Biological Services Program

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U.S. Department of the Interior

Volume Six

The Biological Services Program was established within the U.S. Fish and Wildlife Service to supply scientific information and methodologies on key environmental issues that impact fish and wildlife resources and their supporting ecosystems. The mission of the program is as follows:

- To strengthen the Fish and Wildlife Service in its role as a primary source of information on national fish and wildlife resources, particularly in respect to environmental impact assessment.
- To gather, analyze, and present information that will aid decisionmakers in the identification and resolution of problems associated with major changes in land and water use.
- To provide better ecological information and evaluation for Department of the Interior development programs, such as those relating to energy development.

Information developed by the Biological Services Program is intended for use in the planning and decisionmaking process to prevent or minimize the impact of development on fish and wildlife. Research activities and technical assistance services are based on an analysis of the issues, a determination of the decisionmakers involved and their information needs, and an evaluation of the state of the art to identify information gaps and to determine priorities. This is a strategy that will ensure that the products produced and disseminated are timely and useful.

Projects have been initiated in the following areas: coal extraction and conversion; power plants; geothermal, mineral, and oil shale development; water resource analysis, including stream alterations and western water allocation; coastal ecosystems and Outer Continental Shelf development; and systems and inventory, including National Wetland Inventory, habitat classification and analysis, and information transfer.

The Biological Services Program consists of the Office of Biological Services in Washington, D.C., which is responsible for overall planning and management; National Teams, which provide the Program's central scientific and technical expertise and arrange for contracting biological services studies with states, universities, consulting firms, and others; Regional Staff, who provide a link to problems at the operating level; and staff at certain Fish and Wildlife Service research facilities, who conduct inhouse research studies.



AN ECOLOGICAL CHARACTERIZATION OF COASTAL MAINE (North and East of Cape Elizabeth)

Stewart I. Fefer and Patricia A. Schettig Principal Investigators

Volume 6

Atlas

The principal investigators wish to gratefully acknowledge the excellent guidance provided by the project's steering committee; the U.S. Fish and Wildlife Service National Coastal Ecosystems Team; and the contributions made by the many authors and reviewers.

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AN INTRODUCTION TO AN ECOLOGICAL CHARACTERIZATION OF COASTAL MAINE ATLAS

Authors: Beth Surgens and Dean Johnson Chief Cartographer: Dean Johnson

The Maine Coast Ecological Characterization Atlas is a spatial representation of natural resource information of coastal Maine from Cape Elizabeth to Eastport (figure 1). It is designed to complement the characterization narrative (volumes 1 to 3) by providing a visual display of existing information on the natural resouces of coastal Maine. The characterization atlas and text may serve the needs of administrators, planners, and scientists, when making decisions on land-use planning and natural resource management, and when seeking information on the status of specific resources.

Uses of the characterization atlas are varied and will depend on the users' specific needs and interests. Examples of potential uses include the collection of information regarding potential impacts of a large industrial, commercial, and/or residential development, waste disposal site, or power generating facility, as well as the identification of important resource areas in need of protection.

No new data were generated specifically for the Maine Coast Ecological Characterization. Existing information, published and unpublished, was compiled to provide the information plotted on the atlas. Sources for these data include local, State, and Federal agencies as well as private organizations and individual researchers.

The map scale used in the atlas is 1:24,000 or about 1 inch = 2 1/2 miles. This scale is generalized enough to see spatial relationships without losing the accuracy of site specific data. A total of 115 quadrangles were needed to cover the characterization area. In Maine, the most recent and complete series of maps available at 1:24,000 are U.S. Geological Survey (USGS) orthophotoquad advance prints. Enhanced with added place names, these were used as base maps for the Characterization Atlas. In areas of coastal Maine (regions 1 and 2) where orthophotoquads are not presently available, black and white base maps were produced using other USGS 1:24,000 topographic map products.

The atlas contains four separate maps for each quadrangle; each map representing one of four major data types (in a few cases a data type may not be available for a quadrangle): (1) National Wetlands Inventory; (2) Land Cover; (3) Geology-Land Use; and, (4) Fish and Wildlife.



Organization

Due to the large number of 1:24,000 quadrangle sheets needed to cover the Maine coast, the study area was divided into six regions along township lines (figure 1). Maps within each region are numbered from west to east, beginning with the northernmost quadrangle (figures 2 to 7). In cases where a map contains more than one region, it has been grouped with the region in which the greatest portion of the map lies. A list of quadrangles (and their numbers) included in each region of the characterization area is presented in table 1. All of the atlas maps for a region are placed together in one or more file boxes. Within each box all maps of a single data type (i.e., Fish and Wildlife) are placed together and ordered according to quadrangle numbers.

The following section describes the data types contained in each of the four map categories and presents the source of information for each category. Narrative descriptions of certain data have been excerpted from the Maine State Planning Office, Coastal Inventory (1977).

ATLAS MAP 1: NATIONAL WETLANDS INVENTORY

The U.S. Fish and Wildlife Service is currently conducting a National Wetlands The procedures and methods are described in the Inventorv. enclosed publication, Classification of Wetlands and Deepwater Habitats of the United States. Concepts and terms are defined and the hierarchical structure and use of the classification system are explained in detail. In addition, chapters 4 to 8 of volume 2 of the characterization describe the occurrence of the by the National Wetlands Inventory wetland types identified in the characterization area. The symbology involved in identifying the wetland types as they appear on the maps is presented in the map legend and explained in detail in the enclosed report.

Although the National Wetlands Inventory has not been completed Statewide, most of the Maine coast has been inventoried and wetland types have been mapped on quadrangles at the 1:24,000 or 1:62,500 and 1:100,000 scales. All NWI data appearing in the Characterization Atlas are either direct duplications of the 1:24,000 NWI maps or enlargements of 1:62,500 NWI maps registered and reproduced with base maps. Data on the extent of wetland acreage in each town of coatal Maine are included in appendix A of chapter 2.

ATLAS MAP 2: LAND COVER

The Land Cover information presented in Atlas Map 2 was supplied by the Maine State Planning Office Coastal Inventory (1977). It is a photo-enlargement of the Coastal Inventory Land Cover Type 1:48,000 overlays to the scale used in the characterization atlas, 1:24,000. The minimum mapping unit is 5 acres (2 ha), with the exception of the townships of Gouldsboro, Sullivan, Sorrento, T7SD, T9SD, and T10SD. These six townships are mapped with a minimum unit of 20 acres (8 ha). The following explanation and description of the land cover categories appears in the Maine State Planning Office, Coastal Inventory Handbook (1977).

Region 1 (10 ma	ips)	Reg	ion 2 (15 maps)	Reg	ion 3 (12 maps)
 Cumberland Yarmouth Freeport Orrs Island Portland We Portland Ea South Harps Bailey Isla Prouts Neck Cape Elizat 	Center est est well nd eth	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Augusta SE Vassalboro SW Gardiner NE East Pittston Gardiner SW Gardiner SE Wiscasset Damariscotta Bath NW Bath NE Westport Phippsburg Boothbay Harbor Pemaquid Point Small Point	1 2 3 4 5 6 7 8 9 10 11 12	Jefferson Union West Rockport Waldoboro West Waldoboro East Thomaston Bristol Louds Island Friendship Tennants Harbor New Harbor Monhegan
Region 4 (32 ma 1 Bangor SE 2 Orono SW 3 Bucksport M 4 Bucksport M 5 Orland NW 6 Bucksport S 7 Bucksport S 8 Orland SW 9 Orland SE 10 Belfast 11 Searsport 12 Castine 13 Blue Hill M 14 Blue Hill M 15 Searsmont 16 Lincolnvil 17 Isleboro 18 Cape Rosie 19 Blue Hill S 20 Blue Hill S 21 Camden 22 Vinalhaven 23 Vinalhaven 24 Deer Isle M	nps) W NE SE W SE NW NE SE NW SE	Reg 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	ion 5 (22 maps) Cherryfield NW Cherryfield NE Ellsworth SW Ellsworth SE Tunk Lake SW Tunk Lake SW Tunk Lake SE Cherryfield Harrington Mount Desert NW Mount Desert NW Bar Harbor NE Petit Manan Bois Bubert Mount Desert SW Mount Desert SE Bar Harbor SE Bar Harbor SE Swans Island NW Swans Island SW Swans Island SE	Reg 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	<pre>ion 6 (24 maps) Calais Devils Head Red Beach Robbinston Gardner Lake NE Pembroke Eastport Gardner Lake SW Gardner Lake SW Gardner Lake SE Whiting West Lubec Lubec Columbia Falls Whitneyville Machias Machias Bay Cutler Moose River Addison Jonesport Roque Bluffs Cross Island Drisko Island Great Wass Island</pre>
 26 Rockland 27 Vinalhaven 28 Vinalhaven 29 Deer Isle 30 Deer Isle 31 Hewett Isl 32 Matinicus 	SW SE SW SE and Isle				

Table 1. Quadrangles (1:24,000) included in the characterization atlas for each region and their number.



Figure 2 - The major estuarine systems in region 1 of the Maine Coast Characterization area as delineated by the National Wetlands Inventory. (1979)



Figure 3 - The major estuarine systems in region 2 of the Maine Coast Characterization area as delineated by the National Wetlands Inventory. (1979)



Figure 4 - The major estuarine systems in region 3 of the Maine Coast Characterization area as delineated by the National Wetlands Inventory. (1979)



Figure 5 - The major estuarine systems in region 4 of the Maine Coast Characterization area as delineated by the National Wetlands Inventory. (1979)



Figure 6 - The major estuarine systems in region 5 of the Maine Coast Characterization area as delineated by the National Wetlands Inventory. (1979)



Figure 7 - The major esturaine systems in region 6 of the Maine Coast Characterization area as delineated by the National Wetlands Inventory. (1979)

The Land Cover map shows what is on the surface of the land at one point in time. Most cover type categories are general types of vegetation. However, many alterations of the land's surface by people are also mapped (for example, dumps and large gravel pits) as well as certain non-vegetated natural conditions (barren land).

The Land Cover map provides a general description of what is happening on the land. Knowledge of the types and distribution of vegetation in a watershed helps in determining characteristics of water flow within the watershed and in analyzing water quality problems related to agriculture and timber General assessments can be made concerning the types and extent harvesting. of wildlife in most areas, since many types of wildlife habitat can be Some specific land cover type categories identify land uses or identified. conditions that may need to be mapped for various planning efforts. These include agricultural land, large gravel pits, transmission lines, and wetlands.

The Land Cover maps were compiled from a variety of sources. The dates and level of detail of source material vary. All classifications were based on interpretation of the most recently available low-level or high altitude (U-2) aerial photographs. The dates of the photographs vary from 1966 to 1976.

The following are land cover categories.

- Softwoods (S): naturally forested lands with softwoods comprising over 75% of the crown closure.
- Hardwood (H): naturally forested lands with hardwood comprising over 75% of the crown closure.
- Mixed Woods (M): naturally forested lands with neither hardwoods nor softwoods comprising over 75% of the crown closure.
- Agricultural Lands (A): lands which are being used for production of food for humans or livestock.
- Blueberry Lands (B): lands predominantly covered with blueberry bushes.
- Other Fields (F): areas which were used for agriculture but are reverting to a natural vegetation state.

Orchards (0): land used for the production of fruit.

- Urban Areas (U): built up areas hamlets (clusters of 3 or more houses) to cities; includes yards, pavement, schools, churches, industrial sites, and airports.
- Wetlands (W): areas characterized by waterlogged soils. These soils are either periodically or permanently flooded. They include beaver flowages, bogs, hardwood swamps, tidal flats, salt marshes, and shrub swamps.

Alders (::::): an area which is predominantly covered by alders.

Plantations (P): forest trees which have been planted by humans.

Clear Cut, Cut Over (CC): forested land on which more than 90% of the crown closure has been removed.

Cemeteries (†): cemeteries which are larger than 3 acres.

- Gravel Pits (☆): areas where excavations have been made for the purpose of removing sand or gravel.
- Quarries (Q): land areas where bedrock has been blasted, dug, or cut for removal of stone or minerals.
- Dumps (D): areas used for the purpose of solid waste disposal; also Auto Dumps (AD) and Sanitary Dumps (SD).

Golf Courses (GC): grass areas used for golfing.

Naturally Exposed Lands (Ba): areas of naturally exposed sand or bedrock.

- Power Line Cuts (===): areas of power line rights-of-ways which are distinguishable on aerial photographs.
- Scrub (SC): stands of small woody plants where field grass is not in evidence.
- Grassland (G): areas adjacent to urban areas which are predominantly occupied by grass species. These areas do not serve agricultural purposes.

ATLAS MAP 3: GEOLOGY-LAND USE

The Geology-Land Use maps were compiled from a variety of sources and represent many different data types. Certain data are the results of complete inventories and others are the results of localized studies (e.g., surveyed peat bogs). Each data type included in atlas map 3 is described below preceded by the map symbol used to identify it on the map and the source of information.



Watersheds: Maine Department of Environmental Protection, Augusta, ME. 1979.

The Maine Department of Environmental Protection has mapped watershed boundaries for all streams with watersheds larger than approximately 25 acres (10 ha) at a scale of 1:24,000 or 1:62,500. These boundaries have been included in atlas map 3 at the scale of 1:24,000.



Surveyed Peat Bogs: Cameron, C. C. 1975. Some peat deposits in Washington and Southeastern Aroostook Counties, Maine. U.S. Geological Survey Bulletin 1317-c, 39 pp.

Cameron, C. C., and W. D. Massey. 1978. Some peat deposits in Northern Hancock County, Maine. U.S. Geological Survey Open File Report, 15 pp.

category includes only those surveyed peat This significant bogs determined to be commercially the easternmost regions of the in characteization area.

Granite Quarries; Mines and Mineral Prospects; Historic Seismic Events: Barry S. Timson, 1979. Unpublished report to U.S. Fish and Wildlife Service, Region 5, Newton Corner, MA. These data were compiled from existing file information from the Maine Department of Conservation, Bureau of Geology. They include historic as well as active sites.

Dredge Disposal Sites: U.S. Department of Commerce, Environmental Sciences Service Coast and Geodetic Survey, Administration. 1969.

dredge disposal sites plotted are those The sites identified in the Coast and Geodetic Survey of 1969.

Project Maps Volumes 1 and 3. Dredging Areas: Rivers and Harbors, Maine and New Hampshire. Army Corps of Engineers, New England U.S. Division, Waltham, MA. September 1976. The locations of federal dredging areas within

the characterization area plotted. are Information on sites that have been active since 1959 is presented in chapter 3, "Human Impacts on the Ecosystem."

Solid Waste Disposal Sites: Maine Department of Environmental Protection, Augusta, ME. March 1979.

The inventory from which these site locations were taken was conducted as an ongoing effort by the Maine Department of Environmetal Protection. It is not a complete inventory although most solid waste disposal sites are included.

Maine Marine Geology: Department of Conservation, Bureau of Geology. 1976 These data include marine geologic environments of intertidal and shallow subtidal areas at a scale of 1:24,000 as interpreted from aerial photographs.

Land Ownership and Easements: Maine State Planning Office, Resource Planning Division, unpublished maps.

Data for State, Federal, and Conservation agency land ownership were supplied by the Maine State

















Seismic

Event

Prospect

Quarry

Planning Office and updated through 1979 for inclusion in the atlas.

Natural Landmarks: National Natural Landmarks Program, U.S. Department of the Interior, Heritage Conservation and Recreation Service, 440 G Street N.W., Washington, DC. 20243. National Natural Landmarks are a select portion of America's land and waters that are nationally The Heritage Conservation and significant. Recreation Service conducts studies of ecological and geological resources to provide a National basis for designating Natural Landmarks. Each study includes a list of areas recommended for National Landmarks status. These areas are reviewed by ecologists and recommendations geologists and their are reviewed and submitted to the Secretary of the Interior for approval and Landmark designation. Only those National Natural Landmarks designated as of September 1979 are included in the atlas.

Point Sources of Pollution: Maine Department of Environmental Protection, Augusta, ME. May 1980.

Point sources of pollution which are plotted have been licensed by the Maine Department of Environmental Protection industrial licensing division. The list is inclusive for May 1980. Municipal point sources are not included.



These data include geological features identified by the Natural Areas Inventory of the Maine State Planning Office as of March 1979.

ATLAS MAP 4: FISH AND WILDLIFE

Fish and Wildlife contains a variety of data types compiled from numerous sources. Each data type is described below, preceded by the map symbol used to identify it and the source of information.

Erwin, R. M., and C. E. Korschgen. 33J Waterbirds: 1979. Coastal Waterbird Colonies: Maine to 1 Virginia, 1977. An atlas showing locations and Species Numbers U.S. Fish and Wildlife species composition. Service, Biological Services Program, FWS/OBS -79/08. Korschgen, C. E. 1979. Coastal Waterbird Maine. U.S. Fish and Wildlife Colonies: Service, Biological Services Program. FWS/OBS -79/09.



Maine Shorebird Survey. Wildlife Department, Nutting Hall, University of Maine, Orono, ME. important seabird nesting islands (see The chapter 14, "Waterbirds"), all wading bird nesting colonies, and known shorebird roosting areas are plotted. Systematic surveys of seabird nesting islands and wading bird colonies have been conducted in recent years (Erwin and Korschgen 1979). Shorebird roosting areas have not been systematically inventoried. Only known important roosting areas have been included in the atlas (see chapter 14, "Waterbirds"). These data are based on shorebird surveys. Most of the shorebird roosts identified in regions 5 and 6 have been verified.





Eagle Nesting Territories: Maine Eagle Project. Wildlife Department, Nutting Hall, University of Maine, Orono, ME.

These data include the general location of eagle nesting territories that are monitored by the eagle project. They represent active and recently active nesting territories (see chapter 16, "Terrestrial Birds, Case Study: The Bald Eagle").

Commercial Shellfish Beds: U.S. Environmental Protection Agency.



Soft Clams



Hard Clams



Mussels, salt water



Sea Scallops



Eastern Oyster



Ocean Quahogs

The locations of areas where shellfish are commercially harvested were delineated by personnel of the Maine Department of Marine Resources in 1978 and 1979 for the Environmental Protection Agency. These maps have been reproduced for this atlas.

Anadromous and Catadromous Fish: Maine State Planning Office, Coastal Planning Program. 1977. Maine Coastal Inventory.

•	٠	•	Rainbow Smelt
Δ	Δ	Δ	American Shad
ØÞ	Ø	C⊅	Alewives
•	•	•	Blueback Herring
Q	¢	¢	Atlantic Salmon
		•	Atlantic Sturgeon
			Shortnose Sturgeon
•	•	•	American Eel

The anadromous fish information plotted includes the locations of rainbow smelt, American shad, alewives, blueback herring, Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon. The catadromous fish information plotted includes the location of the American eel. Anadromous and catadromous fish information was supplied by the Maine Department of Marine Resources, and was based on observations by biologists, wardens, commercial fishermen, and river and lake survey reports of the Maine Department of Inland Fisheries and Wildlife.



Fishways

Dam Sites: U. S. Army Corps of Engineers, New England Division, Waltham, MA. 1979. Hydroelectric potential at existing dams, New England Region, 6 volumes.

Dams, which potentially affect the passage of migratory fish, are plotted with information on the condition of the dam (existing or breached) and the presence of fishways.

Wetlands Important to Waterfowl: Maine State Planning Office. Coastal Planning Program. 1977. Maine Coastal Inventory. This information is primarily from the Maine Department of Inland Fisheries and Wildlife Wetland Inventory. Individual wetlands rated as high value wetlands for nesting, migrating, and/or wintering waterfowl by the Maine Wetlands Inventory are plotted.

- <u>Tidal Flats Important to Waterfowl</u>: Maine State Planning Office, Coastal Planning Program. 1977. Maine Coastal Inventory. Major tidal flats of importance to waterfowl as determined by the Maine Department of Inland Fisheries and Wildlife Wetland Inventory were plotted.
 - Shorebird Feeding Areas: Maine Shorebird Survey. Wildlife Department, Nutting Hall, University of Maine, Orono, ME.

These include major tidal flats of importance to shorebirds based on shorebird surveys, unpublished data, and historic records.

Marine Worm Harvesting Areas: Maine State Planning Office, Coastal Planning Program. 1977. Maine Coastal Inventory.

The locations where marine worms are commercially harvested, as determined by the Maine Department of Marine Rsources, were plotted.

Historic Herring Weirs: Maine State Planning Office. Coastal Planning Program. 1977. Maine Coastal Inventory.

The location of herring weirs is an indicator of the location of inshore populations of herring. The locations of herring weirs plotted are from data compiled by the Maine Department of Marine Resources from 1947 to 1977.

Important Seal Haulout Sites: Richardson, D. T. 1975. Unpublished report to the U. S. Department of Commerce, Marine Mammal Commission, Washington, DC. Haulouts judged to be significant based on criteria outlined in chapter 13, "Marine Mammals," were plotted. The data base is from

CPB

0 0 0 0 0 0 0 0 0 0

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Coastal Plateau Bogs: Worley, I. A. 1980. Botanical and ecological aspects of coastal raised peatlands and their relevance to the critical areas program of the State Planning Office. Planning Report No. 69 (draft). Maine State Planning Office, Augusta, ME.

1973.

DWA

Locations of coastal plateau bogs as identified by Worley (1980) have been mapped.

Deer Wintering Areas: Maine State Planning Office. Coastal Planning Program. 1977. Maine Coastal Inventory.

Deer wintering areas were identified in preliminary inventories of certain sections of the coastal regions by the Maine Department of Inland Fisheries and Wildlife. The areas presented on the maps are areas of concern that may, as the result of future investigations, require special consideration.

Threatened and Rare Plants: Maine State Planning Office, 1979 and Eastman, M.L., 1978. Rare and Endangered Vascular Plant Species of Maine. The New England Botanical Club in cooperation with the U.S. Fish and Wildlife Service. Locations where threatened and rare plants are known to occur are based on collected herbarium speciments (see chapter 20) and personal commu-

nications with plant taxonomists. Many locations have not been recently assessed. Certain locations on the atlas are not specific (e.g., general location on Great Duck Island). These are historical locations that have not been recently verified.

Areas: Maine State State Designated Critical Areas Program. Critical Planning Office, Registry of Critical Areas. May 1980. Critical Areas include those areas registered by the Critical Areas Program of the Maine State State law Planning Office as of May 1980. features of defines critical areas as natural statewide importance because of their unusual historical natural, scenic, scientific, or significance.

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

