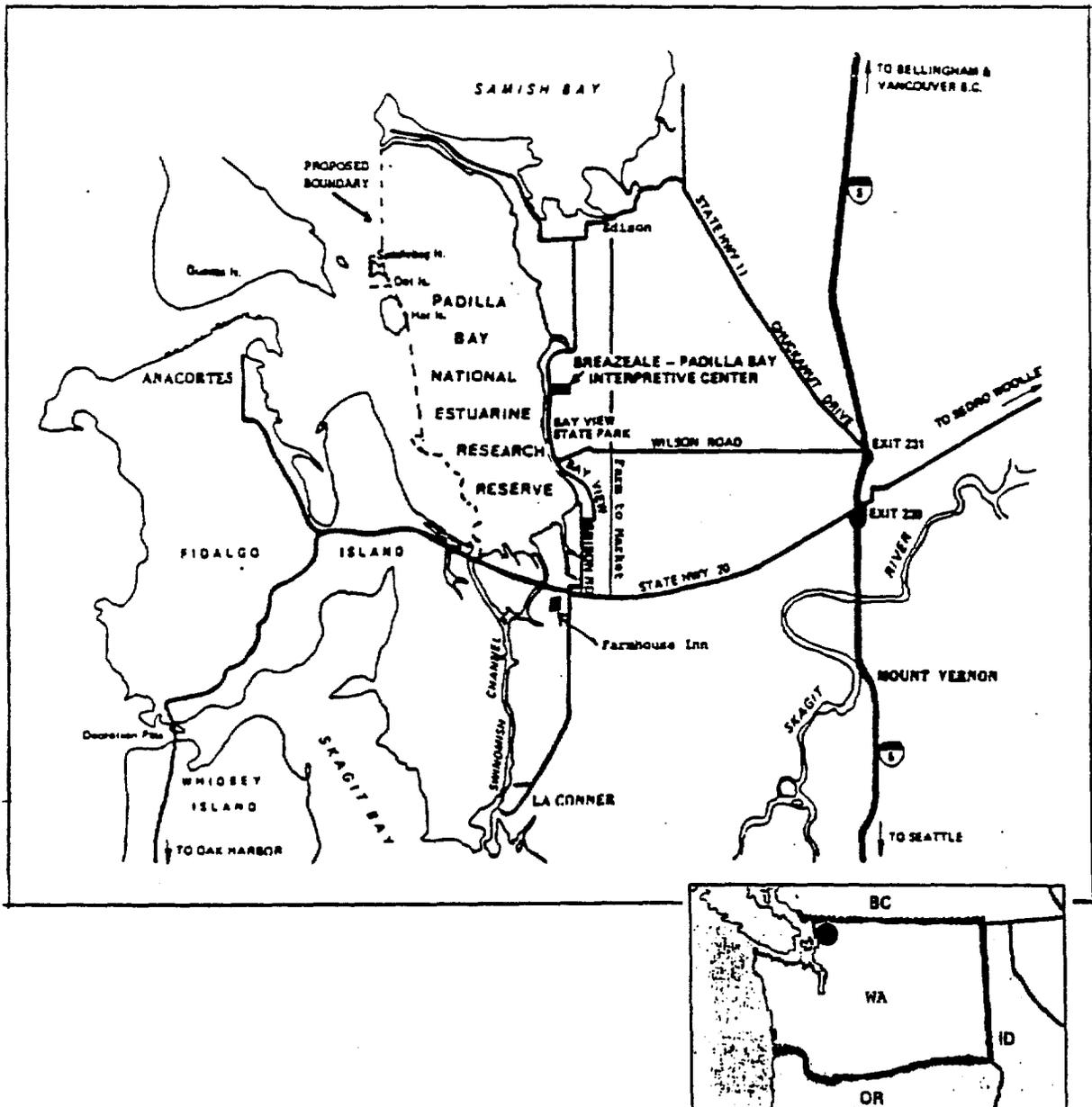
VOLUNTEER PROGRAM: Volunteers assist with education programs, receptions, and special projects. Applications are available on-site or by request.

FACILITIES: The Breazeale-Padilla Bay Interpretive Center is the Reserve's headquarters. The Center contains displays, aquaria, a theater, "hands-on" room, classroom, and a laboratory. Two additional buildings provide research facilities which include a field laboratory, and overnight research quarters. A small boat is available for research use on a limited basis. Upland areas include interpretive trails with direct estuary access.

FOR ADDITIONAL INFORMATION CONTACT:

Padilla Bay National Estuarine Research Reserve
1043 Bayview-Edison Road
Mt. Vernon, Washington 98273
(206) 428-1558

Map 6 - Padilla Bay National Estuarine Research Reserve



SOUTH SLOUGH NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1974

LOCATION: The South Slough is the southernmost inlet of the Coos Estuary on the Southern Oregon Coast. The Reserve is located roughly 2 miles east of Cape Arago and about 3 miles southwest of the city of Coos Bay, Oregon.

SITE DESCRIPTION: South Slough is one of 11 shallow tidal inlets connected to the Coos Estuary. The 4,500 acre administrative boundary encompasses approximately 25 percent of the South Slough drainage basin. It includes a variety of upland and wetland habitats including coniferous forest, fresh and salt water marshes--tide flats, eelgrass beds and open water/sub-tidal habitats.

SIGNIFICANT PLANT AND ANIMAL SPECIES: The South Slough basin is over 80 percent forested. Plant and animal species are typical of northwest coastal forests. The Port Orford Cedar is a species with a limited range that was historically abundant in the drainage. The species is rapidly declining as a result of a soil-born fungal disease introduced by the nursery industry. Dominant tree species include Hemlock, Sitka Spruce, Douglas Fir, and Red Alder. Shrub thickets and understory vegetation include huckleberry, salmonberry, salal and rhododendron. The Reserve supports a diverse assemblage of vertebrates. Over 30 fish species frequent the tidewater areas. Over 100 species of birds including nesting Bald Eagles, Great Blue Herons and dozens of species of mammals including elk, bear, beaver, otters, mountain lions and bobcats. Several hundred species of invertebrates have been identified in the estuary. Spionid worms and burrowing shrimp are most abundant. Over 40 species of introduced marine organisms have been identified. Japanese oysters are cultivated in the Reserve. The introduced eelgrass, *Zostera japonica*, is rapidly colonizing the Reserve. High salinity salt marshes predominate as most of the low salinity marshes have been diked by historic agriculture practices. The Reserve plans to restore tidal influence to these habitats.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: On-site education programs include formal school programs for grades four through twelve. Other curricula are custom-designed for preschool through third grades and college classes. Canoe trips, guided trail walks, and special workshops are offered throughout the summer.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Off-site projects include programs for day-care centers, schools, and libraries. Educational programs are presented to state service clubs and groups. Interpretive programs include assistance to coastal cities in habitat projects as well as planning for interpretive centers and waterfront developments. Waterfront interpretive signage has been designed for coastal cities to use on estuarine docks and waterfront areas.

RESEARCH PROGRAM: The goal of the research program is to initiate and support research initiatives designed to answer management-related questions for the Reserve and the coastal zone. Researchers from resource agencies and academic institutions are encouraged to collaborate with the staff of the South Slough Reserve.

MONITORING PROGRAM: The Reserve collects and maintains summary data describing basic physical environmental features of the area. Tidal data are available since the early 1970's. Solar radiation (total global) has been monitored since 1987. Data sets for meteorological and some hydrographic parameters are also available.

VOLUNTEER PROGRAM: This program comprises several components. Volunteers assist schools on day-long visits to the Reserve. Prison and youth agencies supply maintenance work crews throughout the year. A non-profit support group, Friends of South Slough Reserve, Inc., supports many activities at the Reserve. The main goal of the "Friends" is to improve public education about estuaries.

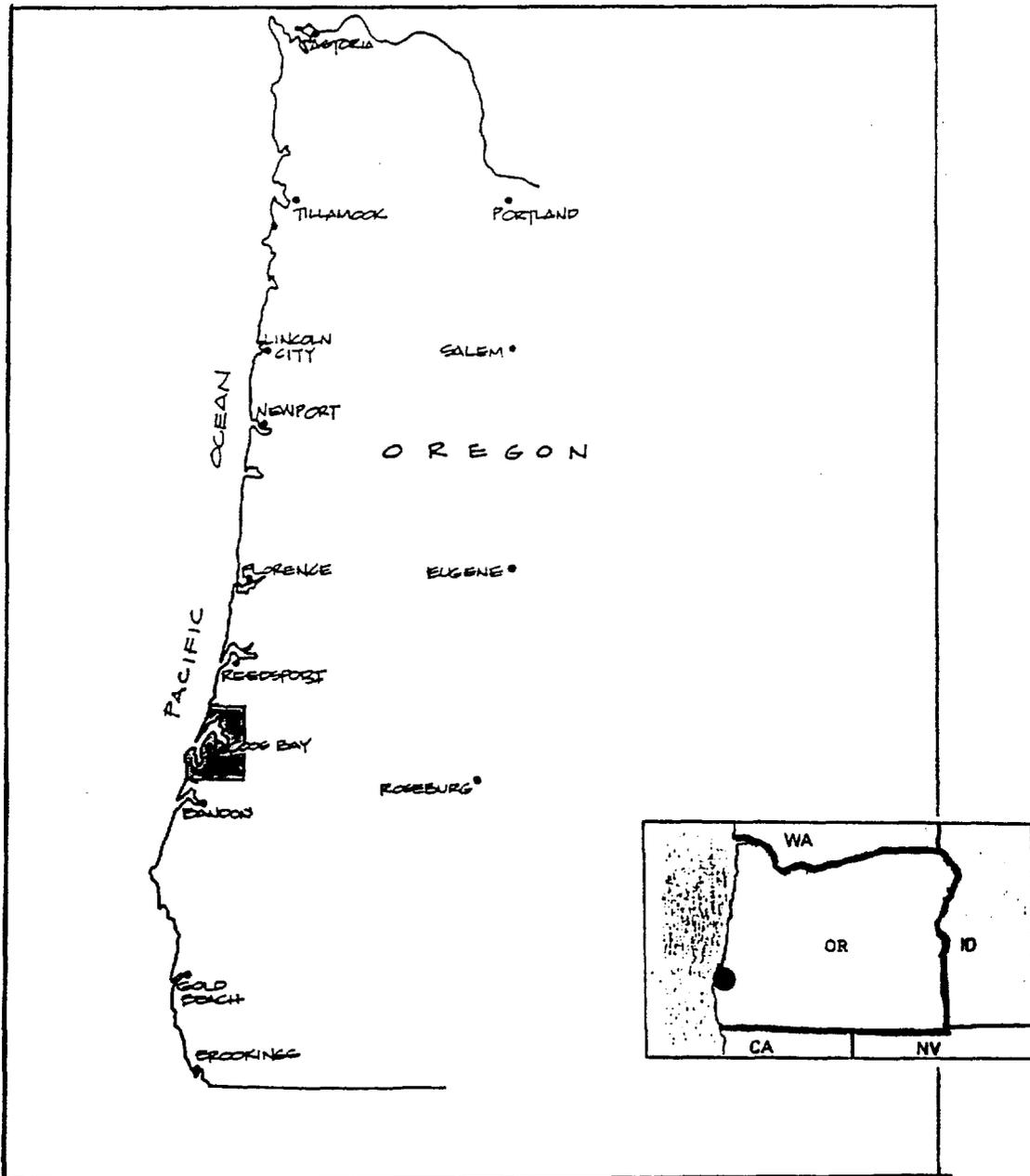
FACILITIES: The Reserve headquarters houses exhibits related to estuaries, a photo gallery, an auditorium, offices, and a small book sale area. Over 5 miles of interpretive trails wind through the western portion of the

Reserve. The trail system includes a small outdoor theater, several information kiosks, and a two-level deck overlooking a salt marsh. Housing for 4 visiting scientists or interns is available. Two unoccupied residential structures and several storage sheds are also on the site.

FOR ADDITIONAL INFORMATION CONTACT:

South Slough National Estuarine Research Reserve
Post Office Box 5417
Charleston, Oregon 97420
(503) 888-5558

Map 7 - South Slough National Estuarine Research Reserve



TIJUANA RIVER NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1982

LOCATION: The Tijuana River National Estuarine Research Reserve is the southernmost estuary on the west coast of the United States. The Reserve is immediately north of the Mexico border in San Diego County, California.

SITE DESCRIPTION: The Tijuana River drains 1,735 square miles of mountain ranges and lowlands to the east in southern California and northern Baja California in Mexico. In fact, 73 percent of the River's watershed lies in Mexico. The Reserve itself contains 2,513 acres of tidally flushed wetlands, riparian, and upland habitats and agricultural lands at the coastal end of the river. Estuarine habitats include open-water channels, beaches, barrier dunes, mudflats, and salt marshes. The Reserve's uplands encompass a variety of riparian habitats and agricultural lands. Together, the lower estuary and upland areas support a diversity of invertebrates, fishes and birds.

SIGNIFICANT PLANT AND ANIMAL SPECIES: Significant populations of endangered and proposed endangered species found at the Reserve include: California brown pelican, peregrine falcon, salt marsh bird's beak, wandering skipper, Belkin's dune fly, globose dune beetle, Belding's Savannah sparrow, light-footed clapper rail, and California least tern. Two hundred forty-six species of fish are present in Reserve waters.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAM: Reserve school programs are structured around the M.A.R.S.H. (Marsh Awareness with Resources of Slough Habitats) Project curriculum developed for 5th and 6th grade students. During the fall and spring, training workshops using the materials in the field are offered to teachers and youth leaders throughout San Diego County. In conjunction with the Reserve, the local YMCA Camp Surf offers an internship program with interns conducting elementary school tours of the estuary. A high school level curriculum is currently being developed through a San Diego County marine science education grant. Public nature walks are conducted on the first and second Saturday of every month from 9 a.m. to 11 a.m. The Reserve offers 4 miles of foot paths as well as access to 2.2 miles of beach.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Slide shows relative to the Reserve and its concerns are presented upon request to environmental groups, schools, community organizations, and other interested groups.

VOLUNTEER PROGRAM: Twenty-five volunteers perform restoration work on the Reserve.

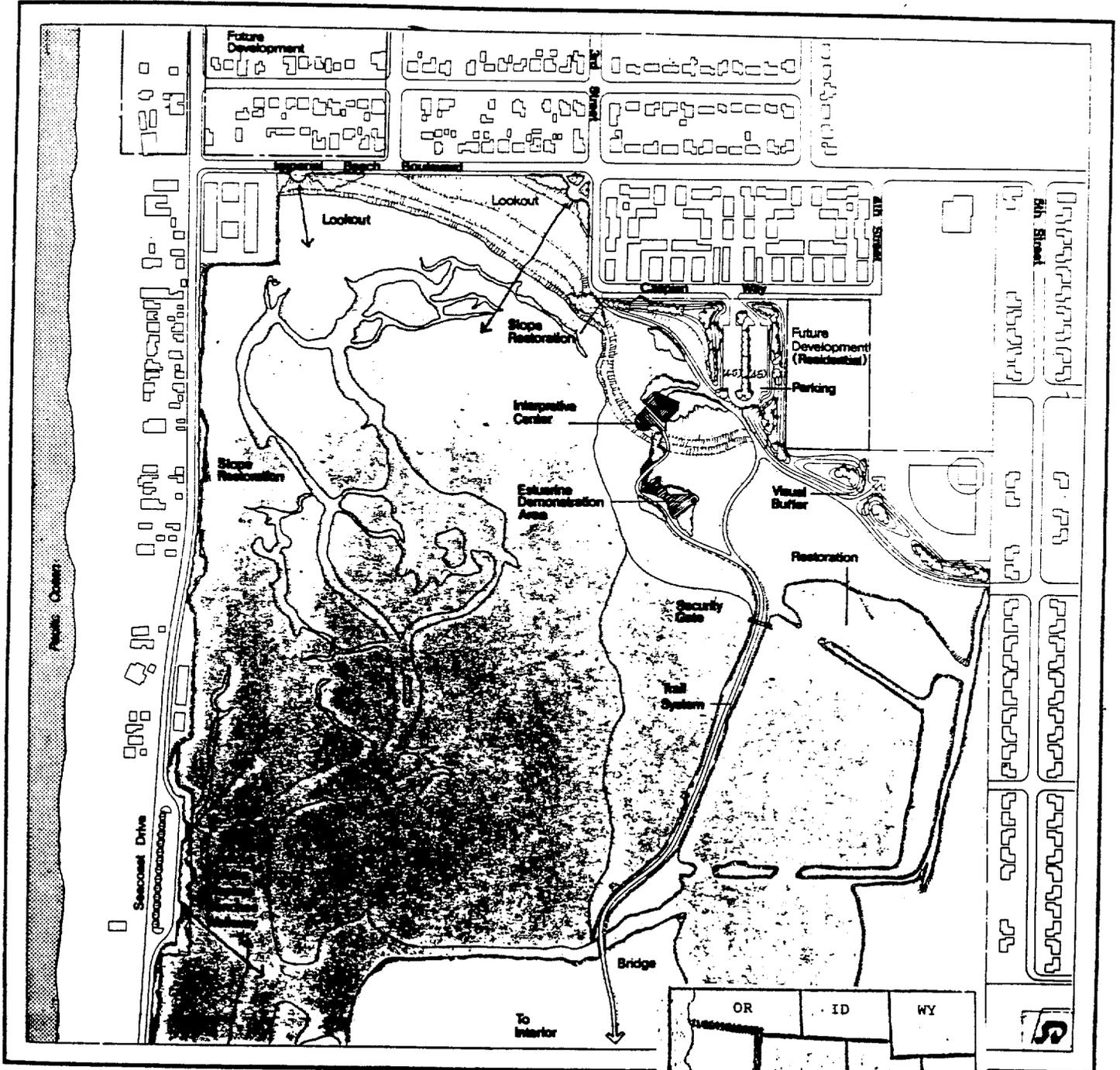
RESEARCH PROGRAM: Research is conducted in a broad range of habitats including dunes, beach, salt marsh, mudflat, salt pannes, coastal sage scrub, riverine and brackish marsh, as well as at the Pacific Estuarine Research Laboratory (PERL). Research has focused on the effects of wastewater discharges and watershed management practices on the estuarine environment, the development of estuarine and riparian habitat enhancement techniques, and the assessment of the nature of artificial wetlands as a mitigation measure in the region.

MONITORING PROGRAM: Monitoring programs have been established to track the influence of hydrological disturbances on the Reserve.

FACILITIES: PERL is a unique research facility located on a 70 acre parcel within the Reserve, managed by San Diego State University. The facility contains two acres of experimental channels and replicate marsh study units. A recently completed Visitor's Center provides an exhibit hall, education laboratory, multi-purpose meeting room, administrative offices, technical and planning reference library, map and photo library, multi-media equipment and computer facilities.

FOR ADDITIONAL INFORMATION CONTACT:
 Tijuana River National Estuarine Research Reserve
 3990 Old Town Avenue, Suite 300C
 San Diego, California 92110
 (619) 238-3188

Map 8 - Tijuana River National Estuarine Research Reserve



WAIMANU VALLEY NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1976

LOCATION: Waimanu Valley is the second largest of a series of amphitheater-shaped valleys in a remote section of the windward coast of the island of Hawaii.

DESCRIPTION OF THE SITE: The Waimanu Valley National Estuarine Research Reserve possesses 3,400 acres that encompass most of Waimanu Valley, the adjacent bay, and the trail corridor from neighboring Waipio Valley. Intermittently inhabited for centuries, Waimanu Valley has been uninhabited for over forty years. Partial surveys have identified two major archaeological sites with complex cultural features. Its water resources are among the few in the State that have not been diverted and developed for human use. With the headwaters of Waimanu Stream and tributaries developing from an adjoining State Natural Area Reserve, an entire watershed and stream system is under Reserve protection.

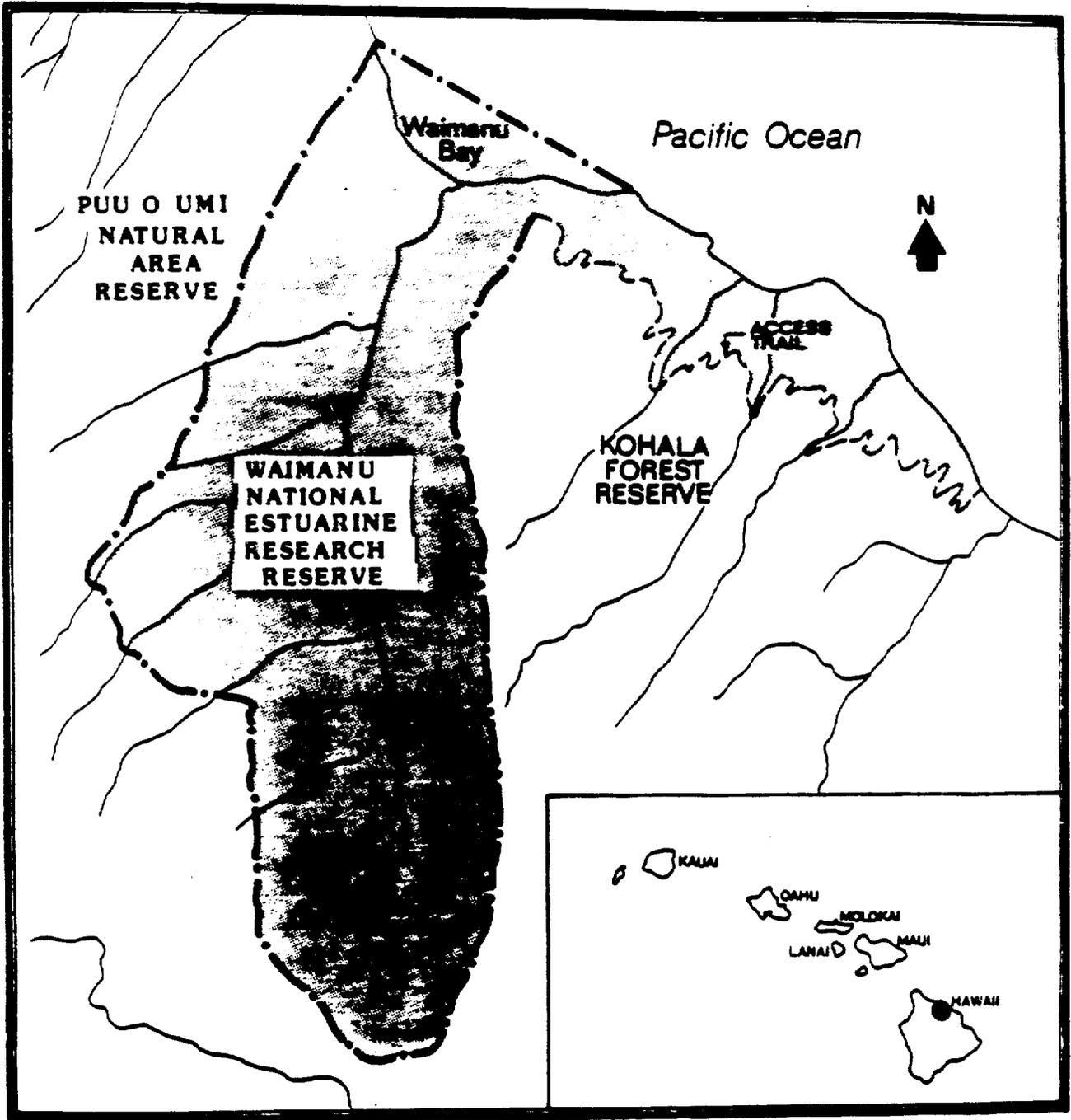
SIGNIFICANT PLANT AND ANIMAL SPECIES: The lack of human influence since the tsunami of 1946 has allowed the vegetation and animal life to follow its own course. The vegetation is made up of both native and non-native species. Native species include such trees and shrubs as ohia-lehua, hala, alahe'e, lama, kopiko and ilima. Non-native plants, such as guava, giant reed, California grass and palm grass dominate some areas of the valley. The valley also provides habitat for the only land mammal native to the Hawaiian Islands, the endangered ope'ape'a or Hawaiian hoary bat. Native birds include honeycreepers, the black-crowned night heron, Newell's shearwater and the migratory golden plover. Aquatic life in the stream system includes five native fish species, four native invertebrates and the introduced Tahitian prawn. Feral pigs, among other introduced mammals such as the polynesian rat and mongoose, have an especially destructive effect on the native vegetation and watershed/stream ecosystem.

FACILITIES: The only facilities present are trails, one of which has a trail shelter. A 5-mile, fairly difficult trail traverses the plateau and gully section between the giant valleys of Waipio and Waimanu. Within Waimanu, a trail runs along the bottom of the western valley wall to numerous waterfalls.

FOR ADDITIONAL INFORMATION CONTACT:

Waimanu Valley National Estuarine Research Reserve
Natural Area Reserves System Program
Department of Land and Natural Resources
Post Office Box 621
Honolulu, Hawaii 96809
(808) 548-7417

Map 9 - Waimanu Valley National Estuarine Research Reserve



ATLANTIC AND GREAT LAKES REGION

Chesapeake Bay

Great Bay

Hudson River

Narragansett Bay

North Carolina

Old Woman Creek

Sapelo Island

Waquoit Bay

Wells



CHESAPEAKE BAY NATIONAL ESTUARINE RESEARCH RESERVE IN MARYLAND

Designated in 1985

LOCATION: The Chesapeake Bay National Estuarine Research Reserve in Maryland will eventually consist of three components. The Reserve presently includes one designated component, Monie Bay, located in Somerset County on the lower eastern shore of the Bay. Two additional elements have been proposed. Otter Point Creek is located 17 miles northeast of Baltimore in Harford County on the upper western shore of the Chesapeake Bay. Jug Bay is located 20 miles southeast of Washington, DC, on the Patuxent River, a western shore tributary to the Bay, and lies in both Anne Arundel and Prince George's Counties.

SITE DESCRIPTION: The 3400 acre Monie Bay component is within the Deal Island Wildlife Management Area and extends over four tributary creeks of Monie Bay, itself a tributary to Tangier Sound. It is comprised of tidal creeks, open estuarine waters, salt marshes, and pine forests. The salinity of the open water typically ranges from 12 ppt in the Spring to 17 ppt in the Fall. Tides in Monie Bay are semidiurnal and have a mean range of 1.0 feet (0.3 m).

SIGNIFICANT PLANT AND ANIMAL SPECIES: Saltmeadow cordgrass, saltgrass and needlerush dominate the high phase areas with large stands of saltmarsh bulrush and three-square bulrush occurring in lower areas. In areas of daily tidal exchange, saltmarsh cordgrass predominates. Wigeongrass and horned pondweed are common in deeper areas. Monie Bay is a haven for resident and migratory bird populations including herons, egrets, and ibises native to Maryland; various raptors including bald eagles, peregrine falcons and rough-legged hawks; a wide variety of waterfowl species, including Canada geese; many of Maryland's shorebirds, gulls and terns; and various passerines and grebes. Mammals include rice rats, meadow voles, muskrats, otter, raccoons, mink, and red and gray fox. Important aquatic populations such as blue crabs, white perch, oysters and blue fish are found in Monie Bay.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Bird banding sessions, open to the public, are held annually.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Reserve staff conduct tours of the Deal Island Wildlife Management Area. Tours are given upon request to student groups.

RESEARCH PROGRAM: Research projects currently include a study on the variability in sea level rise and its effect on marsh development, and a study on the role of sulfate from sea water in the degradation of marsh peat. A barn owl nest box study is ongoing.

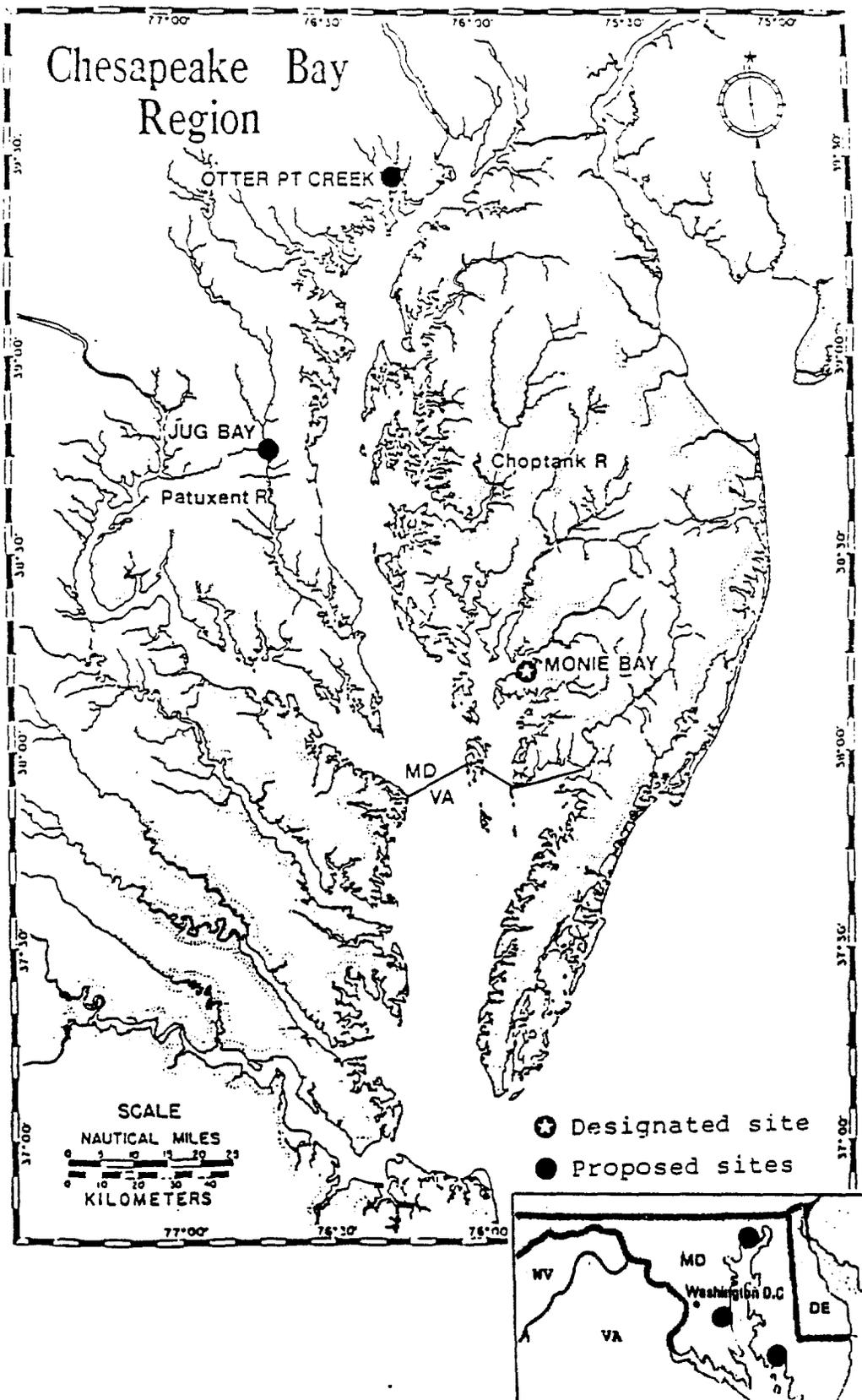
MONITORING: The Maryland Forest, Park, and Wildlife Service performs a waterfowl census and periodic water quality monitoring in the Wildlife Management Area.

FACILITIES: None at this time.

FOR ADDITIONAL INFORMATION CONTACT:

Maryland Chesapeake Bay National Estuarine Research Reserve
Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401
(301) 974-2784

Map 10 - Chesapeake Bay National Estuarine Research Reserve in Maryland



GREAT BAY NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1989

LOCATION: The Great Bay estuary extends 15 miles from the coast at New Castle, New Hampshire to the upper Great Bay in southeastern New Hampshire.

SITE DESCRIPTION: The Great Bay National Estuarine Research Reserve (GBNERR) includes 4,471 acres of tidal waters and mudflats and approximately 48 miles of shoreline. Eight hundred acres of upland within the boundary represent the range of different resources/environments in the estuary, including salt marsh, tidal creeks, islands, woodlands and open fields. The water area includes all of Great Bay, the small channel from the Winnicut River and large ones from the Squamscott and Lamprey Rivers which meet in the center of the Bay to form a channel which connects to Little Bay at Adams Point. The Great Bay estuary derives its freshwater inflow from these rivers. It is a large, shallow estuarine embayment with an average depth of nine feet but deeper channels extend to around 58 feet. Approximately one half of Great Bay is exposed at low tide with most of the intertidal being mudflat. The tidal range of the estuarine system varies slightly from 6.5 feet at Dover Point to 6.8 feet at the mouth of the Squamscott River. Great Bay is typical of northern New England estuaries in having a variety of marine plant communities. Great Bay is dominated by intertidal mudflats with substantial areas of intertidal macroalgae. Within Great Bay, salt marsh occurs predominately as a thin fringe along the uppermost intertidal, although extensive salt marshes are present along the Squamscott River, Lubberland and Crommett Creeks.

SIGNIFICANT PLANT AND ANIMAL SPECIES: Eighteen rare or endangered plant species have been identified within the Reserve. Among them are: downy foxglove, small-crested sedge, turk's-cap lily, large salt marsh aster, and eastern lilaeopsis. The five rare or endangered animal species found in the Reserve are: the bald eagle, common tern, common loon, eastern hognose snake, and four-toed salamander.

FACILITIES: Headquarters for the Great Bay National Estuarine Research Reserve programs and staff are located in Durham, adjacent to the University of New Hampshire. The University of New Hampshire's Jackson Estuarine Laboratory is located within the Reserve at Adam's Point, affording an ideal location for research.

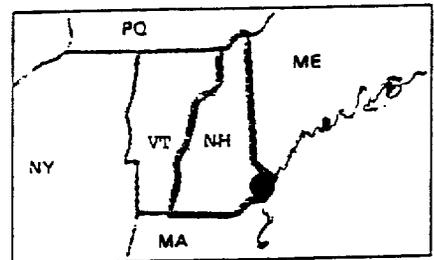
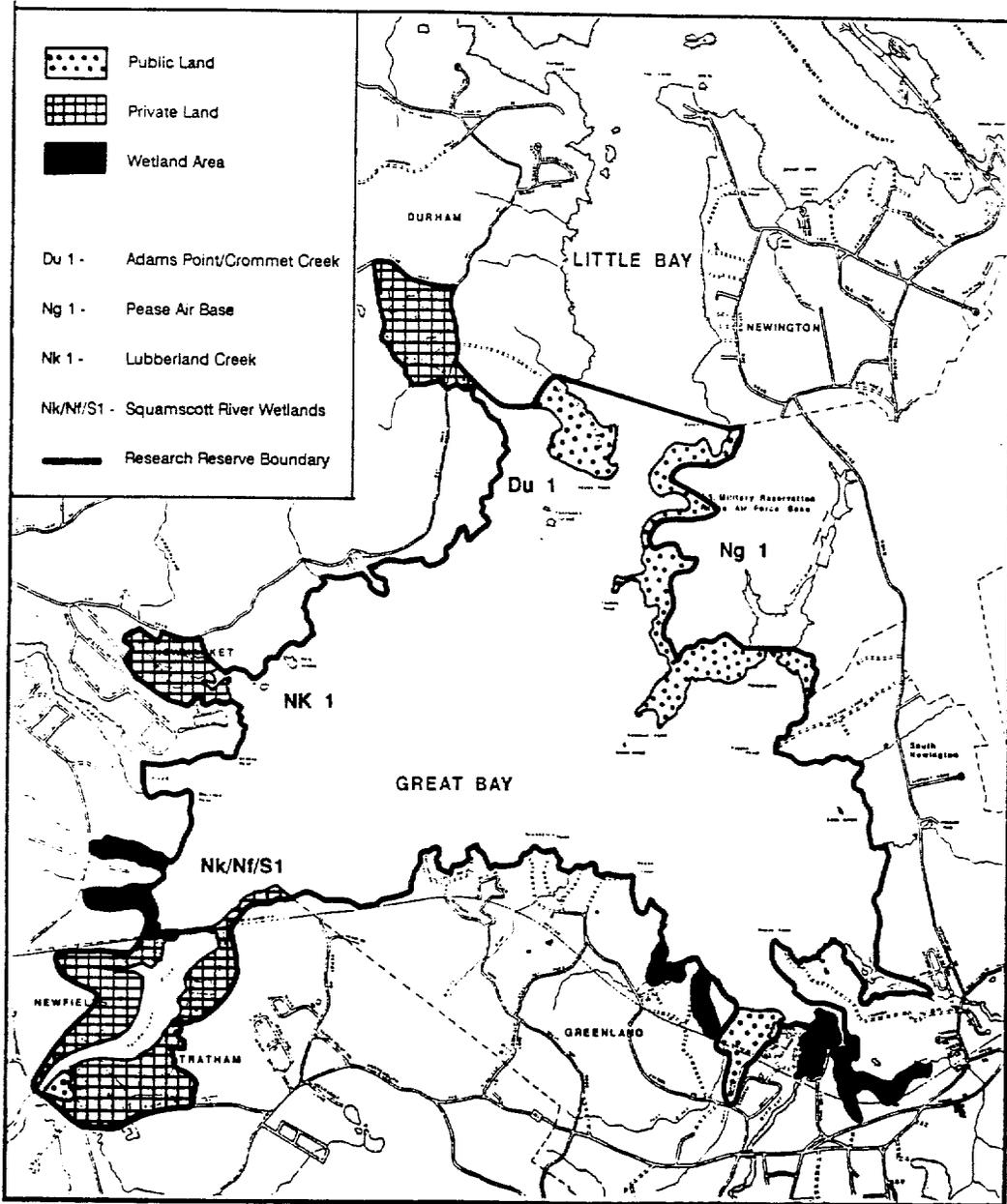
FOR FURTHER INFORMATION CONTACT:

Great Bay National Estuarine Research Reserve
New Hampshire Office of State Planning
2 1/2 Beacon Street, 2nd Floor
Concord, New Hampshire 03301
(603) 271-1752

OR

New Hampshire Department of Fish and Game
Region 3
37 Concord Road
Durham, NH 03824
(603) 868-1095

Map 11 - Great Bay National Estuarine Research Reserve



HUDSON RIVER NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1982

LOCATION: The Hudson River Estuary extends 152 miles from the southern tip of Manhattan Island north to the Federal Dam at Troy, New York. The Hudson River Reserve embraces four sites, Piermont Marsh, Iona Island, Tivoli Bays, and Stockport Flats, along 100 miles of the tidal Hudson. A broad salinity gradient is found along the estuary.

SITE DESCRIPTIONS: **Piermont Marsh** is a brackish, 944-acre tidal wetland comprised of emergent vegetation and shallows along two miles of shoreline, about 25 miles north of New York City. **Iona Island** includes 556 acres of slightly brackish tidal marsh and rocky, forested uplands located in the heart of the Hudson Highlands. Its diversity of wetland species reflects the highly variable salt regime in this reach of the Hudson.

Tivoli Bays is the largest freshwater tidal wetland complex on the Hudson estuary. Its nearly 1600 acres include Tivoli South Bay, a large shallow embayment with extensive mudflats at low tide; Tivoli North Bay, a mature cattail marsh, two islands, upland forests and extensive nearshore shallows. **Stockport Flats**, the Reserve's most northern site, is 1150 acres of intertidal mudflats, subtidal shallows, emergent freshwater tidal marshes, and vegetated dredge spoil islands.

SIGNIFICANT PLANT AND ANIMAL SPECIES: Tidal freshwater wetlands are the Reserve's most unusual habitat. Its emergent marshes are dominated by narrowleaf cattail and support many marsh birds, small mammals and snapping turtles. Low marsh vegetation includes spatterdock and pickerelweed, and provides habitat for fish, turtles, waterfowl and wading birds. Shallows vegetated by wild celery, Eurasian watermilfoil, various pondweeds and water chestnut serve as spawning and nursery grounds for many species of fish. Cattails and *Spartina* species occur together in the Reserve's brackish marshes.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Offerings include year-round interpretive field programs for general adult audiences, field classes for students, workshops for teachers and youth leaders, traveling exhibits, and presentations to community groups and service organizations. Resource materials, research results, existing data bases, site brochures, maps, trail guides and curriculum materials are distributed as well. Interpretive exhibits about the Reserve are located at the Trailside Museum and Zoo near Iona Island in Bear Mountain State Park and at the Cossackie boat launch near Stockport Flats.

RESEARCH PROGRAM: A wide variety of research projects have been conducted at the four Reserve sites. These include physical, biological and chemical characterizations, studies of ecosystem processes, and investigations of exchanges between wetlands and the main stem of the Hudson. The Reserve sites represent the range of salinity regimes found in the estuary, as well as the gradient of watershed development density, creating many excellent opportunities for examining research questions related to coastal management issues. The sites are also fed by sizeable tributaries. Railroad causeways separating two of the Reserve's wetlands at the Tivoli Bays from the main stem of the estuary offer unique opportunities to quantify interactions between the tidal wetlands and the river. The Hudson also has a large selection of natural and man-made chemical markers that make possible the historical analysis of sediment deposition. Finally, the Reserve co-sponsors the Polgar Fellowship Program, an opportunity for graduate and undergraduate students to conduct independent research on the Hudson River Estuary.

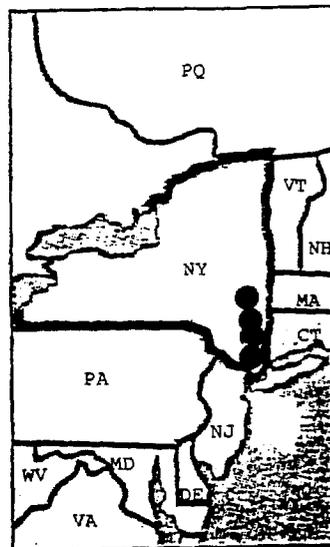
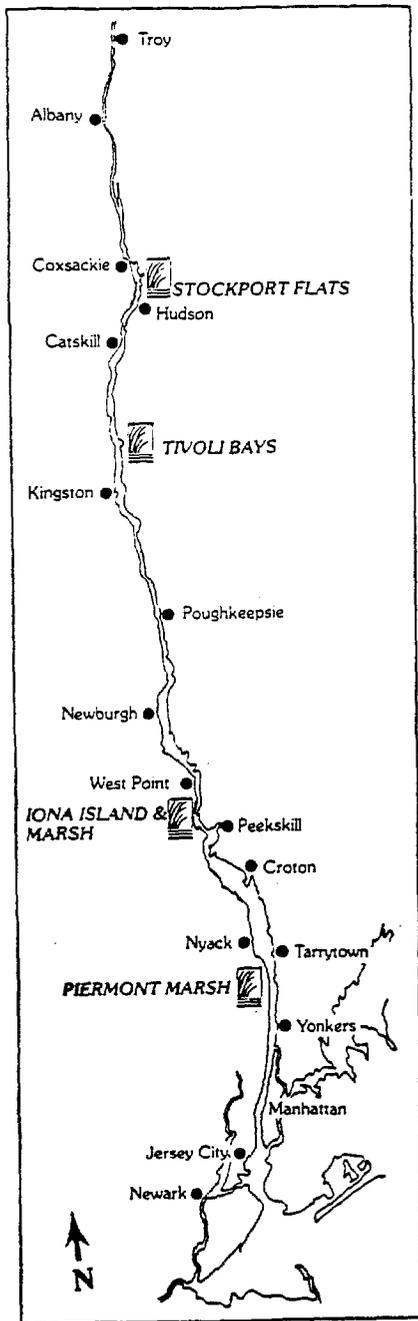
VOLUNTEER PROGRAM: The Hudson River Reserve is assisted by volunteers on four advisory committees, as well as those involved in site characterizations and other key tasks.

FACILITIES: The Reserve's headquarters is at the Bard College Field Station on Tivoli South Bay. The Field Station houses laboratories, a library, herbarium, bunkrooms, boats and field gear that are available to researchers working in the Reserve.

FOR ADDITIONAL INFORMATION CONTACT:

Hudson River National Estuarine Research Reserve
Bard College Field Station
Annandale-on-Hudson, New York 12504
(914) 758-5193

Map 12 - Hudson River National Estuarine Research Reserve



NARRAGANSETT BAY NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1980

LOCATION: The Narragansett Bay National Estuarine Research Reserve is located in the geographic center of Narragansett Bay, twelve miles from Newport, Rhode Island to the south and twelve miles from Providence, Rhode Island to the north.

SITE DESCRIPTION: The Reserve is composed of 1,035 acres of land on Prudence, Patience, and Hope Islands and 1,591 acres of water adjoining the islands out to the 18-foot isobath. The land area includes 737 acres on North Prudence, 204 acres on Patience Island and 94 acres on Hope Island. The islands contain diverse aquatic and terrestrial habitats and are nesting sites for numerous species of birds.

SIGNIFICANT PLANT AND ANIMAL SPECIES: The Reserve is home to white-tailed deer, raccoons, eastern red fox and eastern cottontail rabbits. The bird population in the Reserve includes the great blue heron, green-backed heron, little blue heron, great egret, snowy egret, black-crowned night heron, and the glassy ibis. Soft-shell clams, quahogs, lobster, striped bass, black-back flounder and sea trout are found in the Reserve's tidal deepwater. During the winter, harbor seals occasionally use the Reserve's exposed offshore rocks as haulout and resting sites.

ON-SITE PUBLIC EDUCATION AND INTERPRETION PROGRAMS: An extensive trail system reaches the major ecological features of the Reserve. A seasonal ferry brings school classes, organizations and individuals to the Reserve. An interpretive program is provided.

OFF-SITE PUBLIC EDUCATION AND INTERPRETION PROGRAMS: The Reserve is associated with the Narragansett Bay Project and is involved in special off-site educational programs to increase appreciation of the site.

RESEARCH PROGRAM: The research program is focused on the salt marshes and aquatic habitats of the Reserve. The program is designed to promote the understanding necessary for restoration and protection of the nation's estuaries.

MONITORING PROGRAM: A long-term atmospheric monitoring effort is underway and will be coupled to a water quality program designed to characterize, detect change, and assess trends in marine water quality.

VOLUNTEER PROGRAM: Prudence Conservancy, Inc., a publicly supported, non-profit organization participates in the monitoring program and selected educational events.

FACILITIES: Public facilities within the Reserve include docking space at north Prudence Island, a small interpretive area at the dock, and interpretive panels at the site of a farm established by John Brown twenty to thirty years after the Revolutionary War.

FOR ADDITIONAL INFORMATION CONTACT:

Narragansett Bay National Estuarine Research Reserve
Department of Environmental Management
9 Hayes Street
Providence, RI 02908
(401) 277-2771

NORTH CAROLINA NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1982

LOCATION: The North Carolina National Estuarine Research Reserve includes three sites along the North Carolina coast. The Reserve includes: the Zeke's Island component in New Hanover and Brunswick Counties, the Rachel Carson component in Carteret County, and the Currituck Banks component in Currituck County. A fourth component at Masonboro Island in New Hanover County is proposed for designation.

SITE DESCRIPTION: The Zeke's Island component encompasses approximately 1,165 acres of upland, intertidal, and shallow water areas. The Rachel Carson component includes 2,625 acres of upland area, marshes, intertidal flats, tidal creeks, and shallow estuarine waters. The proposed Masonboro Island component includes 5,046 acres of salt marshes, maritime forests, dunes, grassy flats, shrub thickets, eel grass beds, and mud and sand flats. Finally, the Currituck Banks component covers 964 acres of beach, dunes, maritime forest, marshes and flats, sound-side islands and a portion of Currituck Sound.

SIGNIFICANT PLANT AND ANIMAL SPECIES: The Atlantic Loggerhead sea turtle, a federally-listed threatened species, occasionally nests within the Reserve. Other endangered or threatened fauna found in the Reserve include: the southern bald eagle, piping plover, peregrine falcon, eastern brown pelican, and the green turtle. Feral horses are found on the Rachel Carson component.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Slide presentations and video tapes are presented at the North Carolina Aquarium and the North Carolina Maritime Museum.

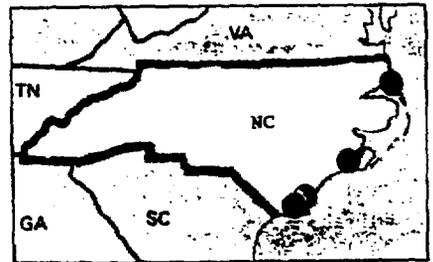
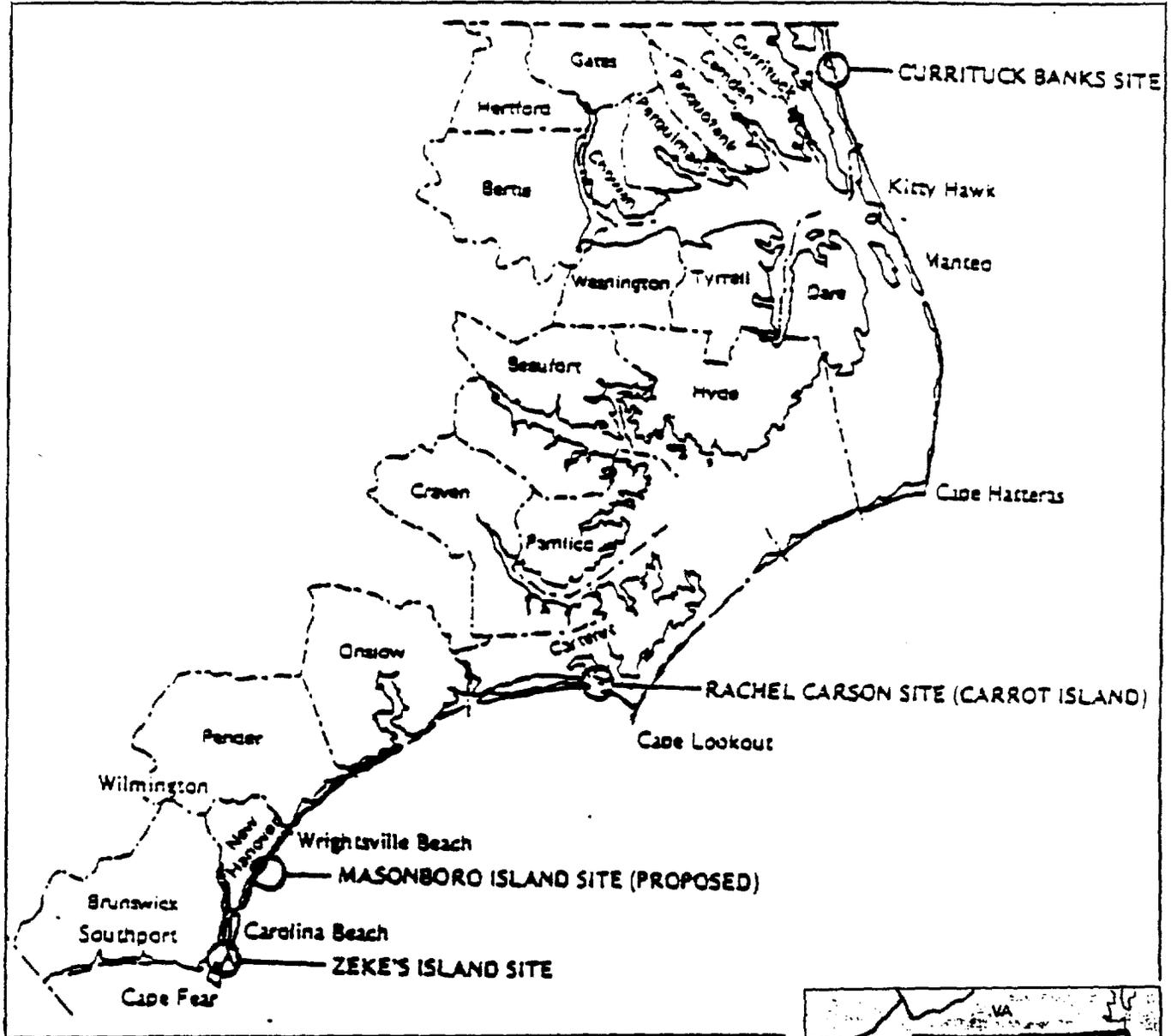
RESEARCH PROGRAM: To date, most NOAA-funded research has been focused on the Rachel Carson component of the North Carolina NERR. Research has included a quantitative description of plant succession on dredge spoil islands and changes as a result of transformations in plant species composition; habitat mapping; and effects of feral horses on the production, distribution, abundance and stability of salt marsh plants. Research funds for baseline studies on sediment dynamics of Currituck Sound at the Currituck component have been awarded.

FACILITIES: While there are no public facilities at the Reserve, the following entities provide information and offer field trips to the Reserve: the North Carolina Aquariums at Roanoke Island, Pine Knoll Shores, Fort Fisher, and the North Carolina Maritime Museum in Beaufort.

FOR ADDITIONAL INFORMATION CONTACT:

North Carolina National Estuarine Research Reserve
Division of Coastal Management
P.O. Box 27687
Raleigh, NC 27611-7687
(919) 733-2293

Map 14 - North Carolina National Estuarine Research Reserve



OLD WOMAN CREEK NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1980

LOCATION: The Old Woman Creek National Estuarine Research Reserve is located on Lake Erie, two miles east of Huron, Ohio.

SITE DESCRIPTION: This is the smallest Reserve in the National Estuarine Research Reserve System with a total of 571 acres. Old Woman Creek is a drowned stream mouth that drains into Lake Erie and is considered to be a Great Lakes-type freshwater estuary. Within the Reserve several aquatic and terrestrial habitat types have been identified. These include open water, barrier beach, remnant embayment marshes, mudflats, oak-hickory upland hardwood forests, and a swamp forest. Aquatic vascular plants typical of the estuary are American water lotus, white water lily, arrow arum, sago pondweed, duckweeds, smartweeds, sedges, rice cutgrass, and cattails.

SIGNIFICANT PLANT AND ANIMAL SPECIES: Hundreds of species of algae, vascular plants, invertebrates, mammals, fishes, and birds have been recorded in the Old Woman Creek Reserve. Several are threatened, endangered, or species of special concern. Some examples include the American bald eagle, sharp-shinned hawk, spotted turtle, eastern fox snake, Blanding's turtle, and several emergent plants. The Reserve also serves as an important nursery and spawning area for numerous Lake Erie forage and sport fish species.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: These programs range from multi-media presentations and aquatic ecology field trips to college-accredited workshops for students and teachers as well as lectures open to the general public. Programs concentrate on topics directly related to the Reserve and its management, such as, water chemistry, nutrient-level monitoring, fish ecology, aquatic insects, estuarine plant communities, primary productivity, food web relationships, migratory birds, and lake shore and beach ecology. The Reserve maintains a reference library, educational materials file, and bibliography of wetland educational resources.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Off-site programs include lectures, slide presentations, mobile displays, and inter-agency cooperative workshops. Technical reports and annual operations reports are distributed regularly to state, Federal and local agencies.

RESEARCH PROGRAM: The long-range goal of the Old Woman Creek research program is to develop a better understanding of the Great Lakes-type freshwater estuarine ecosystem. A secondary objective is to determine the extent that Great Lakes-type freshwater estuaries perform natural functions similar to marine estuaries. Information from this research program is made available to coastal zone managers and decisionmakers for the Great Lakes region. A significant portion of the Reserve staff's job is to encourage members of the academic community to undertake field studies within the coastal zone, with special emphasis on research in the estuary.

MONITORING PROGRAM: A watershed-wide water quality monitoring program began at the Reserve in 1980. The purpose of this on-going project is to provide basic temporal information about the water chemistry of the estuary. In 1984, the monitoring program was expanded to include a study of the role of storm events in changing the chemical makeup of estuarine waters and the effects of these storms on the microscopic plant populations which are the foundation of the estuarine food chain. Routine monitoring of phytoplankton, zooplankton, aquatic plants, invertebrates, reptiles, amphibians, mammals, fish, and birds is carried out on a seasonal basis by members of the Reserve staff.

VOLUNTEER PROGRAM: The volunteer program enlists 25-30 persons to assist the staff with operation of the Visitor Center, public programming, and maintenance of facilities and hiking trails. Volunteer program materials have been developed for use in training sessions.

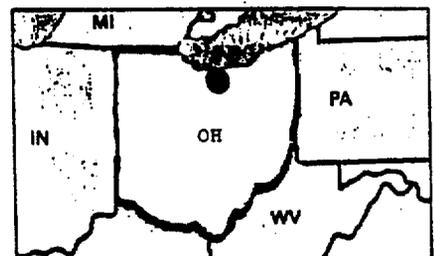
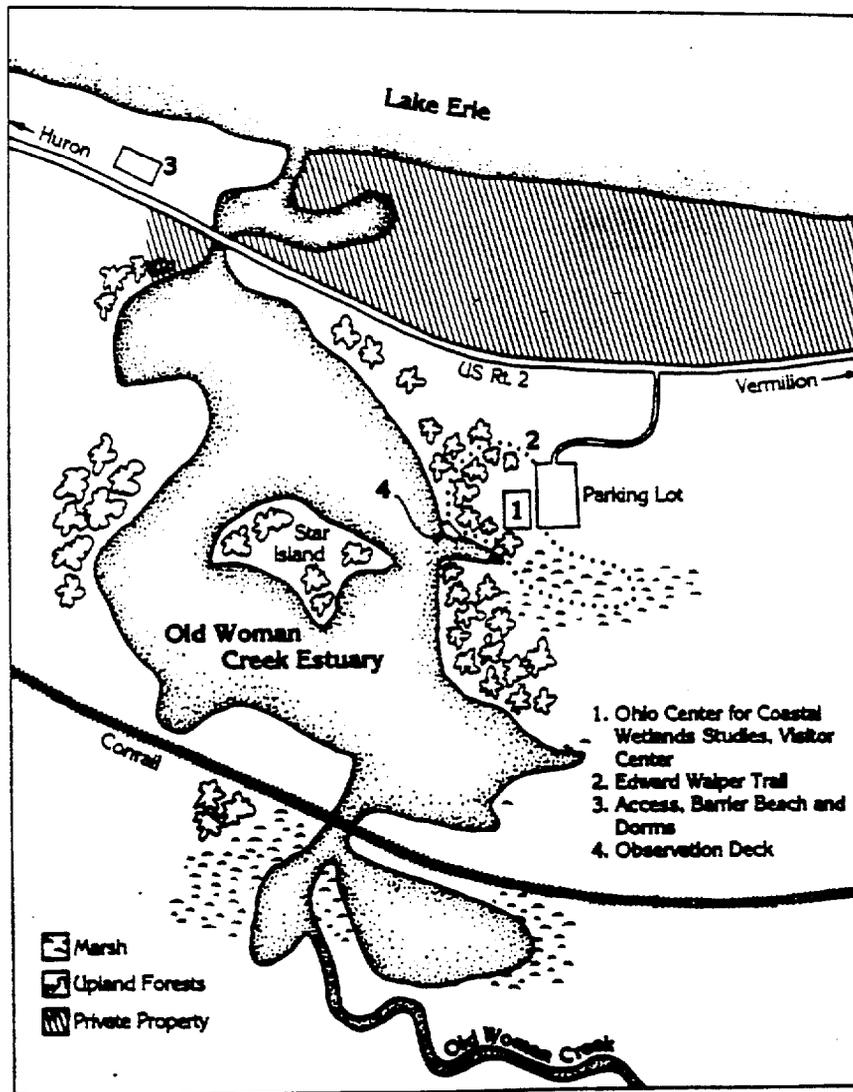
FACILITIES: The Reserve's administrative offices are located in the Ohio Center for Coastal Wetland Studies which overlooks the eastern shore of the estuary. The Center also provides laboratory space for research, and

houses exhibits that serve as a focal point for public visitation and educational programming. An on-site dormitory provides overnight accommodations for researchers and workshop participants.

FOR ADDITIONAL INFORMATION CONTACT:

Old Woman Creek National Estuarine Research Reserve
2514 Cleveland Road, East
Huron, Ohio 44839
(419) 433-4601

Map 15 - Old Woman Creek National Estuarine Research Reserve



SAPELO ISLAND NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1976

LOCATION: Sapelo Island is located seven and one half miles northeast of Darien, Georgia in McIntosh County in the Duplin River system.

SITE DESCRIPTION: The Sapelo Island National Estuarine Research Reserve includes most of the Duplin River watershed and contains extensive marsh, southern hardwood forest, pure stands of pines, dunes, and beaches. The Reserve is bound to the northwest by the Mud River, to the west by New Teakettle Creek, and to the southwest by Doboy Sound. The Reserve encompasses 5,905 acres, of which 3,811 acres are marshland and 2,094 acres are high ground at the south end of Sapelo Island.

SIGNIFICANT PLANT AND ANIMAL SPECIES: Broad-leaved evergreens and Spanish moss are abundant in the Reserve. During the warm months, the Duplin River serves as a nursery for shrimp and the juvenile forms of menhaden, sea trout, blue crabs and sea bass.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Guided tours are conducted on Wednesdays and Saturdays from September through May, and on Wednesdays, Fridays and Saturdays between Memorial Day and Labor Day. Field trips are given for schools on Tuesdays and Thursdays.

OFF-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: Approximately twenty off-site programs for civic organizations and schools are conducted annually.

RESEARCH PROGRAM: The University of Georgia Marine Institute (UGMI) is located at the Reserve. The Institute, which was founded in 1953, has been a center for nearshore geological and ecological research since its inception. Research at the Institute has generated more than 600 publications, many addressing the general ecology and system energetics of the marshes of Sapelo Island. In addition to UGMI-sponsored research, the Reserve has attracted a variety of estuarine research proposals funded by other Federal agencies such as the National Science Foundation and NOAA's Sea Grant Program. Currently the NERRS program is funding the development of a Geographic Information System for the Island that may provide a prototype system for other Research Reserves.

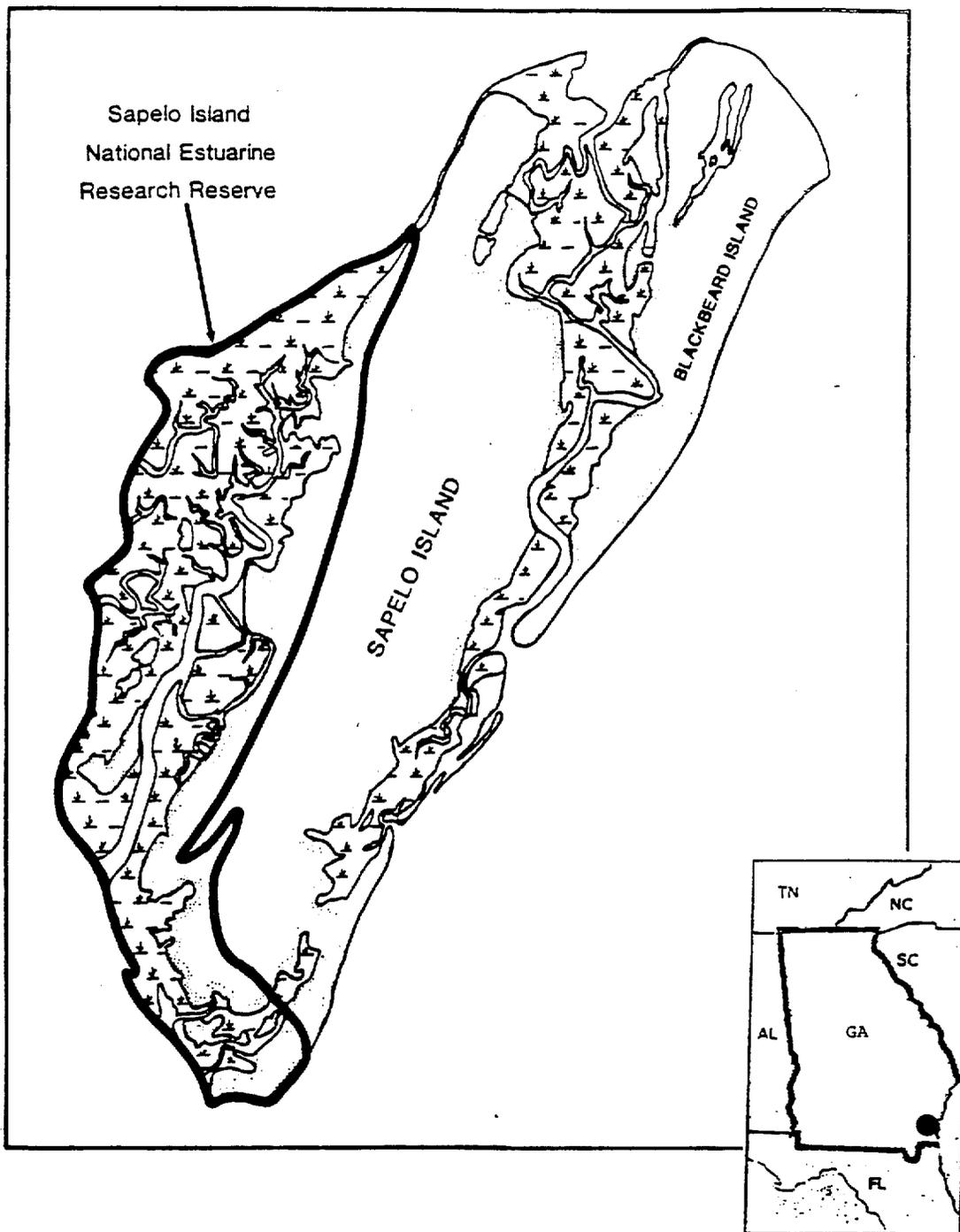
MONITORING PROGRAM: The Reserve is working in conjunction with the University of Georgia Marine Institute to establish three remote Hydro Lab 2020 units and three weather stations. Two units operated by UGMI already exist. In addition, Georgia's Environmental Protection Division does quarterly sampling of 22 physio-chemical parameters and annual sampling of metals and pesticides in water, oysters and sediment. The Coastal Resources Division conducts bi-monthly water quality sampling as part of its shellfish program at four sites within the Reserve.

FACILITIES: The University of Georgia Marine Institute is located at the Reserve. Facilities at the Institute include: offices, laboratories, dormitories and permanent housing for resident and visiting scientists, a flowing-seawater laboratory, a library and computer facilities. The Marine Institute also manages a conference center on the island available for use by academic groups and state agencies. Two research vessels are also maintained by the Institute. The facilities for casual visitors to the Reserve include a passenger ferry to the Island from the main dock in Meridian, and a small visitors facility at the Meridian Dock. The Department of Natural Resources conducts tours of the Reserve on a regularly scheduled basis and has interpretive displays and descriptive brochures at the Administration offices on Sapelo Island.

FOR ADDITIONAL INFORMATION CONTACT:

Sapelo Island National Estuarine Research Reserve
Department of Natural Resources
Post Office Box 19
Sapelo Island, GA 31327
(912) 485-2251

Map 16 - Sapelo Island National Estuarine Research Reserve



WAQUOIT BAY NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1988

LOCATION: Waquoit Bay is located in the towns of Falmouth and Mashpee in Barnstable County, Massachusetts. The Bay is adjacent to Nantucket Sound on the south side of Cape Cod.

SITE DESCRIPTION: The Waquoit Bay National Estuarine Research Reserve includes areas of intense, moderate and low human impact. The boundary of the Reserve encompasses several distinct water bodies and upland areas within and adjacent to the Bay. The waters within the Reserve include all of Waquoit Bay; Jehu, Hamblin, Bourne, Bog, Caleb, Sage Lot and Flat Ponds; the Great and Little Rivers; and portions of the Quashnet/Moonakis River. Upland and major marsh areas within the Reserve include Washburn Island, South Cape Beach, a small acreage at the head of the Bay known as the Swift Estate, and wetlands areas adjacent to the ponds mentioned above. The Reserve encompasses 2,199 acres of marsh, open water and upland fields and forest.

SIGNIFICANT PLANT AND ANIMAL SPECIES: The Reserve is one of only two confirmed localities in the Commonwealth where the endangered plant Sandplain *Gerardia* is found. The Piping Plover, currently listed as Federally threatened on the East Coast, resides on Washburn Island.

ON-SITE PUBLIC EDUCATION AND INTERPRETATION PROGRAMS: The Reserve's education project entitled Coastal Resources Education--Discovering an Estuarine Ecosystem is designed to increase public awareness of estuarine ecosystems and create curriculum materials and a field guide for visitors. Children from the public schools have been introduced to the Reserve through this project. In addition, lectures are given on research currently underway at the Reserve. Opportunities for college students are offered to learn about estuaries and research methods through field trips to the Reserve or by working closely for a period of time with researchers at the Reserve.

RESEARCH PROGRAM. The following research projects are being conducted at the Reserve in conjunction with various state agencies, universities and institutes. Declines of Eelgrass in Estuarine Research Reserves along the East Coast of the United States; Problems of Pollution and Disease; Comparison of Young-of-the-Year Nekton Growth and Survival in Seagrass Beds and Marshes; The Potential Effects of Sea Level Rise and Development on the Importance of Wetlands and Benthic Denitrification in Reducing the Input of Groundwater Transported Nitrogen to Coastal Waters; Effects of Eutrophication on Growth and Productivity of Macroalgae in Waquoit Bay; Osprey Productivity Project; The Distribution and Productivity of Juvenile Winter Flounder in Waquoit Bay; Continued Studies of Vegetation and Nutrient Changes in Waquoit Bay. This latter project has led to a Land Margin Ecosystem Research (LMER) grant for an ecosystem-level experiment in Waquoit Bay to assess the effects of varying nutrient loading rates on primary production of phytoplankton and macroalgae looking specifically at nutrient inputs from septic tanks. This grant is jointly funded by National Science Foundation (NSF), the Environmental Protection Agency and NOAA.

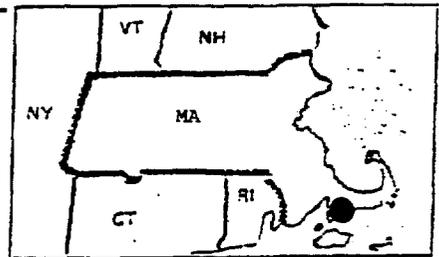
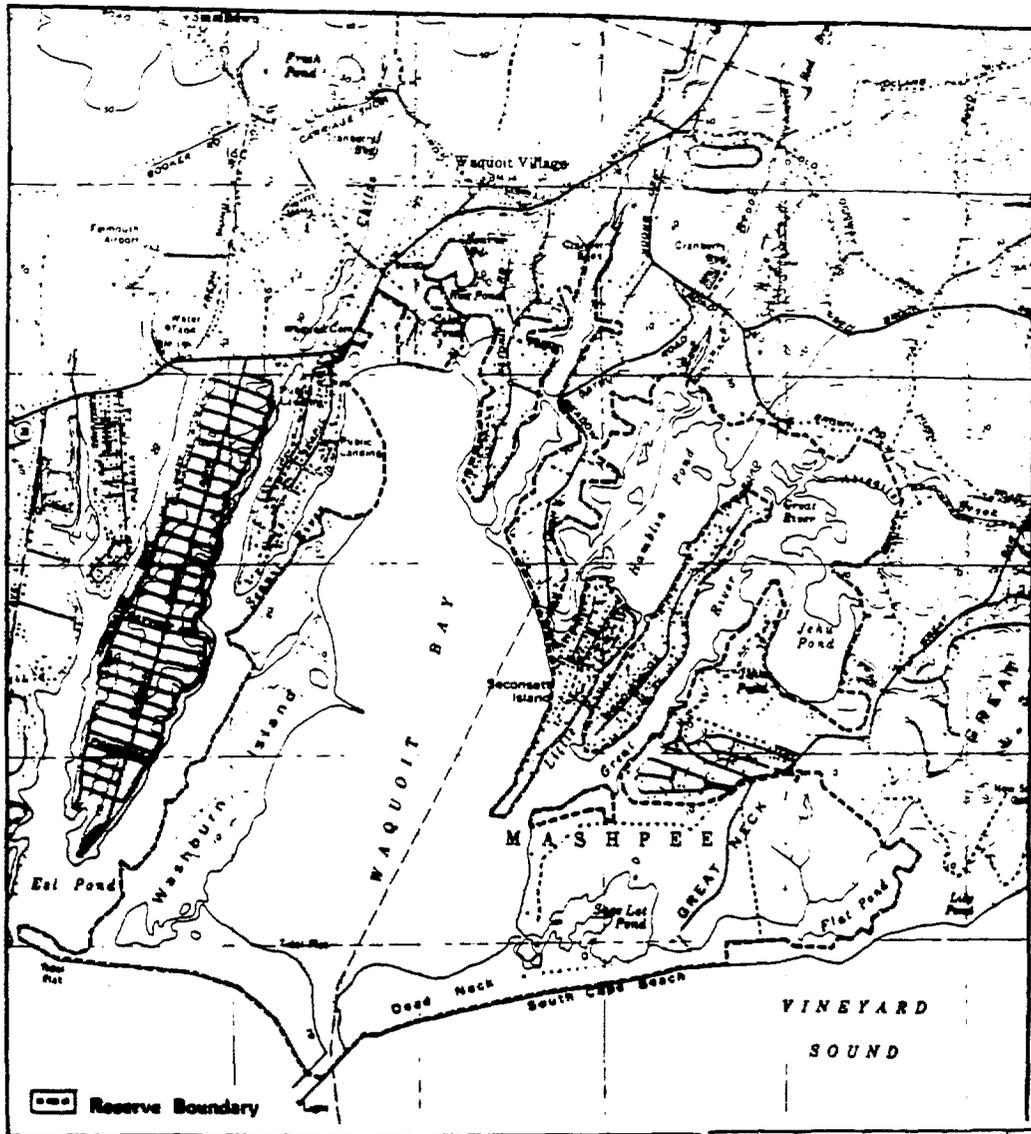
VOLUNTEER PROGRAM: A very active group of volunteers serves on the Reserve's Advisory Committee and three sub-committees. In addition, there is currently an effort to recruit volunteers to become involved in day-to-day operations, assisting in tasks such as reception, patrolling lands, grounds work, cataloguing the library, photography, monitoring of endangered plants and animals, etc.

FACILITIES: The Swift Estate is the site for the Reserve Headquarters and Visitors Center. The Swift Estate is located in Falmouth on a bluff thirty feet above the waters at the north end of the Bay. Site improvements on the property include a 100 year-old, three-story Victorian mansion, a carriage house, a gate house, and a two-story boat house. Major renovations are planned for this site in the near future. Upon completion of renovations, the Reserve will be an on-site base for research, education and interpretation, and monitoring activities. South Cape Beach, which is inside the Reserve boundaries, is a state park passive recreational area for swimming, hiking and birding. Future plans include a small visitor's center, bath houses and boardwalks.

FOR ADDITIONAL INFORMATION CONTACT:

Waquoit Bay National Estuarine Research Reserve
Post Office Box 92W
Waquoit, MA 02536
(508) 457-0495

Map 17 - Waquoit Bay National Estuarine Research Reserve



WELLS NATIONAL ESTUARINE RESEARCH RESERVE

Designated in 1984

LOCATION: The Wells National Estuarine Research Reserve is located in southern Maine on the Atlantic coast in the Town of Wells.

SITE DESCRIPTION: The Reserve encompasses approximately 1,550 acres of undeveloped marsh system and transitional upland fields and forests, occurring along two contrasting watersheds--the Little River estuary and the Webhannet River estuary.

SIGNIFICANT PLANT AND ANIMAL SPECIES: Two Federally endangered species have been found within the Reserve: the Bald Eagle and the Peregrine Falcon. Five species of state concern are also found: piping plover, least tern, slender blue flag, eastern joe-pye weed, and arethusa.

ON-SITE PUBLIC EDUCATION AND INTERPRETION PROGRAMS: The Wells Reserve has seven miles of trails that wind through woodland, freshwater wetland, salt marsh and beach habitats. Two-hour guided tours are available year round for the general public and community groups. The Reserve is also open Tuesday through Saturday from 10 a.m. until 3 p.m. for self-guided tours. A Visitor Center is located at the Laudholm Farm site, and houses exhibits, staff offices and a research library. Special programs concerning the natural resources of the coastal area are given periodically. A pilot program, "Researchers for a Day", for fourth graders is given by trained volunteers in the fall and spring. Other grades may use the facilities at the Reserve with prior arrangements.

OFF-SITE PUBLIC EDUCATION AND INTERPRETION PROGRAMS: Programs and displays on the importance of the Reserve are available for local civic groups, conservation organizations and special events.

RESEARCH PROGRAM: Sedimentation and hydraulic studies have been conducted on both the Webhannet and Little River estuaries. Other studies have compared productivity between the Reserve's marsh systems and those of the rest of the Gulf of Maine. The Wells Reserve was one of four sites that hosted a coast-wide study that resulted in the isolation of the causal organism of eelgrass wasting disease. Enteric viruses occurring within Reserve estuaries have been sampled and catalogued. Investigation into fishery habitat requirements in northern high marshes is ongoing.

MONITORING PROGRAM: Environmental characterization of Wells Reserve has progressed to include inventories of vegetation, breeding birds, and small mammals. Pilot programs commencing in 1989 will monitor rainfall, fresh water runoff, salinity, tidal currents and tidal height within the Webhannet River estuary, as well as water quality in the tributaries of the Webhannet River, over the course of a year. Results of the studies will serve as a model for developing a long-term monitoring program at the Wells Reserve.

VOLUNTEER PROGRAM: A corps of volunteers runs the tour program at the Reserve. Docents receive forty hours of training prior to leading school programs. In addition, training/class opportunities are offered throughout the year which are especially designed to enhance a volunteer's ability to conduct guided tours for the public. Volunteers also act as receptionists at the Visitor Center, design exhibits, develop educational programs, and maintain the buildings and grounds of the Reserve. In 1988, volunteers contributed over 8,000 hours to assist in the Reserve programs.

FACILITIES: The former Laudholm Farm, a unique example of a 19th century saltwater dairy is located within the Reserve. The farm's Greek Revival mansion is being restored and transformed into a Visitor Center with administrative offices, exhibit rooms, a map room, research library and classrooms. The barn and out buildings provide additional space for educational activities, analytical, field and microscopy laboratories and collection storage.

FOR ADDITIONAL INFORMATION CONTACT:

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