



Where the Rivers Meet the Sea:

Fulfilling the Promise of the Rachel Carson National Wildlife Refuge





Rachel Carson National Wildlife Refuge Location:

Scattered over 50 miles of coastal Maine between Kittery and Cape Elizabeth.

Size: Approximately 5,000 acres of protected land within a current 7,600-acre refuge acquisition boundary.

Habitat: Coastal salt marsh, forested wetland, barrier beach, coastal meadow, and upland forest and grassland.

Key Species: More than 250 species of birds, 47 species of mammals, and 35 species of reptiles and amphibians can be found on the refuge during the course of a year. Key species include barred owl, black duck, black-throated

green warbler, bobolink, common loon, Eastern meadow-lark, great blue heron, least tern, Nelson's sharp-tailed sparrow, Northern saw-whet owl, oven bird, peregrine falcon, piping plover, saltmarsh sharp-tailed sparrow, sharp-shinned hawk, snowy egret, wild turkey, fisher, harbor seal, mink, New England cottontail, river otter, Eastern painted turtle, spotted salamander, spotted turtle, spring peeper, wood frog, American eel, alewife, and smelt.

Major Rivers and Brooks: Batson River, Branch Brook, Goosefare Brook, Little River, Ogunquit River, Merrilland River, Mousam River, Saco River, Smith Brook, Spurwink River, Webhannet River, and York River.

A Message from Maine's Congressional Delegation

Maine's southern coastline is a place of wonder that draws us again and again to its beautiful stretches of sand and stunning rocky outcroppings. The diversity of activity is astounding: millions of tourists arrive each summer; thousands of commercial fishermen take off daily from its many ports; small businesses and commerce thrive; and seaside homes are in great demand. In the midst of this everyday hustle and bustle, the sea and its estuaries, tidal pools, salt marshes, and buffering uplands are equally productive—nurturing and sustaining important fisheries and endangered species and providing critical habitat for waterfowl and migratory birds.

The tug and pull among these different forces is constant as we struggle to balance our economic and environmental needs. The Rachel Carson National Wildlife Refuge, located along Maine's southern coast, provides an immensely important role in ensuring that a reasonable balance is maintained and that our most sensitive coastal habitat lands are protected and managed for future generations. This report documents the challenges we face and presents opportunities for protecting Maine's southern coast.

Over the years we have worked on behalf of the refuge to ensure that its land protection efforts are sustained; and, working in partnership, we have accomplished much. As we begin the 21st Century, it is important that we take a good look at where we are now and what we can do in the future to ensure that Maine's southern coast continues to be a special place for residents and visitors alike.

In Maine, we are honored to have a national wildlife refuge named after Rachel Carson, who through her significant writings caused a fundamental shift in the way all of us look at the relationship between natural and human communities. This report on the future of the refuge will help carry on her legacy and guide us in the future.

We would like to thank the Trust for Public Land, the Rachel Carson National Wildlife Refuge, and the many groups and individuals involved in the production of this report for their interest in and support for the refuge and for this report on its land protection needs.

Sincerely,



Olympia J. Snowe
United States Senator



Susan M. Collins
United States Senator



Thomas H. Allen
Member of Congress



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Executive Summary

Southern coastal Maine's natural resources are exceptionally valuable. Scientific research clearly demonstrates that southern coastal Maine contains a greater diversity of terrestrial vertebrates, threatened and endangered species, and woody plants than any other part of the state. Unfortunately, the biologically richest region of the state is also the most densely populated, and sprawling growth, which disperses development from urban areas into previously rural areas, is extensive. Protected areas, particularly those managed for the long-term maintenance of biodiversity and ecological processes, are scarce.

One of the most significant networks of conservation land in southern coastal Maine is the Rachel Carson National Wildlife Refuge. The refuge includes approximately 5,000 acres scattered along a 50-mile band of coastline between Kittery and Cape Elizabeth. When it was established in 1966, the refuge was designed to protect coastal marshes and estuaries. Because few upland areas were included within the refuge boundary, however, the wetlands protected by the refuge have remained vulnerable to the impacts of adjacent development. Although refuge acquisition programs have been broadened over the years, land protection remains the most serious need at the refuge today.

To address this need, the Trust for Public Land collaborated with the refuge and other partners to produce *Where the Rivers Meet the Sea: Fulfilling the Promise of the Rachel Carson National Wildlife Refuge*. In light of the challenges facing the region and the urgent need to protect land before it is developed, this report makes the following recommendations:

- Expand the refuge's acquisition focus areas to include critical inland and coastal habitat, upland buffers around refuge marshes, and corridors along the rivers that feed refuge marshes.
- Increase annual federal Land and Water Conservation Fund allocations and other funding for the refuge to a level that ensures that key parcels can be protected.
- Create partnerships with state agencies, towns, and conservation organizations

to coordinate land protection efforts and leverage funding. Structure land protection creatively by employing a combination of fee ownership and easements.

- Whenever possible, combine habitat protection with the expansion of opportunities for wildlife-dependent recreation, such as controlled fishing and hunting, birdwatching, and wildlife photography, in a manner that is consistent with the 1997 Refuge Improvement Act.

Expanding the refuge's key focus areas to include critical inland and coastal habitat, marsh buffers, and corridors around rivers that feed into the refuge's many wetlands will be critical to secure the well-being of refuge ecosystems and wildlife.

Significantly increased funding will be needed to achieve this goal before development irreversibly degrades these natural resources. Creative partnerships with towns, the state, and nonprofit organizations will also help the refuge achieve its mission by leveraging existing efforts to protect scenic views, water quality, wildlife habitat, and recreation areas. Finally, by expanding opportunities for recreation in a manner that is consistent with the 1997 Refuge Improvement Act, the refuge can maximize community benefit, strengthen public support, and educate the public about the importance of the refuge's mission.

Underlying the beauty of the spectacle of life, there is meaning and significance. It is the elusiveness of that meaning that haunts us, that sends us again and again into the natural world where the key to the riddle is hidden.

Rachel Carson, *The Edge of the Sea*

Introduction: Threats and Opportunities in Southern Coastal Maine

Maine's unique natural landscape provides extensive wildlife habitat, as well as scenic, recreational, and natural resource benefits. The state, which is the size of all the other New England states combined, includes approximately 20 million acres of forestland, more than 3,500 miles of meandering coastline, hundreds of inlets and islands, soaring mountains, and breathtaking views. While much of Maine is ecologically rich, research shows that the most biologically diverse area is the southern coastal region. Here, the eastern deciduous forest and the northern mixed hardwood forest converge in a unique transition zone of sandy beaches, pitch pine woodlands, large salt marshes, and rocky shores.

This region is also one of the state's most threatened. Although Maine's coastal zone comprises just 12 percent of the state's land base, it is home to 44 percent of the state's residents, with the southern coast significantly more populated than the downeast coast.¹ The pressure that population growth is putting on the natural resources and undeveloped land in the southern coastal region is exacerbated by a



pattern of increasingly dispersed development commonly known as sprawl. Over the past three decades, many urban and suburban residents have migrated to outlying rural areas 10 to 25 miles away from traditional population centers. As residents have dispersed, per capita land consumption has skyrocketed. For example, between 1960 and 2000, population in the Portland metropolitan area grew by 80 percent. At the same time, the geographic extent of the metropolitan area increased by 550 percent, a rate seven times higher than that of population growth.²

Divided into scattered units between Kittery and Cape Elizabeth, the Rachel Carson National Wildlife Refuge is particularly vulnerable to the effects of sprawl. As development has moved closer to refuge marshes, runoff carrying pollutants, such as pesticides, herbicides, fertilizers, gasoline, antifreeze, and oil, has increased. These contaminants disrupt natural systems, affecting the health of plants and animals. Nearby development also renders marshes more vulnerable to invasion by exotic plants, which often thrive at the expense of the native wetland vegetation needed by wildlife for food and habitat. Development and road construction decrease the natural capacity of land around the refuge to filter sediments and absorb floodwaters, further burdening refuge marshes. In addition, development and associated human activities also disrupt wildlife feeding and breeding activities, thus reducing survival rates.

Shoreline development, which has a particularly heavy impact on fragile coastal resources, is increasing rapidly in southern coastal Maine. Long stretches of once publicly accessible coastline have been developed into private residential subdivisions. As available oceanfront properties have become less common and more expensive, development pressures have increased on riverfront and other scenic lands. The impact on the refuge is magnified, because refuge marshes are not well buffered by conserved uplands. At the refuge, nearby extensive development has increased pressure on vulnerable populations of piping plovers and least terns,[†] as well as populations of other shorebirds, neotropical songbirds, black and harlequin ducks, and many other declining plant and animal species.

Land Conservation Needs

Approximately 13 percent of Maine, or 2.7 million acres, is dedicated for conservation, including both conservation easements and land owned outright by state and federal government agencies as well as private conservation organizations.³ Land protection in southern coastal Maine is even more limited. Only 9 percent of the region surrounding the Rachel Carson National Wildlife Refuge is permanently protected as open space.⁴ This is a disproportionately low amount, particularly considering that the area is the state's richest in terms of biological diversity and is the most threatened by extensive development pressures.



Size of Maine's coastal zone as percentage of entire state: **12%**

Percentage of state residents who live in the coastal zone: **44%**

Percentage of Maine that is permanently protected as open space: **12%**

Percentage of southern coastal Maine that is permanently protected as open space: **9%**

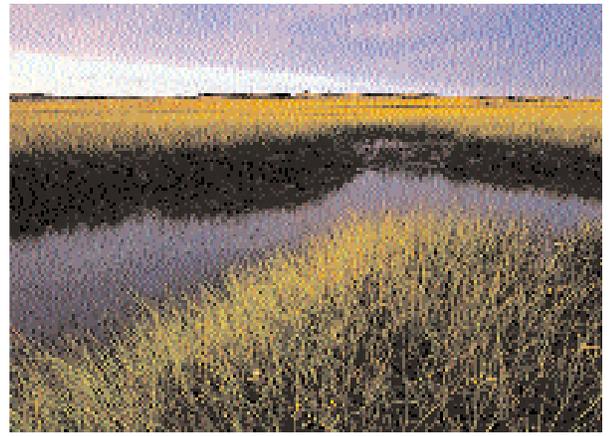
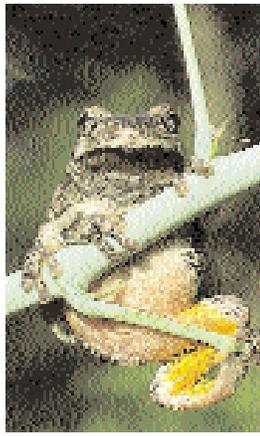
Increase in the geographic extent of the Portland metropolitan area between 1960 and 2000: **550%**

Southern coastal Maine contains a greater diversity of terrestrial vertebrates, threatened and endangered species, and woody plants than any other part of the state.

[†]Piping plovers are listed federally as a threatened species and listed in the State of Maine as an endangered species. Least terns are listed in the State of Maine as an endangered species.

Not only is land protection limited in the southern coastal region, many local open spaces are not permanently protected. Town forests and parks held as general municipal land are not specifically protected from development, and they are all too often appealing targets for new schools, town offices, sewage disposal facilities, and other municipal uses. Moreover, private lands that have traditionally supplemented public open space are being closed to the public, as they are developed or posted as private property.

It is estimated that by the year 2050 an additional 428 square miles of urban land will be developed in the eight counties of southern Maine, while 569 square miles of agricultural and forest land in the same area will be lost.⁵ Market forces associated with these rates of development have caused real estate prices to soar, further hampering protection efforts. As a result, in Governor Angus King's 1997 *Land Acquisition Priorities Report*, the State of Maine highlighted the disproportionately small amounts of open space in the southern coastal region and the need for increased land conservation in the area.



The Role of the Rachel Carson National Wildlife Refuge

In 1966 the U.S. Fish & Wildlife Service established a wildlife refuge in cooperation with the State of Maine in order to protect trust species, defined as wildlife that migrates across state and national boundaries, and plants and animals that are federally threatened or endangered. Dedicated as the Coastal Maine National Wildlife Refuge, the refuge was formally renamed in 1970 in honor of Rachel Carson, the renowned author and environmentalist who was devoted to coastal Maine. In 1997, the Refuge Improvement Act reinforced the management mission for all lands within the National Wildlife Refuge System, including the Rachel Carson National Wildlife Refuge: to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Today, spread out along 50 miles of Maine's southern coastline between Kittery and Cape Elizabeth, the refuge is composed of ten units in eleven coastal towns. Despite its wide geographic span and 34-year history, the refuge can only acquire land within a 7,600-acre area. Approximately 5,000 acres have already been acquired within this boundary and are owned by the U.S. Fish & Wildlife Service.



Coastal salt marshes are the refuge's dominant habitat type. These marshes are particularly important to breeding, migrating, and wintering waterfowl, nesting shorebirds, and seabirds. Other habitat types within the refuge include forested wetlands, coastal meadows, rocky coast, and barrier beaches, which provide habitat for the piping plover. Approximately 25 percent of the refuge is upland, consisting primarily of oak, hemlock, and white pine forests.

Initially, the refuge focused on protecting coastal wetlands and preserving waterfowl migration routes through southern Maine's coastal estuaries. At that time, scientists did not foresee the negative impact of upland development on nearby marshes and underestimated the rapid rates of development the

area would experience. As a result, few upland areas were included in the refuge, effectively terminating land acquisition at the edge of the salt marshes.⁶ Excluded from the refuge were contiguous freshwater wetlands and sufficient upland, both of which are now known to be vital to the health of salt marshes and their inhabitants. Although this policy has been revised over the years as the importance of uplands has been fully recognized, the upland acreage protected by the refuge remains insufficient.

Future Land Conservation at the Refuge

Currently, the refuge's 10 divisions are split into small and often unconnected parcels, all of which are located in the most densely populated and rapidly developing area of the state. The fractured nature of the refuge makes it particularly vulnerable to the negative effects of bordering roads and development.

Based on research by the U.S. Fish & Wildlife Service Gulf of Maine Coastal Program and additional information gathered from project partners, several key areas have emerged as most important for future protection efforts: land defined as critical inland and coastal habitat in communities surrounding the refuge,^{††} marsh buffers (including contiguous wetlands and uplands), and corridors around refuge rivers. As of June 2001, the refuge was preparing a boundary expansion proposal including important areas with a high concentration of identified critical habitat. When the plan is approved, refuge acquisitions will be focused in these areas of

^{††}In 1997 Rachel Carson National Wildlife Refuge and the U.S. Fish & Wildlife Service Gulf of Maine Coastal Program used biological models, Geographic Information System (GIS) mapping, and field studies to locate the most critical unprotected habitat within the 14 towns surrounding the refuge: Arundel, Biddeford, Cape Elizabeth, Eliot, Kennebunk, Kennebunkport, Kittery, Ogunquit, Old Orchard Beach, Saco, Scarborough, South Berwick, Wells, and York. The refuge currently owns and manages land in 11 of these towns. (See Appendix I on page 14 and maps on pages 17-19.)

concentration. To protect remaining critical habitat outside these areas of concentration, the participation of other conservation organizations and agencies will be essential.

Critical Inland and Coastal Habitat. Freshwater wetlands and upland cover types, such as oak/pine forests, northern hardwood forests, and grasslands, are underrepresented in the refuge.⁷ This is particularly significant given that wetland development is restricted by local, state, and federal laws, while regulations governing the development of upland forests and grasslands are generally minimal. The Gulf of Maine Coastal Program identified a substantial quantity of upland habitat in Maine's 14 southern coastal towns as critical for key wildlife species.⁸ Because larger open spaces generally are ecologically more valuable than small ones, only inland parcels of ten acres or more were identified as priorities for protection.⁹ By contrast, because much of the coastal area has been subdivided and developed and because remaining coastal properties are a primary target for development, all identified critical habitat in the coastal area was identified as an acquisition priority, regardless of size.

Critical inland areas support communities of mammals, reptiles, amphibians, and invertebrates that depend on large unfragmented areas for survival. Among these are many trust species, including declining populations of neotropical songbirds. Coastal lands also provide particularly valuable habitat for a number of trust species. Migrating shorebirds feed and roost in coastal marshes, and barrier beaches provide nesting habitat for populations of piping plovers and least terns. Black ducks, mallards, and other species rely on coastal marshes and waterways year-round.

Marsh Buffers and River Corridors. Southern Maine's salt marshes form the core of the Rachel Carson National Wildlife Refuge. As a result, in addition to focusing future acquisitions on critical inland and coastal habitat, the refuge should prioritize acquisitions that help guarantee the future viability of the marshes. Currently, many of the refuge's marshes are insufficiently insulated from surrounding development. When possible, additional land adjacent to marshes held by the refuge should be acquired to 1) provide for the health of trust species, 2) protect existing public investments in the refuge, and 3) facilitate better management of refuge resources.

There at the edge of low water the beach with its reminders of the land seemed far away. The only sounds were those of the wind and the sea and the birds. There was one sound of wind moving over water, and another of water sliding over the sand and tumbling down faces of its own wave forms.

Rachel Carson, *The Edge of the Sea*



Because one or more rivers feed each marsh, the quality of river water directly impacts the health of downstream estuaries and marshes and affects resident fish and wildlife. To protect water quality and wildlife habitat, the entire riparian zone should be protected wherever possible along rivers that flow into significant refuge holdings. Expanding open space buffers along rivers should be an important refuge priority.¹⁰

Funding and Partnerships

The federal Land and Water Conservation Fund (LWCF) is the principal source of funding for the purchase of federal conservation and recreation lands across the country and has always been the Rachel Carson National Wildlife Refuge's primary source of acquisition funds. However, the refuge competes for LWCF funding with more than 500 other refuges, as well as hundreds of national parks, forests, and other federal lands. For the refuge to successfully complete its acquisition program, a higher and more consistent level of LWCF allocations is needed. The refuge could further benefit from an increase in LWCF grants to the states, as it is located in an area with significant open space needs, many of which could be met through state acquisition of land that is also important to the refuge.

To acquire land, the refuge has also used Migratory Bird Conservation Fund (MBCF) monies, which come from the required purchase of "duck stamps" by hunters and are marked exclusively for the nation's refuges. However, LWCF and MBCF alone cannot provide enough funding to protect all the priority habitat, particularly given the relatively high per-acre value of land in southern coastal Maine. Creative partnerships that tap less traditional funding sources are also important (See Appendix III).^{†††} Since much of the critical habitat identified in this report is important not only to the refuge but to other conservation, recreation, and open space initiatives, refuge staff should actively work with towns, state agencies, land trusts, and others to focus private, state, and federal acquisition efforts on land that meets their joint priorities.



An Open Space Opportunity for Southern Coastal Maine

In many cases, land acquisition by the Rachel Carson National Wildlife Refuge fulfills the U.S. Fish & Wildlife Service's mission, while also helping to achieve state and local goals. Refuge acquisitions inherently protect wildlife habitat where it is most needed. If acquisitions were more closely coordinated with state and local conservationists, refuge investments could be leveraged to help address broader open space needs in southern coastal Maine, such as protecting scenic views and habitat for non-trust species, providing opportunities for low-impact recreation, and helping to relieve sprawl and contain municipal costs.

^{†††} For additional information on potential partner organizations, visit www.tpl.org. Click on New England, then click on "Where the Rivers Meet the Sea: Fulfilling the Promise of the Rachel Carson National Wildlife Refuge" in the publications box.



Public Access to the Refuge. An estimated 270,000 people visited the refuge in 1999. Nearly 150,000 of those visitors used the one-mile interpretive foot trail at the Wells headquarters, which is the only developed trail on the refuge. Others enjoyed nature photography and wildlife observation, generally from roads abutting the refuge. Hunting, which is allowed on the refuge with a permit, has increased in popularity during each of the past several years. Tidal waters of the refuge are open to fishing, and bank fishing is permitted in several areas. Both of these forms of sport fishing are increasingly popular. Demand for low-impact recreational activities, including walking, sailing, saltwater fishing, canoeing, and kayaking, is also strong.

The 1997 Refuge Improvement Act recognized that wildlife-dependent recreational uses—hunting, fishing, wildlife observation, photography, and environmental education and interpretation—are legitimate and appropriate public uses where compatible with the Refuge System’s mission and the individual refuge’s purposes. As additional land is acquired at the refuge, it should, insofar as is compatible with wildlife protection, include public access. Increased public access will need to be managed so that wildlife and the resources on which they depend are not harmed. The benefits will include enhanced public support for the refuge and its mission and increased opportunities for environmental education.

Partnership Protects Goose Rocks Corner

The 70-acre Goose Rocks Corner property in Kennebunkport was slated for a high-end residential subdivision that would have eliminated public access, degraded scenic views, and threatened water quality and wildlife habitat. Because the land abuts the Rachel Carson National Wildlife Refuge and contains valuable upland habitat, it was a high priority for acquisition. In 1999, the Trust for Public Land (TPL), the refuge, and the Kennebunkport Conservation Trust (KCT) joined forces to protect the land with funds from the federal Land and Water Conservation Fund and private donations raised by KCT. Thanks to this partnership, TPL was able to secure an option on the land and hold it off the market until the Rachel Carson National Wildlife Refuge purchased it in the spring of 2000.



Conclusions and Recommendations

The current pressures of growth and development in southern coastal Maine are threatening the region's ecological health and biodiversity. In order to ensure that the outstanding natural resources of the region are permanently protected before

they are irreversibly damaged, additional land must be conserved. As the largest open space system in the region, the Rachel Carson National Wildlife Refuge is well positioned to play a lead role in this effort. To succeed, however, the refuge will need increased funding, effective partnerships, and strong public support. As a result, this report makes the following recommendations:

1. Expand the refuge's acquisition focus areas to include critical inland and coastal habitat, upland buffers around refuge marshes, and corridors along the rivers that feed refuge marshes. The refuge currently includes just 5,000 protected acres scattered across nearly 50 miles of coastline. Refuge land is increasingly at risk as nearby properties are developed. As a result, it is important that the refuge act quickly to expand its focus areas before development has irreversibly degraded the region's ecological resources.
2. Increase annual federal Land and Water Conservation Fund allocations and other funding for the refuge. The refuge is located in the most densely populated area of Maine, and the pace of development is growing. Significant allocations are needed now to keep up with market forces and to enable the refuge to acquire critical habitat and retain its ecological integrity.

Clockwise on left: Blue flag blossom (by Mark Wilson), Piping plover with chick and eggs (by Mark Wilson), Father and son on a beach in Kennebunkport (by Susan Lapidés), Monarch butterfly (by Bill Silliker, Jr). Right (from left to right): Red fox with kit (by Scott Leonhart, Positive Images), Moose (by Bill Silliker, Jr.).

3. Forge new partnerships and structure land protection projects creatively by employing a combination of outright ownership and conservation easements. Since much of the critical habitat identified in this report is important not only to the refuge but to other conservation, recreation, and open space initiatives, the refuge should actively work with towns, state agencies, land trusts, and others to focus private, state, and federal acquisition efforts on land that meets their joint priorities.

4. Whenever possible, combine habitat protection with the expansion of opportunities for wildlife-dependent recreation, such as controlled fishing and hunting, birdwatching, and wildlife photography, in a manner that is consistent with the 1997 Refuge Improvement Act. This will help maximize community benefit from refuge activities and strengthen public support for the refuge and its mission.

The edge of the sea is a strange and beautiful place. All through the long history of Earth it has been an area of unrest where waves have broken heavily against the land, there the tides have pressed forward over the continents, receded, and then returned. For no two successive days is the shore line precisely the same.

Rachel Carson, *The Edge of the Sea*

Land use decisions made over the next 20 years will shape both natural and human communities in southern coastal Maine for generations. If implemented soon, the recommendations contained in this report will significantly improve the health of the estuaries and marshes that form the core of the refuge. In addition, they will help address some of the most pressing open space needs in the region and in the State of Maine. The chance to preserve some of what Rachel Carson and many other visitors and residents have treasured in southern coastal Maine is fleeting. We must seize this opportunity before it is lost forever.



Appendix I: Critical Inland and Coastal Habitat: The Identification Process

To address accelerating rates of habitat loss, in 1997 the Rachel Carson National Wildlife Refuge began an ambitious study to identify and prioritize land acquisition needs. Refuge managers teamed up with the U.S. Fish & Wildlife Service Gulf of Maine Coastal Program and used biological models, Geographic Information System (GIS) mapping, and field studies to locate the most critical unprotected habitat within the 14 towns surrounding the refuge: Arundel, Biddeford, Cape Elizabeth, Eliot, Kennebunk, Kennebunkport, Kittery, Ogunquit, Old Orchard Beach, Saco, Scarborough, South Berwick, Wells, and York. The partnership identified critical habitat that ranges geographically from the coast inland to the western boundary of each town.

The following biologically based methods were used to identify the critical habitat:

- Land in the study area was evaluated through computer modeling, supplemented with on-site observations, and ranked for its importance for 43 selected endangered species and migratory birds and fish. The 43 species were selected because they were 1) federally- or state-listed threatened or endangered trust species, 2) listed as threatened or endangered by two of the three states in the Gulf of Maine watershed, or 3) experiencing persistent population declines over much of their range.
- The habitat scores, which were based on general, migration, reproductive, wintering, feeding, nesting, and roosting needs for each of the 43 species, were summed.
- Four general cover types were established: 1) grass/shrub/bare land, 2) forested land, 3) fresh water emergent or aquatic wetland, and 4) salt-water emergent or aquatic wetland.
- Although all of the habitat identified by the Gulf of Maine Coastal Program is valuable and should be considered for conservation, for the purposes of this report only the highest scoring 50 percent within each cover type are included in the critical inland and coastal habitat category and targeted for protection.
- For the purposes of this report, critical inland

habitat was further prioritized by size. Only inland parcels 10 acres or larger are considered to be acquisition priorities, whereas all of the most important 50 percent of coastal habitat are considered a priority regardless of size. The rationale behind the size differences is discussed further on page 9. All priority habitat is mapped on pages 17-19.

Please note that the habitat evaluation process was designed specifically to identify and prioritize unprotected habitat critical to the health of certain species that the Rachel Carson National Wildlife Refuge is responsible for protecting. Evaluation species were limited to migratory birds and anadromous or interjurisdictional fish experiencing population declines or already threatened or endangered. Although the habitat used by these species supports many other organisms, it may not meet the needs of all flora and fauna. Identification and prioritization of habitat critical to other species should supplement this report.

Appendix II: Endnotes

¹ Maine State Planning Office, "The Cost of Sprawl," May 1997.

² Maine State Planning Office, "State of the Maine Coast," 1999, and Interview, June 2001.

³ Maine State Planning Office, Interview, 2001.

⁴ This region is defined as the 14 towns immediately surrounding the refuge. (See maps on pages 17-19.)

⁵ Planting, Mauldin & Aligissa, "Land Use in Maine: Determinations of Past Trends and Projections of Future Changes," 1999.

⁶ U.S. Fish & Wildlife Service, Rachel Carson National Wildlife Refuge, Annual Narrative Report, 1990.

⁷ Critical inland and coastal habitat is mapped on pages 17-19. The maps are based on data prepared by the U.S. Fish & Wildlife Service Gulf of Maine Coastal Program (as explained in Appendix I). Due to space limitations in this publication, the scale is too small to show precise locations. Readers who want to know the specific location of critical habitat or the species for which any given area is important should contact the Gulf of Maine Coastal Program at (207) 781-8364 or visit <http://gulfofmaine.fws.gov>.

⁸ Critical habitat is located in 14 southern Maine coastal towns: Arundel, Biddeford, Cape Elizabeth, Eliot, Kennebunk, Kennebunkport, Kittery, Ogunquit, Old Orchard Beach, Saco, Scarborough, South Berwick, Wells, and York.

⁹ When large undeveloped areas are lost or degraded by development, wildlife is threatened in several ways. Some become vulnerable to predators and parasites, such as skunks and cowbirds, that occupy habitat edges. Others are eliminated because habitat areas are no longer large enough to support them, and still others lose site-specific nesting grounds or critical foraging habitat.

¹⁰ Because the appropriate size of river buffers varies and because acquisition of marsh buffers needs to be considered on a case-by-case basis, river corridors and marsh buffers are not mapped in this report.

Appendix III: Land Conservation Funding Opportunities

Historically, the Land and Water Conservation Fund and Migratory Bird Conservation Fund have been the primary sources of land acquisition funding for the Rachel Carson National Wildlife Refuge. They are insufficient, however, for the refuge to meet its land protection goals. The following is a partial list of additional sources that could provide land acquisition funding. In some cases, the refuge is directly eligible for funds. In others, the refuge must work with other agencies and conservation organizations to qualify for funding.

FEDERAL

National Coastal Wetlands Conservation Grants

National Coastal Wetland Conservation grants are matching grants ranging from \$10,000 to \$1 million and directed to the Maine Department of Inland Fisheries & Wildlife (MDIFW) for acquisition, restoration, or management of coastal wetlands for fish and wildlife. A 35 percent non-federal match is required. Grant applications are coordinated by the Maine Wetlands Protection Coalition, which includes representation from the U.S. Fish & Wildlife Service Gulf of Maine Coastal Program, MDIFW, Maine Coast Heritage Trust, The Nature Conservancy, and local

land trusts. For more information, contact the Gulf of Maine Coastal Program at (207) 781-8364 or visit <http://gulfofmaine.fws.gov>.

North American Wetlands Conservation Act (NAWCA) Grants

NAWCA provides funding for the North American Waterfowl Management Plan, an international program to protect the continent's wetlands and increase migratory bird populations. NAWCA authorizes up to \$30 million annually in small grants (up to \$50,000) and standard grants (up to \$1 million) for the funding of wetlands conservation projects. In Maine, habitat acquired or restored with standard grant funding is typically owned and managed by MDIFW, but any organization with the ability to own and manage land, including the refuge and local land trusts, is eligible. Habitat acquired or restored with small grant funds can be owned or managed by any federal, state, or nonprofit organization involved in land management. Although these grants require a 1:1 match, the program is extremely competitive and many applications offer a 2:1 match. The Maine Wetlands Protection Coalition coordinates grant applications. For more information, contact the U.S. Fish & Wildlife Service Gulf of Maine Coastal Program (see above).

Partnerships for Wildlife

This program awards a maximum of \$250,000 per state on a 3:1 matching basis to state agencies focusing on conserving non-game species that are not protected by federal legislation. Partnerships for Wildlife could be a good source of funding for priority refuge habitat, as the funds for Maine sometimes go unused due to a lack of applications. For more information, contact the U.S. Fish & Wildlife Gulf of Maine Coastal Program (see above).

Transportation Equity Act for the 21st Century (TEA-21)

TEA-21 funds transportation projects by directing funds to states. Each state sets aside a portion of its funding for "transportation enhancement" projects that can include activity-specific acquisitions. For

further information, contact the Maine Department of Transportation at (207) 287-3131 or visit www.state.me.us/mdot/homepage.htm, www.fhwa.dot.gov/tea21, or www.enhancements.org.

STATE

State Agency Funding

Both the Maine Department of Inland Fisheries & Wildlife (MDIFW) and the Maine Department of Conservation (DOC) have acquisition programs that use internal and external funding sources. Contact MDIFW at (207) 287-8000 or visit www.mefishwildlife.com. Contact DOC at (207) 287-3821 or visit www.state.me.us/doc.

Maine Outdoor Heritage Fund (MOHF)

The Maine Outdoor Heritage Fund is a state grants program whose sole revenue source is a dedicated instant lottery ticket distributed by the Maine State Lottery. Grant applications require a state-agency sponsor. Over \$500,000 is awarded annually to land protection projects throughout Maine. Call (207) 688-4191 for more information or visit <http://janus.state.me.us/ifw/outdoorheritage>.

Land for Maine's Future Program

This state fund, which was rejuvenated in 1999 thanks to overwhelming voter support for a \$50 million bond referendum, is the most prominent public land acquisition program in Maine. Distribution of the proceeds is through a competitive grants program. Because southern Maine is one of the focus conservation areas identified by Governor King's 1997 Land Acquisition Priorities Advisory Committee, proposals to protect southern Maine lands can receive up to 20 extra points. State agencies, municipalities, and nonprofits are eligible for the grants. Contact the Land for Maine's Future Program at (207) 287-1487 or visit www.state.me.us/spo/lmf.

NONPROFIT & OTHER

National Fish and Wildlife Foundation (NFWF)

NFWF was established by Congress to conserve fish, wildlife, plants, and the habitat on which they depend. The foundation provides challenge grants that require at least a 2:1 non-federal match to government agencies, private corporations,

universities, and nonprofits. NFWF administers a number of grant programs. More information can be found at www.nfwf.org, by calling NFWF at (202) 857-0166, or by contacting the U.S. Fish & Wildlife Service Gulf of Maine Coastal Program (see page 15).

Private Funds

Partnerships with other agencies and nonprofit conservation groups, foundations, and individuals can play an important role in accomplishing the refuge's land protection goals. Reference books and web sites list and describe the kinds of programs various foundations are likely to support. Good places to contact are The Foundation Center, which can be reached at (212) 620-4230 or via www.fdncenter.org, and Environmental Grantmaking Foundations, which publishes an extensive directory on U.S. and other foundations. Visit www.environmentalgrants.com or call (800) 724-1857 to order the directory.

Where the Rivers Meet the Sea: Fulfilling the Promise of the Rachel Carson National Wildlife Refuge was produced by the Trust for Public Land in collaboration with the Rachel Carson National Wildlife Refuge, the U.S. Fish & Wildlife Service Gulf of Maine Coastal Program, the Wells National Estuarine Research Reserve, Laudholm Trust, and the Friends of Rachel Carson National Wildlife Refuge.

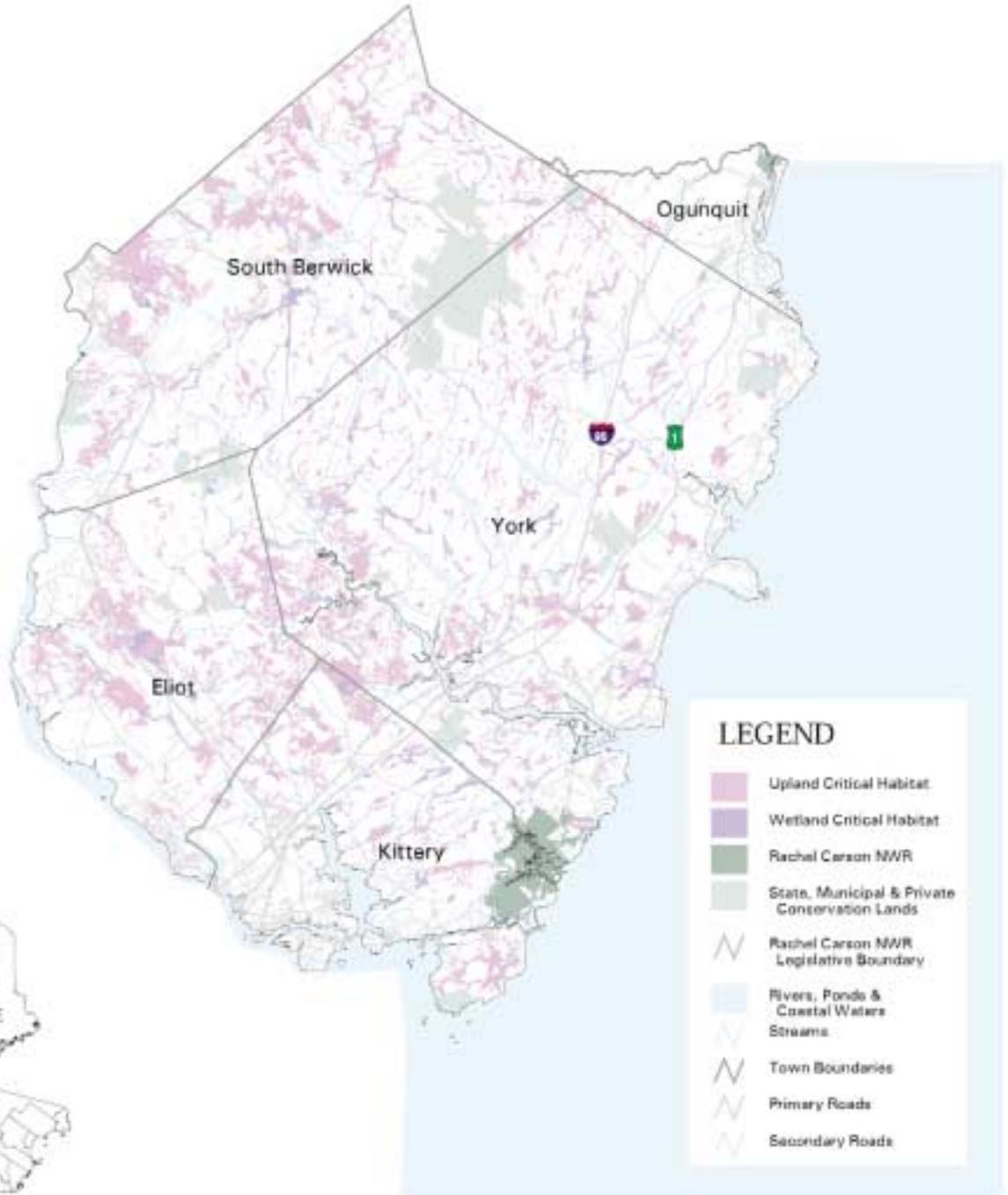
Critical funding was provided by the National Fish and Wildlife Foundation, Cricket Foundation, Davis Conservation Foundation, Payne Fund, and William P. Wharton Trust.

The report was researched by Nellie Aikenhead, Nick Donin, Jennifer Melville, Denise Mullane, Erin Rowland, Liz Uhlin, Heather Wiggins, and Jeremy Wintersteen. It was written by Nellie Aikenhead and edited by Erin Rowland. Design services were provided by Catalyst Design.

Map on page 2: Magellan Geographix/maps.com.
Maps on pages 17-19: Alex Abbott. (Data provided by the U.S. Fish & Wildlife Service Gulf of Maine Coastal Program, Maine Office of Geographic Information Systems, and the Maine Department of Inland Fisheries & Wildlife.)

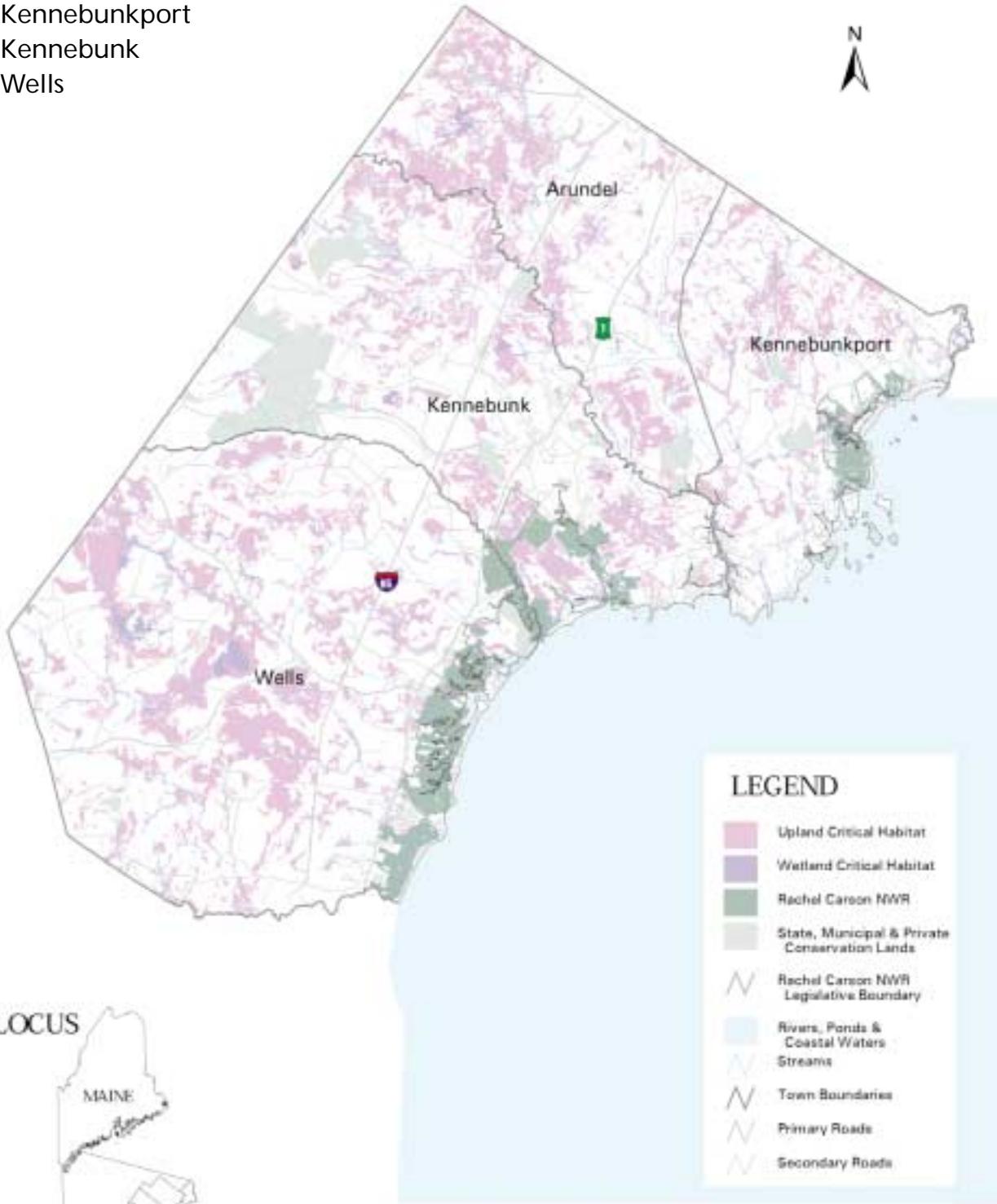
Critical Habitat

South Berwick
Ogunquit
York
Eliot
Kittery



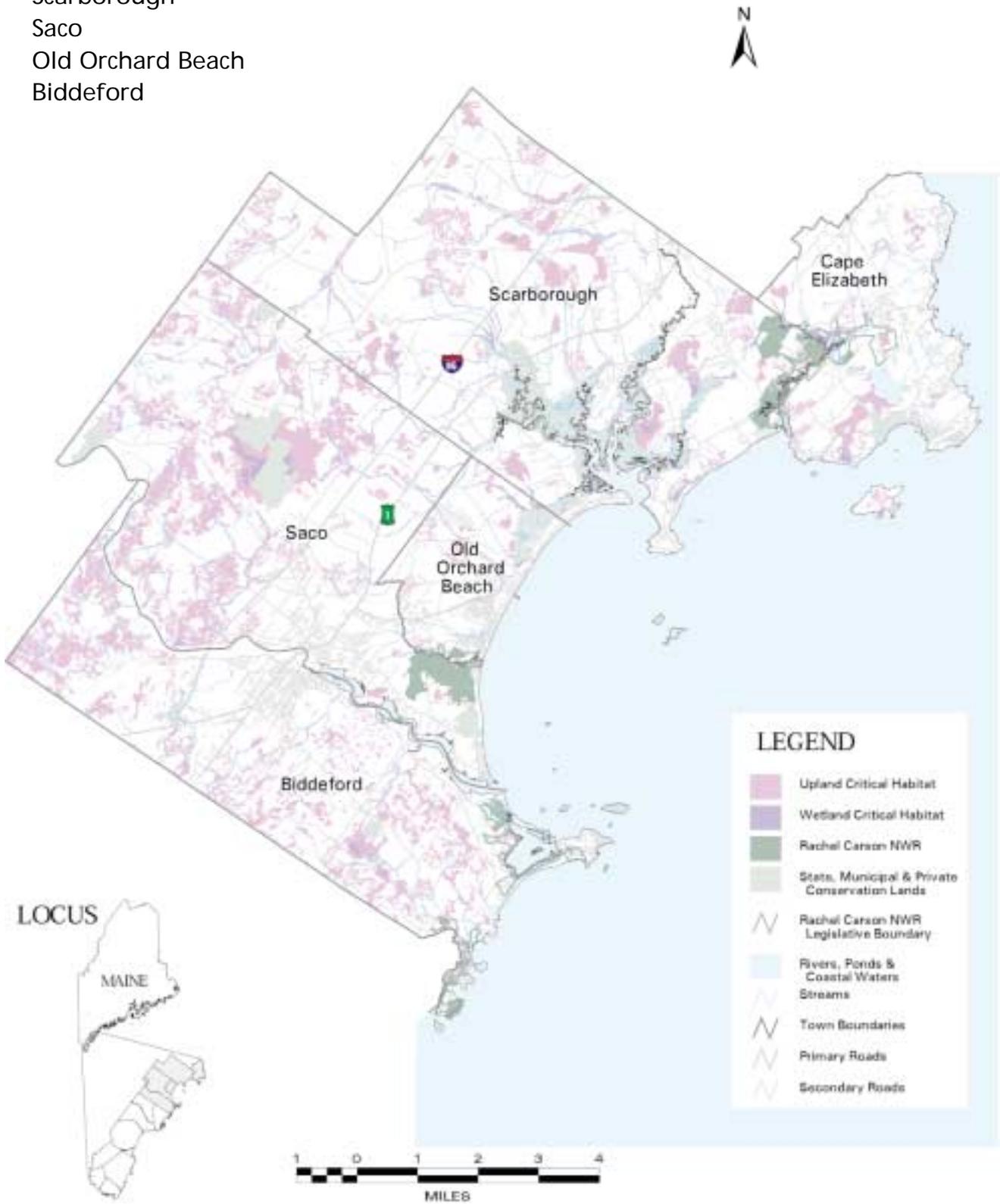
Critical Habitat

Arundel
Kennebunkport
Kennebunk
Wells



Critical Habitat

- Cape Elizabeth
- Scarborough
- Saco
- Old Orchard Beach
- Biddeford

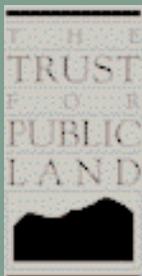




**Rachel Carson National
Wildlife Refuge**

321 Port Road
Wells, Maine 04090
tel. 207.646.9226
fax. 207.646.6554

The Rachel Carson National Wildlife Refuge is part of the National Wildlife Refuge System and protects more than 5,000 acres between Kittery and Cape Elizabeth. Named for Rachel Carson, one of America's best-known naturalists, the refuge was established in 1966 to protect valuable salt marshes, estuaries, and other important wildlife habitat.



**The Trust for Public Land
Maine Field Office**

245 Commercial Street
Portland, Maine 04101
tel. 207.772.7424
fax. 207.772.3627
www.tpl.org

The Trust for Public Land conserves land for people to improve the quality of life in our communities and to protect our natural and historic resources for future generations. Since 1972, TPL has protected more than 1.2 million acres nationwide, including more than 30,000 acres in Maine.

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