PETIT MANAN NATIONAL WILDLIFE REFUGE
MILBRIDGE, MAINE
and Satellite Stations:
CROSS ISLAND NWR
SEAL ISLAND NWR
FRANKLIN ISLAND NWR
POND ISLAND NWR

ANNUAL NARRATIVE REPORT
CALENDAR YEAR 1991

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVALS

PETIT MANAN NATIONAL WILDLIFE REFUGE

Milbridge, Maine

and

Satellite Stations

Cross Island National Wildlife Refuge
Seal Island National Wildlife Refuge
Franklin Island National Wildlife Refuge
Pond island National Wildlife

ANNUAL NARRATIVE REPORT

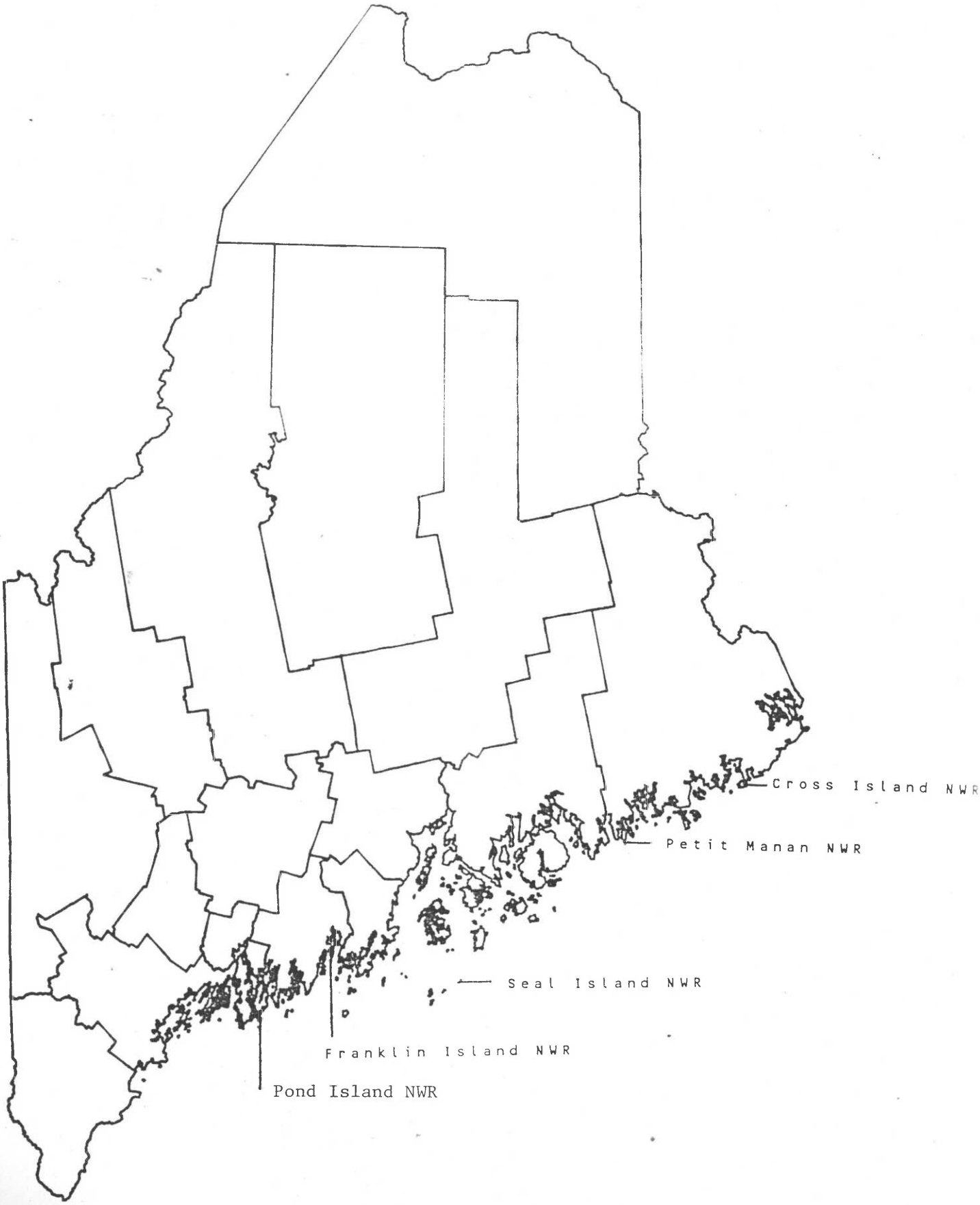
Calendar Year 1991

Margaret M Anderson — July 21, 1992
Refuge Manager — Date

Donald M Trickie — July 24, 1992
Refuge Supervisor Review — Date

Donald A Young — 7-24-92
Regional Office Approval — Date

Maine


Cross Island NWR
Petit Manan NWR
Seal Island NWR
Franklin Island NWR
Pond Island NWR

PETIT MANAN NATIONAL WILDLIFE REFUGE

Milbridge, Maine

ANNUAL NARRATIVE REPORT

Calendar Year 1991

INTRODUCTION

Petit Manan National Wildlife Refuge is a 3,335 acre refuge complex consisting of 2,166 acres on Petit Manan Point, acquired in 1975 and 1976 through the Nature Conservancy; 1,155 acres on Bois Bubert Island, most of which was donated in 1980 through the Nature Conservancy; nine acres on Petit Manan Island, transferred from the Coast Guard in 1974; and five acres on Nash Island, transferred from the Coast Guard in 1983. The refuge is located in the towns of Steuben, Milbridge, and Addison, in Washington County, Maine.

Petit Manan Point has a rugged, windswept character. Its habitats include red and white spruce forests with some mixed hardwoods, coastal raised heath peatlands, fresh and saltwater marshes, blueberry barrens, cedar swamps, jack pine stands, old hayfields, rocky shores, and cobble beaches. It is noted for its use by migrating waterfowl, shorebirds, and raptors.

At the turn of the century most of the peninsula was owned by the Maine Coast Club, a company that intended to develop the land for "rusticators". Tennis courts, a golf course, a saltwater swimming impoundment, a deer enclosure, a wharf, and even a casino were built, and portions of the Point were divided into lots. However, their expectations were never realized, and the Club went bankrupt. Most of the Point was eventually acquired by the Mague family who turned it back into a saltwater farm, using the cleared areas for sheep pasture and blueberry grounds. The old Club buildings gradually disappeared, and, aside from two old camps and a small chapel, few traces of it remain.

Bois Bubert Island is much like Petit Manan Point in character and wildlife. The island runs parallel to the Point, about one mile east. Approximately 90% of the island is owned by the Service; inholdings are being acquired as they become available. Like many of the larger islands in Maine, Bois Bubert once had a village with a school, but now only a few old camps remain on the inholdings.

Petit Manan Island, named by Samuel de Champlain after Grand Manan Island, New Brunswick, in 1604, is a nine acre treeless island, two and a half miles south of the Point. Historically it has been one of the most important colonial seabird nesting islands in the Gulf of Maine. It is also the site of an historic lightstation.

Nash Island is a nine acre treeless island approximately seven miles east of Petit Manan Point. Only half of the island is under Service ownership; the other half is privately owned. It is a former tern nesting island, but now only hosts nesting eiders and gulls.

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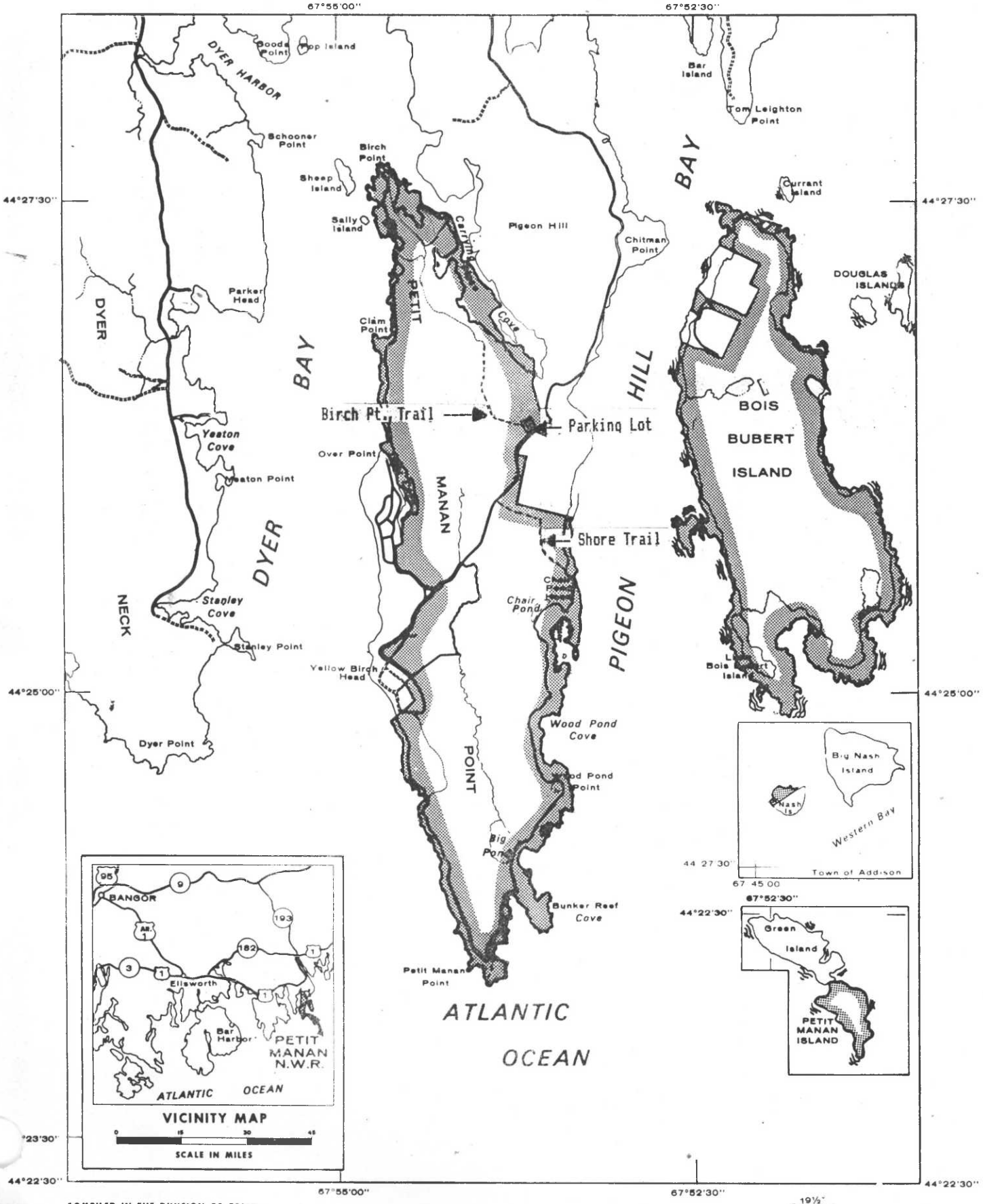
PETIT MANAN NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

WASHINGTON COUNTY, MAINE

UNITED STATES
FISH AND WILDLIFE SERVICE



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MEAN DECLINATION 1948

BOSTON, MASSACHUSETTS JULY 1974

A. HIGHLIGHTS

Petit Manan is no longer a satellite station of Moosehorn NWR. Administrative independence brought staff changes and office expansion. Section E-1,8.

Throughout most of the year we experienced above average temperatures. Summer drought conditions created almost a fog-free environment on the islands. We were spared the wrath of Hurricane Bob, but subsequent storms took their toll. Section B.

The seabird management program on Petit Manan Island experienced another banner year. Tern numbers and fledgling success increased, and razorbill auks showed up. Section D-5.

The Maine Historic Preservation Office awarded a grant of $39,000 to the refuge for rehabilitation work on the Petit Manan Lightstation, the third such grant in two years. Section I-2.

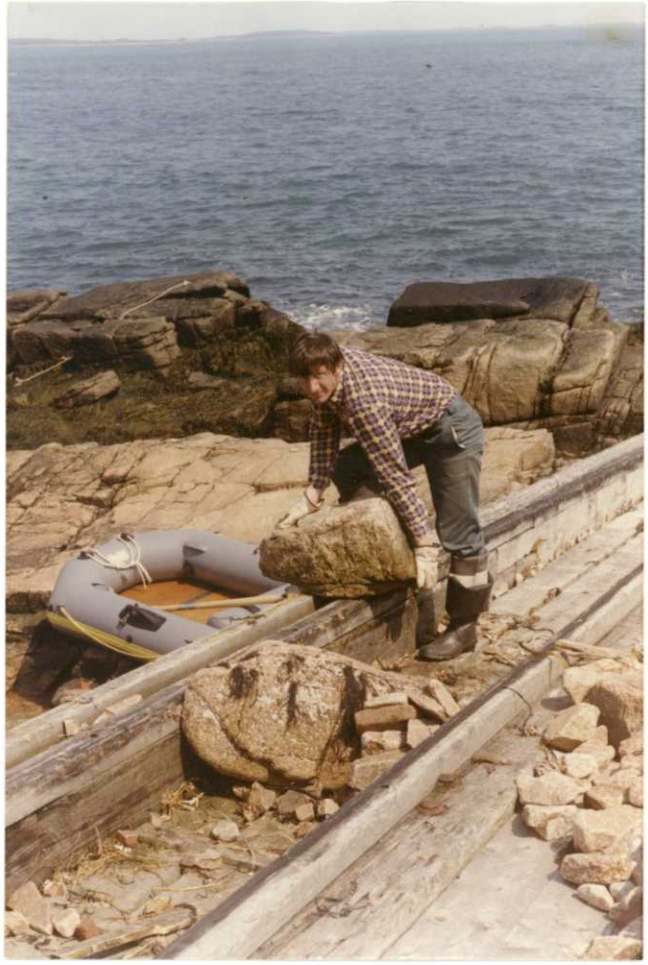
We continued to reap the benefits of solid funding support. The new 32' workboat, several major pieces of equipment and vehicles were replaced, and a new computer arrived. Section I-4.

Two rare plants, **Botrychium lunaria** - a moonwart and **Calamagrostis pickeringii** - a reedgrass, were discovered on Petit Manan Point. Section F-6.

B. CLIMATIC CONDITIONS

The climate of coastal Washington County is moderated by the Atlantic Ocean. Summer temperatures are significantly cooler and winter temperatures are significantly warmer than inland areas. No weather data are collected at this station; however,in the Machias area, the average annual temperature is 43 °F., the average annual precipitation is 49 inches, the average annual snowfall is 75 inches, and the average frost-free growing season is 132 days. This area receives an average of fourteen thunderstorms per year. The average tidal range is 10.9 feet. Fog is an important influence on coastal ecosystems, occurring 33% of the time during the summer months.

The first four months of the year were uncharacteristically mild. The year began with mild temperatures and conditions throughout most of January, February and March. Many fields and blueberry barrens were devoid of snow for the most part, except for a few spring snowstorms in March. Unseasonably mild conditions persisted throughout April until a storm hit the coast of Maine on 22 April. High winds and seas washed approximately two tons of stone on the Petit Manan Island boathouse apron.



M. Alley clearing debris deposited by a spring storm.

Extremely dry conditions prevailed on the mainland throughout May and June pushing the fire danger and pollen count to extremes. These severe conditions on the mainland improved living conditions on Petit Manan Island for both people and birds. Rain was recorded only 9 days out of the 76 day field season. Even more telling, the foghorn, which by agreement with the Coast Guard can be turned off in the daytime if visibility is over 2 km., was on all day on only four occasions. This weather, at what is reputed to be "the foggiest light station on the Eastern Seaboard", contributed to a banner crop of terns fledged. Hurricane Bob arrive on 12 August but did very little damage to our area compared to what occurred further south.

Conditions changed drastically in the fall bringing a series of severe storms with high winds. September was extremely wet. A storm on the 25th brought 5" of rain and raised the flowages 6" in one and a half days. Damaging winds followed causing more destruction in town, on Petit Manan Island, and the surrounding area than Hurricane Bob. Another major storm hit at the end of October when we experienced four days of gale/storm warnings and 20'seas. Portions of the island boardwalk were washed away and

huge boulders thrown onto the ramp and into the boathouse. The construction crew was marooned on PMI during this time and forced to ration food! November presented six days of gale/storm warnings and the first snowfall of the season the 4th. Even so, overall weather conditions were rather mild for this time of year.

Winter arrived early in the month of December with temperatures in the single digits and 5" of snow on 12/3. All flowages were iced over by 12/6. Above normal amounts of precipitation fell, 15-20" of snow, most arriving in two storms on 12/3 and 18.

A Hygrothermograph and instrument box were installed on the point in November.

C. LAND ACQUISITION

1. Fee Title

On 19 July, FmHA officially turned over two pieces of property to the Fish and Wildlife Service in a conveyance ceremony held in East Benton. The five acre Nash property, Camden, became a part of Petit Manan NWR. A larger property, about 200 acres, was conveyed to Sunkhaze Meadows NWR. These were the first FmHA properties in Maine to be transferred. Sunkhaze Meadows Manager Sweeney organized the affair which was attended by Regional Director Lambertson, Public Affairs staff Connely and staffs from Moosehorn and Sunkhaze Meadows.

2. Easements

Petit Manan Point: There are several key inholdings on the Point where easements would benefit both the Service and the landowner. After years of interest by several of the inholders we are well on the way to finalizing our first donated conservation easement.

Mr. Paul Wehr wished to place a development easement on his 15 acre tract which borders the refuge, shoreline and private lands. He currently has a small cabin and garage on the property. Caroline Pryor, Maine Coast Heritage Trust, met with us on 18 July to discuss and outline a development easement that both parties felt comfortable with. On 7 October a "Draft" Conservation Plan along with the LARC Presentation Check List was sent to Realty for consideration.

The property consists primarily of forested wetland with 500′ of tidal shoreline. Seals use the rocks as a haul out area, and bald eagles, peregrine falcons, wading birds and waterfowl utilize the shoreline and coastal waters. Without an easement the property could be subdivided and three additional living quarters built within 75′ of the shoreline.

Although this is a small tract of land, acceptance of this easement is being "watched" very carefully by several other inholders and abutters. Collectively, these private individuals own 300+ acres and over 12,000' of tidal shoreline. Increased residential development beyond what exists now would impact the integrity of the refuge.

FmHA Conservation Easement: On 21 October Ron Joseph, FWE-Orono, and Anderson inspected the Frank and Muriel Hart property, 70 acres, in Belfast, Waldo County. The forested wetland and intermittent stream, about 15 acres, is valuable to many game and non-game species. Transactions were not complete by years end.

3. Other

Expansion of the refuge is still being seriously considered, but progress is slow due to limited acquisition funds, limited realty staff time to prepare a project proposal plan, and concern about the very vocal Washington County Alliance, a group which generally oppose federal ownership. Anderson attended briefings on acquisition status plans 28-29 August in the Regional Office with Project Leaders Goettel and Fefer, Associate Manager Frickie, and Realty Supervisor Bob Miller and staff Melberg and Zinni.

Anderson and Fefer attended an informational meeting hosted by the Friends of Taunton Bay on 16 September. They have completed a plan which designates areas of significance to endangered species, wading birds and other wildlife. They would like the FWS to begin active acquisition and land protection in the area.

A Bald Eagle Habitat Acquisition Package was sent to the Regional Office on 4 October in response to a request by an anonymous donor interested in purchasing habitat.

Increased taxes and land use restrictions resulted in several inquiries on land donations, sales, and easements. Anderson met with Maine Coast Heritage Trust's field representative, Caroline Prior, on numerous occasions to discuss issues with land owners, strategy and review properties and documents. The following is an outline of work accomplished:

Fletcher Wood Salt Marsh - Donation/Easement

July 13 and 25 met with Francis Wood to discuss and inspect a 20 acre salt marsh, surrounding mainland and two islands that she wanted to donate, about 40 total acres located on West Gouldsboro Bay. She is also interested in putting a conservation easement on an adjoining 60 acre piece with extensive shoreline located near an active bald eagle nest. The balance of the property, 125+ acres, is planned for 5+ acre subdivisions. This area is designated a Class A

wildlife area by the State, important to wading birds, migrating black ducks and bald eagles. A Level I Contaminant Survey was completed in September. During the survey, 300 black ducks and an immature bald eagle were on the property. On 9 October, LARC review accepted. A "draft" of the development easement on 60 acres and adjoining 35 acres scheduled for donation were discussed 5 November. Mrs. Wood had no problem with the suggested 250' buffer zone along entire shoreline. We also met with Gouldsboro Town Planning Board and Town Selectmen (5) to discuss donation and answer questions. Both were pleased with the proposal. Bill Zinni, RE-RO, met Mrs. Wood on 14 November to discuss land donation and time frame for FWS review, approval and acceptance process.

Abbott Island - Possible Donation/Sale

Mr. L. Alley met with us on 18 July to discuss donation/sale of Abbott Island, (Co-owner W.Kelly). This island, 900' x 300', is located in Carrying Cove just 300' from refuge boundary. This small island is covered with unique vegetative cover (Section F-6). During low tide one can walk to it from refuge fee land. The surrounding mudflats are utilized heavily by migrating black ducks. In August, the LARC committee accepted Abbott Is. for acquisition consideration. In September a Level I Contaminant Survey was completed, and the Steuben Town Selectmen sent an unfriendly letter to RE-RO regarding FWS possible acquisition. On 14 November, Bill Zinni, RE-RO, met with the Selectmen (3) to discuss concerns. The Alley's paid for an appraiser recommended by MCHT but were unhappy with the results. On 23 December, Mr. Alley stopped in to discuss the appraisal - it came in at <u>only</u> $40,000! They were hoping for at least $70,000. Originally, they discussed outright donation. They are still interested in selling the island.

Douglas Islands - Possible Donation/Sale

These islands are owned by Pond Island Association, an extended family group. A member contacted the refuge on 2 October regarding donation of the Douglas Islands (3) and half of Pond Island. This complex of islands would be an excellent addition to the refuge. Members were sent information from MCHT/TNC.

D. PLANNING

4. Compliance with Environmental and Cultural Resource Mandates

Cranberry Dike Rehabilitation Project: The COE 404 permit was submitted last year, however, an approved permit was not received until 31 May 1991. Manager Mullen, Moosehorn, prepared in February a summary response to the letters the COE received during the public comment period. There was quite a bit of resistance from the Steuben Town Planning Board to this project and they requested a building permit application be submitted. This was done on 28 February. Mullen attended a Board meeting on 20 March where they expressed concern that the ducks might be the cause of the high coliform count on the clamflats last year (See Sec F-6. They tabled discussions until the April meeting at which time approval was granted. The Maine Department of Natural Resources took additional samples from the flats in April. Although, no concrete results were available, they sent a letter to the Board stating that they did not believe the project had any affects on future closures.

Steuben Planning Board: 7/25 MA attended the 1991 Comprehensive Plan Meeting for the town of Steuben. The plan seems to address zoning issues sensitive to the integrity of the refuge. This planning process is required by the State. Increased taxes and land use restrictions on coastal properties were discussed.

5. Research and Investigations

Petit Manan NR90-"Monitoring Colonial Seabird Populations and Reproductive Success in Terns Nesting on Petit Manan Island, Petit Manan NWR." 53533-1. Dr. John Anderson, The College of the Atlantic.

1991 Objectives:

- Maintain or increase nesting populations of Common, Arctic, and Roseate terns.

- Maintain or increase nesting populations of Common eiders, Laughing Gulls, Black Guillemots, and Atlantic Puffins.

- Increase nesting populations of Roseate terns in accordance with goals outlined in the Roseate Tern Recovery Plan.

- Continue scientific investigations and initiate new studies to enhance and facilitate tern recovery effort.

▸▸ Extend baseline data on tern numbers, nesting habitat, and productivity from previous years, and to continue to develop and apply techniques suitable for long-term monitoring on the island.

▸▸ Monitor presence of Herring and Great Black-backed Gulls, and the effects of predation and competition for nesting space on eiders, terns and Laughing Gulls nesting on Petit Manan and Green Islands.

▸▸ Continue the banding program, placing federal bands on Arctic, Common, and Roseate Tern chicks.

▸▸ Investigate and monitor the effects of experimental habitat alteration designed to attract terns to establish nesting territories.

▸▸ Investigate the effects of human disturbance and census techniques on estimates of tern productivity.

▸▸ Establish schedules for visits and prepare programs and guided tours for visitors to the refuge to maximize the information process and minimize the disturbance on nesting birds and the research program.

Since the initial gull control and seabird management program began in 1984, we have annually issued a contract to maintain and monitor the colonies. This year the $5,500 contract was again issued to the College of the Atlantic. The contract pays interns a small stipend to live on the island from when the terns arrive in May until when they leave in August. The field crew this year consisted of John Anderson, Professor of Zoology, COA; student interns Kate Devlin and Artie Fleischer, COA; Master's student Scott Swan, COA; Andrea Roberto, Research Associate, Island Research Center, and USFWS Coop. Student Socheata Lor. Members of the team arrived on the island on 15 May and stayed until 14 August.

This was the first year that the island-wide GIS came into its own. All basic data layers are now in place, and it remains to 1) update patterns of nesting and vegetation change in subsequent years and 2) further sub-divide and refine broad habitat categories. Building data sets around the ARC/INFO platform has proved to be an efficient and powerful way of organizing a wide variety of information. The shift to dBase format for tabular information within GIS greatly facilitates import and export of raw data to and from other software systems. We now have sufficient "baseline" information to begin to adequately assess ecological patterns within the island's seabird communities.

The 30 m grid has also proved its worth several times over. It provides both an immediate spatial reference for field

observations and a framework for data entry and analysis. Island-wide census were noticeably improved by the presence of the grid markers.

a. Terns

The seabird management program was initiated in 1984 with the goal of restoring the colony of arctic, common, and roseate terns to Petit Manan, which was historically one of the largest and most successful colonies in the Gulf of Maine. This is an especially interesting colony because it has traditionally been composed of roughly equal numbers of common terns and arctic terns. All other colonies in the Gulf are largely composed of one species. Petit Manan is close enough to the bays and estuaries to attract common terns, yet far enough out to sea to be ecologically considered an outer island and attractive to arctic terns.

The nesting terns had been passively, and in some cases, actively, protected by lightkeepers over the years. The rainwater collected from the roofs provided the only freshwater for the three lightkeepers and their families, and the presence of gulls was not tolerated since they had a nasty habit of loafing on the roofs and fouling the water supply. This may explain why the three main tern colonies surviving in Maine today are on lighthouse islands.

After Petit Manan Light was automated in 1972 the gulls took over the tern colony. By 1978 tern numbers had started to decrease and by 1980 there were no nesters left. They did not nest again until we initiated the gull control program in 1984. Within two weeks after the third application of 1339 Gull Toxicant, the terns were back. Today their numbers surpass the historical numbers, and, most importantly, their production is consistently high.

This colony is also important because it includes over half of the roseate terns nesting in Maine. Roseates, which were placed on the Endangered Species List in 1988, increased to 52 pairs, four more than last year. Although only roseates are officially endangered, we are concerned about all three species of terns because their populations have declined drastically since the 1940's, largely due to competition from gulls. It will take more active management programs at other colony sites to reverse this long-term decline.

A nest count begun on 12 June and concluded on 14 June revealed 1,836 total tern tests compared with 1,724 in 1990. A Lincoln Index produced an estimate of sampling error of 6%, suggesting an island total of 1,946 tern nests. Species identification by observed incubation and/or chick feeding in a stratified sample of 583 nests gave a ratio of 70% common to 30% arctic terns

compared to last years ratio of 60% commons to 30% arctic. This gradual shift in species ratio has been ongoing since the 1970s. It is apparent that the island had gone from a "primarily arctic" to "primarily common" colony over the past 20 years. A census of the entire periphery of the island on 1 July produced an estimate of 52 Roseate tern nests.

Nest densities were again mapped. Compared to last year the number of nesting terns increased in 46 squares, decreased in 14, and remained constant in 3. Vegetation height on the island as a whole appears to have a significant effect on tern nest site selection. There is a negative correlation between numbers of tern nests and mean vegetation height within a grid square. The number of nests in the vegetation management square doubled in comparison to 1990. Birds nested in all treatment plots, clearly favoring short vegetation and edges between taller vegetation and the mulch cloth. Two terns nested on the cloth, and chicks were often found loafing on it.

Mean clutch size of common terns was 2.5 , arctic terns 2.0, and Roseates 1.5. Tern fledgling success was determined from chicks weighed and measured in two plots and observed from the lighthouse tower in a third. Production was again good this year. Survival to 15 days did not vary significantly between the three plots, so results were pooled to produce a mean common tern productivity of 1.4 chicks/nest and arctic tern productivity of 1.3 chick/nest; slightly improved over last years 1.2 and 1.1 respectively (anything above .75 is good). The first fledgling was seen flying 6 July. Recorded fledgling success in 1988 was higher than at any other time until this year.

Common tern on nest.

Primary prey seen fed to tern chicks was herring (Clupea sp.) although insects, marine invertebrates, hake (Urophysis sp.) and other small fish were observed. h and dragonfly. Growth information was again collected from chicks for the first two weeks.

A total of 453 tern chicks and 66 adults were banded this year as part of a study to follow individual nests over the years.

b. Laughing Gulls

Petit Manan is also noted for having over half of the nesting laughing gulls in Maine. Fortunately, the laughing gulls do not compete significantly with the terns; very minor predation on tern eggs and chicks has been documented on Matinicus Rock, but never here. Kleptoparasitism has been documented here, but has had no significant effect. Their nesting habitat requirements are also very different from the terns, as they prefer dense, tall vegetation, instead of the more open, rockier areas. Like the terns, they were rousted from Petit Manan by the large gulls, and returned in 1984 when the gulls were removed.

Their preference for rank vegetation and nesting in 'tunnels' in the grass makes them very hard to census. There seems to be an association between laughing gulls and eider ducks. The density and height of the vegetation around the gull nests creates problems in movement for the gulls to/from their nests. The laughing gull nests are often made in anti-chambers off eider tunnels, and the gulls use the tunnels to move around in the vegetation. Whether the tunnels are entirely initiated by the eiders, or whether the gulls generate additional or new tunnels is unknown.

This year nest survey suggested that overall numbers were down from estimates of previous years; 450 nests in 1989. Counts made on 18, 19 and 23 June revealed a total of 291 active nests. Mean clutch size was 2.6 eggs/clutch. Vegetation height and type was recorded and mapped for 208 nests; 59% were in vegetation dominated by Calamagrostis, 33% in Angelica sp., 6% in open spaces, and 3% primarily in Rue (Thalictrum sp.). Nest locations were mapped as was a small section of tunnels.

Twenty-six samples of Laughing Gull chick and adult regurgitate were collected. Results of initial analysis reveal 46% insects, 38% fish, 8% marine invertebrates, 8% unknown, and 4% blueberries.

A total of 198 chicks and 15 adults were banded as compared to 49 chicks last year. COA student intern, Kate Devlin, took a special interest in laughing gull work.

c. Black Guillemots

Black guillemots are one of the rarest alcids, but are very common here in Maine. Guillemots seen loafing along the shoreline were counted from the lighthouse tower, with a maximum number of 352 recorded on 13 June. They nest in rock crevices and between small boulders and rocks, close to the water. In 1984, approximately 16 pairs of guillemots nested on Petit Manan. Since then this number has increased. A total of 155 active nesting burrows were observed during the nesting season, almost a 100% increase over last years number of 79. Primary prey seen carried by guillemots was red rock eel (Pholis sp.).

Unfortunately, we do not have good population numbers prior to 1984; however, since the only thing that has changed is a decrease in the influence that the gulls have on the island, it is reasonable to assume that this dramatic increase is a result of the gull control also.

A total of 105 chicks and 15 adults were banded in late July compared to 95 chicks last year. Andrea Roberto has been working with these birds for several years now.

d. Common Eiders

Eider numbers on both Petit Manan and Green Island have increased since the gull control. On Petit Manan eider nests have increased from 12 in 1984 to 25 in 1990, and from 50 to 750 (1989) on Green. For reasons unknown the Green Island count dropped to 435 in 1990. This year nest counts were late, between 17 and 23 June. Petit Manan yielded 18 nests, which was an undercount since adult females with chicks had been observed on the berm for several days before mapping commenced. The count on Green was also an under-estimate. About 80% of the available nesting area was censused, extrapolating it is likely 640 eiders were nesting at the time of the count. Why they prefer Green over Petit Manan is also unknown.

Predation on eiders by herring and black-backed gulls is readily apparent. During one five minute period, we observed herring gulls taking three eider chicks on the water. We have also witnessed Harbor Seals, Phoca vitulina. The size of eider "nursery groups" dropped dramatically during the later part of June, and suspect predation a major factor.

e. Atlantic Puffins

Until 1984 puffins had not been documented visiting Petit Manan. That year, up to 13 individuals regularly visited the island, loafing near the lighttower, courting, and prospecting for nest sites. Puffins, like guillemots, nest in crevices and between rocks; puffins, however, prefer large desk-size boulders over the

smaller, breadbox-size boulders that the guillemots prefer. Petit Manan does not have the boulder fields that the puffin colony islands do, so there is almost no nesting habitat, but what it does offer is a site that is free from gulls. Since the gull control, puffins have been regular nest prospectors on Petit Manan Island.

This year the average number of puffins seen on shore on a daily basis was up sharply over previous years. Puffins were seen on 72 days of the 77 day field season. Although we did not reach last years peak of 68, a peak of 52 was observed on 23 June. The mean number of birds seen was 20.68 (1.5 SE). A total of 57 observations of color-banded puffins were made. We have also been successful in reading band numbers off the loafing birds, and have been able to document movement between Petit Manan, Seal Island NWR, Matinicus Rock, Eastern Egg Rock, and Machias Seal Island.

Loafing on Puffin Point

This year Coop Student Soch Lor constructed and monitored use of 17 artificial and modified puffin burrows placed on Puffin Point. There are a few crevices in the higher ledges around the lighttower as well as some small boulder areas that provide marginal puffin nesting habitat. None of the completely artificial burrows produced chicks, but appeared to be a strong attractant to loafing birds. Small bunches of seaweed and

grasses were found in most of the burrows. On 6 July fish were observed taken into a modified burrow. A chick from this burrow was banded 20 July. A second chick was also observed in another modified burrow, a third burrow contained a cold egg. Winter storms destroy many of the artificial burrows. We have tried to make artificial puffin burrows out of rocks. Therefore, it is doubtful that the puffin colony here will ever grow, but it is nice to have the "little brothers" (Fratercula) hanging around.

f. Razorbill Auks

Razorbills were observed intermittently throughout the season, with a peak of 17 on 13 June. The "Bills" often appeared to be engaged in disputes with the Atlantic Puffins for possession of loafing sites on Puffin Point. A single razorbill would usually displace individual or even pairs of puffins, but if large numbers of puffins were in the area the razorbills would retreat.

More detailed text, statistical analysis, diagrams and maps are available in the 1991 Progress Report, Tern, Gull, Eider, Puffin Nest Success, Dr. John Anderson. Soch Lor also prepared a report, Artificial and Modified Burrows Establishment for the Atlantic puffin (Fratercula arctica) on Petit Manan Island, Maine. Both are available on request.

Obviously the island and the birds that utilize it are an ever changing dynamic scene. The increase in the number of puffins, guillemots and common terns, and the change in species ratio observed over the past several years are clear indicators that only through careful long-term study can we hope to understand this dynamic nature of seabird populations and hope to develop adequate management information.

Other: Refuge staff attended the Interagency Seabird Survey Meeting, MDIFG, Bangor, 16 December. Regional Bio-Diversity Coordinator Pence also attended. A topic of concern was the Atlantic Coastwide 10 Year Seabird Survey scheduled for 1993. Census techniques, narrow time frame for census, repeatability, variable breeding timing of species, etc. The following day Pence met with refuge staff and J.Anderson, COA to discuss funding for a Pilot Seabird Study in 1992 and plans for 1992 field season on Petit Manan Island.

E. ADMINISTRATION

1. Personnel

2 3 * 1 4 (J. Noschese)

1. Margaret M. Anderson, Refuge Manager, GS-12, PFT, EOD 6/15/91, transferred in from Lee Metcalf NWR, MT.

2. David Schick, Maintenance Mechanic, WG-9, PFT, EOD 4/18/88.

3. Jodie L. Kimmel, Office Assistant, GS-5, TFT, EOD 09/30/91.

4. Ralph Widrig, Biological Technician, GS-5, IPT, EOD 10/21/91.

*. William "Bill" Mague, PFT, EOD prior to refuge establishment.

Bill Mague is the reason we have Petit Manan NWR. His vision and incredible persistence ensured protection of this unique peninsula. A long time resident, he owned what is now the mainland portion of the refuge. Over the years he has been unfailing in his support of refuge projects. Bill utilizes his own equipment to mow hayfields, roadsides, and to maintain and plow the road. Quite remarkable for a man in his eighties. Perhaps more telling is the way he has met the sometimes 'bizarre' antics of how we go about conducting business in the government with remarkable forthrightness and truly gentlemanly demeanor. He provides historical perspective and suggestions or solutions to current projects. We could not run the refuge without him.

Not Pictured:

5. Thomas A. Goettel, Refuge Manager, GS-9 PFT, EOD 1/5/85 transferred to Eastern Neck NWR, MD 2/11/91.

6. Maurice Mills, Acting Refuge Manager, GS-11, 2/12-7/15/91, permanent duty station Moosehorn NWR, ME.

7. Karyn Kocincki, Student Trainee, GS-4, COOP., EOD 6/2/91, LWOP status 8/24/91 to return to college.

8. Ritchie Hafford, Motor Vehicle Operator, WG-5, TFT, EOD 5/6/9, appointment expired 9/17/91.

9. Myron Alley, Motor Vehicle Operator, WG-5, TFT, EOD 5/6/9, appointment expired 9/30/91.

10. Norm Famous, Biological Technician, GS-5, IPT, EOD 3/24/91, assigned to Cross Island NWR, Cutler, ME.

Refuge Manager Goettel left for his new assignment, Project Leader at Eastern Neck NWR in Maryland, during the second week in February. Tom was the first employee assigned to this duty station in 1985. Six years of hard work brought about major changes to this station, to mention a few - establish an office, purchase equipment for a coastal operation, initiating controversial gull control programs which resulted in restoration of nesting terns to Petit Manan and Seal Island, construction of two impoundments, and developing leaflets and Kiosks. His efforts brought Petit Manan NWR and the coastal islands the recognition they deserve. His wife Beth volunteered on many of these projects and worked closely with the local schools. Both were honored at a luncheon on 1 February at the Rusty Anchor, Steuben. Friends, staff from Petit Manan, Moosehorn and Sunkhaze NWRs, FWE-Orono field personnel, and Zone Biologist Atwell attended.

This station is no longer a satellite of Moosehorn NWR. Petit Manan NWR officially became administratively independent in January; realistically we did not attain that status until years end. Transitions are always difficult, but without the continued support and involvement of the Moosehorn Staff - Refuge Operation Specialist Mills, Office Assistant Riley and Manager Mullen - we would still be in a tailspin. ROS Mills served as Acting Manager from February through July. He provided invaluable continuity, two days per week, through the field season and budgeting process for the upcoming FY. Muriel Riley saw us through the end-of-year fiscal business and trained the new Office Assistant. Both were always helpful and cheerful in assisting us on our road to independence. Both were relieved when we quit calling them!

The following PFT positions were approved for this year - Project Leader GS-12, Refuge Operation Specialist GS-9/11, Maintenance Mechanic WG-9, Office Assistant GS-5. At years end only the ROS position remained vacant.

Margaret Anderson, Project Leader at Lee Metcalf NWR, Montana, was selected for the Project Leader position at this station. Her entrance on duty date was 6/15/91. She reported for work 7/5/91.

Maintenance Mechanic Schick was converted to a full-time career conditional Appointment effective 2 June 1991. David not only managed all of his regular duties, but handled a great deal of the administrative work, ordering materials, and supervised the seasonal crews.

Ritchie Hafford and Myron Alley were selected to the fire crew. Due to the new drug testing requirements their starting date was delayed considerably.

Jodie Kimmel transferred in from the Moosehorn NWR fire crew, to fill the Office Assistant vacancy. She is on a TFT/NTE appointment. Her arrival was greeted with much enthusiasm.

Karyn Kocincki transferred in from Realty-RO to fill a Student Trainee-Coop. position. She completed her first semester at the University of Maine and decided not to continue with the program. In December we had approval to fill a Coop. Masters Student Trainee position.

Student Trainee-Coop., Socheata Lor, assigned to Zone Biologist Atwell, Great Meadows NWR, arrived at Petit Manan Island for a tour of duty, 15 May to 13 August. Soch worked on establishing artificial and modified burrows to encourage nesting of Atlantic Puffins.

Two Intermittent Biological Technician positions were filled. Norm Famous was hired in March with contributed funds to monitor the salmon pens located off Cross Island NWR. Long-time volunteer Ralph Widrig began working at the end of October. He was hired to update the bird and plant list he developed for the refuge several years ago and to map Critical Habitat Areas for unique plants and high shorebird use.

Anderson, Managers Mullen and Sweeney, and Regional Fire Coordinator Carter met on 12 November to discuss the job duties and priorities of new Fire Management Officer Vollick.

Staffing Patterns for the Last Five Years

	PFT	COOP	TFT	T/IPT	Ttl. FTE
FY 87	1	0	1	1	1.3
FY 88	1	0	2	1	2.3
FY 89	1	0	3	5	5.6
FY 90	1	0	3	2	4.0
FY 91	2	1	3*	1**	3.0***

* includes position that began 9/30/91 (1 day in FY)
** does not include position filled in Oct.
***represents aprox. FTE used;4.0 FTE approved

4. Volunteer Programs

Petit Manan has a very vibrant volunteer program. Most of the students working on Petit Manan Island - Colonial Nesting Seabird Research Project are volunteers. Four to six students arrive the second week in June and remain until the end of July. The Puffin Project on Seal Island also relies heavily on volunteers. In the future we will make a better effort of documenting the hours and accomplishments of these dedicated students.

Petit Manan Island field station is reported to be one of the foggiest stations on the east coast. It takes a "special" person to volunteer a summer to the birds. Tight quarters, an almost constant fog horn, and only 10 acres to find solitude tests your metal.

Eleven enrollers in the Volunteers for Peace program worked on Petit Manan Point on 26 August on beach cleanup. In spite of heavy periods of rain, they removed five pickup loads of trash.

Ralph Widrig continued to volunteer throughout most of the year. In November a Take Pride Application - Individual Division was submitted for Ralph's work on plant and bird inventories and leaflets for the refuge. Over a period of three years, he has put together a list of 332 vascular plant species, a bird list of 283 species, and invaluable records of arrivals, departures and numbers. This information is presented in his 49-page bound booklet, "The Birds and Plants of Petit Manan National Wildlife Refuge". Ralph represents the epitome of hard work and dedication to the resource.

Bill Mague continues to maintain the road, mow roadsides, and keep us informed of what is going on down at the point. He has also been extremely generous in allowing us to store equipment, materials and supplies in his shed. When one considers he is in his mid-80's he is truly a remarkable man. See Section E-1.

Vol. Widrig sustained a puncture injury to his leg while walking through thick brush. See Section E-6.

5. Funding

This following is a five year funding summary for this station.

	Allotment	Salaries	Travel and Fixed Costs	Operating Balance
FY 87	67,162[2]	34,332	11,564[1]	10,607
FY 88	66,109[5]	44,259	8,150	9,300
FY 89	122,621	61,471	6,700	45,831[4]
FY 90	309,396[5]	70,646	7,750	217,000[6]
FY 91	225,768*			

[1] Includes $ 5,120 for office rent.
[2] Includes $8,659 EOY purchase of outboard motor, dingy, new transmission Chevy Blazer, and $2,000 from private donor.
[3] Includes $1,700 EOY purchase of laser printer and $2,700 added in July for emergency repairs to Volvo outdrive.
[4] Includes $7,000 contributed from two private donors and $16,000 grant from the Maine Historic Preservation Commission for Petit Manan Lightstation Rehabilitation.
[5] Includes $2,000 EOY add-on for impoundment construction and $17,000 for purchase of replacement vehicle.

[6] Includes $14,500 grant from Maine Historic Preservation Commission for Petit Manan Lightstation Rehabilitation.

* This was the amount allotted at the beginning of the FY. Involvement of 4 individuals from two stations, salary savings withheld, many difficulties with computer budget program, DFC sending reports periodically, and EOY add-ons, it's anybodies guess what we ended up with.

An enormous amount of time was spent in August and September with Moosehorn staff in processing and sorting out budget issues. The EOY process, although confusing and chaotic, treated this station well. Major pieces of equipment were purchased, and several construction projects approved.

6. Safety

There was one reportable accidents this year. On 15 October, while censusing birds in a dense spruce stand, Vol. Widrig sustained a puncture wound from a stick to his right leg. He thought he had removed the entire stick; however, by 21 October the wound was not healing properly. At this time he reported the accident to us and went to the doctors. X-rays revealed a piece of stick was still embedded, requiring removal & stitches ($283).

On 25 September, Regional Safety Manager Suich spent several hours orientating Anderson to responsibilities and discussing safety issues and needs relating to several upcoming projects.Anderson and Moosehorn's ROS Maury Mills performed reciprocal safety inspections in September.

Cold-weather floatation suits and associated equipment were purchased as well as an additional fireproof storage cabinet, and additional NUS supplies.

An 8-hr Defensive Training Course was attended by Schick, Alley, Hafford, and Kocincki on 12 June. An 8-hr CPR and 1st Aid Refresher Course was attended by Anderson, Alley, Hafford, and Kocincki on 8-9 August.

Schick performed an annual Hazardous Material Inventory. Material Safety Data Sheets were obtained and placed on file in the office and shop.

7. Technical Assistance

Staff from Moosehorn and Petit Manan assisted State Non-Game Biologist McCollough with the State survey of islands to locate nesting terns between Nash's Island and Gouldsboro Bay on 18 June.

Refuge Staff attended the Gulf of Maine Tern Working Group meeting, 14 August, on Hogg Island to discuss statewide tern management
plans for the Gulf of Maine. Tern production in Maine is now centered on six colonies managed by the Service, National Audubon Society and Canadian Wildlife Service. There was no production at any of the other historic colony sites; all have been taken over by gulls, or suffer serious human or predator disturbance. Fortunately, there are active management programs on these colonies, and production was good again this year. GOMTWG has gone on record in support of initiating an active management program at Two Bush Island, part of Franklin Island NWR. Currently, plans are underway to initiate a program at this site by the Service.

Refuge Manager Anderson is on the Advisory Board for the Eagle Hill Wildlife Research Station, Steuben, ME.

Information and copies of the COE 404 permit for the Cranberry and Mague Flowage Projects were provided to the U.S. Navy, Cutler Base.

8. Other

Training - the following is a list of training attended by refuge staff this year:

Date	Training	Hrs.	Attendees
3/18-22	Chain Saw/Portable Fire Pump	24	Mills
5/5-8	S-130/S-190	24	Alley,Hafford
5/30	Safe Boating	8	Alley,Hafford
6/12	Defensive Driving	8	Alley,Hafford, Kocincki,Schick
7/3	Pumper Unit Workshop	8	Alley,Hafford,Schick
8/8-9	First Aid/CPR Refresher	8	Anderson,Alley, Hafford,Kocincki
12/9-13	OJT - Regional Office	36	Kimmel

Anderson served on the Regional Law Enforcement Training Committee, and filled in for Associate Manager Frickie on 9-13 December.

Office (Rental): Our office space doubled in February. The 'annual' office contract was up for renewal in August. Both the landlord and tenants would like a five-year agreement. GSA notified us of another possible building in Gouldsboro which would allow more competition. The site is located on Rt. 1, five miles south of our current location. It does not provide close access to the bay, and office space is not as nice as existing quarters, but there is excellent shop space, especially for boat maintenance and storage. The boundary for competition was extended to include Gouldsboro; status quo at years end.

Atlantic Coast Joint Venture: Petit Manan Refuge lies within this area and is playing an active role in the North American Waterfowl Management Plan. Work began to replace a former cranberry bog stone dam with an earthen dikes and water control structure. The site is located at Cranberry Marsh and is funded jointly with Ducks Unlimited through the MARSH program. (Section I-1).

Another possible site is the Addison Salt Marsh. About 800 acres of intertidal salt marsh was cut off from tidal influence when the Department of Transportation put in a dike with flappergates. The gates have been closed since the mid-30's. The DOT is looking at bridge reconstruction and a local sportsmans club would like to see the salt water return for both anadromous fish and waterfowl. All adjacent and affected land owners were identified. The project was discussed with Ducks Unlimited representative Whittemore and FWE-Old Town biologist Rosier.

Cooperative Agreements for the following were negotiated and signed this year: College of the Atlantic, Petit Manan Island seabird monitoring; Island Institute, camping on Bois Bubert Island; Hurricane Island Outward Bound, use of Cross Island NWR; and USDA, ADC, gull control on Seal Island.

Meetings: An important part of FWS employees jobs is attending meetings, events, assisting other FWS offices, making contacts, etc. These events take a great deal of time, especially if you add travel time for a relatively remote station. The following is an informal list I began shortly after my arrival, primarily to document why some of my other duties are not accomplished. It does not include incidental walk-ins, travel/preparation time, or total hours involved - might be interesting though.

Date	Meeting/Purpose
7/5	On Board
7/12	COA-Colonial Nesting Seabird Research Proposals
7/18	MCHT/Wehr - donated easement.
7/19	Conveyance ceremony - FmHA
7/23	Take Pride Ceremonies, WO
7/25	Steuben Planning/Zoning
8/9	Don Carrigan, Sen. Cohen's Rep.(informal)
8/12	Pleasant River Fish & Game (membership-Addison salt water marsh project)
8/13	MCHT (Land protection)
8/14	GOMTWG (Tern Meeting)
8/16	Section 1 (inholders)
8/26	DU-Ellsworth Chpt./Cranberry Dike photos.
8/27	COA (Island protection)
8/28-29	RO/RE (Land Acquisition)
8/30	Sen. Cohen's Staff/Bangor Office (Wendy Rice-WO)

Date	Meeting/Purpose (continued)
9/7	Sen. Cohen picnic (social)
9/9-13	Project Leader Meeting, Easton,MD
9/16	Friends of Taunton Bay/S.Fefer
9/17	ME Inland Fish & Wildlife-Deer Management
9/24-26	Joint Venture/Black Duck Meeting, Calais
9/28	DU Banquet, Ellsworth, (speaker)
9/30	Riley Phone Interview for (Metcalf)
10/7	ROTARY - Milbridge/Cherryfield (speaker)
10/9	G.Sepik, MSH, field check PMP for hydro-axe use
10/11	N.Famous, Eagle Research @ Cross Island
10/15	Eagle Hill Wildlife Research Station
10/21	FMHA property inspection
10/22	Coast Guard,Coast Guard Aux., COE
10/23	Commented on 'Draft' Resource Protection Priorities, Environmental Sensitivity Index provided by S.Bart, Calais Audubon Chapter.
10/23	Wetland Coalition Meeting, Augusta
10/25	ME Chapter of Wildlife Soc., Bar Harbor
10/28-30	LE Planning Committee, NJ
11/5	Gouldsboro Town Planning meeting - donated land.
11/7	Gouldsboro Selectmen - donated land.
11/12	FMO position duties/priorities
11/14	S.Fefer, slide program, ME Coastal Estuary Proj.
11/14	Steuben Town Meeting - Abbott Isl.
11/15	F.Wood - land donation.
11/15	K. Kosinski, Coop. program.
11/20	Maine Coastal Wardens
11/22	Acadia Chapter DU,view video on Cranberry marsh/discuss text.
11/22	N.Famous - Salmon Pen/Bald Eagle work.
12/9-13	Acting for Associate Manager Frickie,RO
12/10	LE Committee, RO.
12/16	Interagency Seabird Survey Meeting.
12/17	COA-PMI planning tern restoration/seabird census.
12/17	Aquaculture, Public Hearing-Salmon Pens, Cutler, ME

F. HABITAT MANAGEMENT

1. General

Biological Tech. Widrig completed a 'draft' revised vascular plant list for Petit Manan Point.

2. Wetlands

There are over 300 acres of freshwater wetland and 200 acres of saltmarsh on Petit Manan Point and Bois Bubert Island. The largest and most productive freshwater marsh on the Point was created from a heath in the late 1800's by the construction of a

stone dam that was to provide water level control for cranberry production. Two other smaller dams built years ago also impounded water and created good waterfowl habitat. The dams have since grown over with alders and been "improved" by beaver, and now provide some of the highest quality waterfowl habitat in Downeast Maine.

In the past we took the beaver for granted; they kept the dams in reasonably good repair and kept the water levels within reason. The flowages are important to the large numbers of black ducks that pass through the area in the fall. During the last several years, the beaver were not maintaining the dams. Low food availability and shallow pond depths drove beaver out or froze them out. The decision was made to replace the rock structures with earthen dams and watercontrol structures.

Last year the Mague and Meadow Brook dikes were replaced, See NR90 - Section I-1. During the spring freeze-thaw cycles in early March Meadow Brook developed a leak and was drained 16" to prevent sediment washing. As a precaution, the water levels were dropped 8" in Mague, which lies downstream of Meadow Brook. In April water levels were restored in Mague after the dike was seeded and fertilized during the third week. Water boards could not be replaced until rehabilitation was completed in June, see Section I-2. Full management level was not realized until August when Hurricane Bob broke the draught conditions. A heavy rainstorm at the end of September caused all flowages to rise 6" in a day and a half. Heavy rains continued, during the first week in October submerging 50% of the rock dam at Cranberry Marsh. Water levels were dropped 8" in November in Mague and Meadow Brook flowages for the winter. All flowages were iced over by 6 December.

Wild rice stands were excellent in Cranberry Flowage. Rice was harvested in 3 October from Cranberry and seeded into Mague and Meadow Brook.

3. Forests

Much of Petit Manan Point and Bois Bubert can be classified as commercial forest, chiefly second-growth red, black, and white spruce, white cedar, and larch, with mixed hardwoods such as red maple, paper and yellow birch, mountain ash and alders. There are also some jackpine stands on both units. No wood harvesting is allowed at this time to allow the woods to mature to encourage bald eagle nesting and roosting.

Mountain Ash berry production was excellent this year, which robins really focused on.

Biologist Sepik met with us in October to discuss possible hydro-axe sites. Small strips, 75' wide, will be cut in areas adjacent

to hay or blueberry fields and old roads were selected.

5. Grasslands

Two former sheep pastures totalling approximately 10 acres are maintained for upland species by spot mowing when necessary. None of the fields were mowed this year. We had the hydro-axe cut one swaths distance along the edge of these fields and roadways. Vegetation cut was primarily alder.

6. Other Habitats

There are approximately 38 acres of **blueberry grounds** on the Point. They are important to migrating songbirds, raptors, whimbrels ("blueberry curlews"), deer, and as singing grounds for woodcock. Because we were unable to burn, see Section F-9, we had all of the blueberry fields mowed during the third week in October.

The arctic-like tip of Petit Manan Point with its shrub-slope **peatlands** and raised peatlands contains fragile, unique ecosystems that will not be actively managed.

Unusual plants on the refuge include: beachhead iris, *Iris hookeri*; sea lungwort, *Mertensia maritima*; a snapdragon, *Gerardia neoscotica*; blinks, *Montia lamprosperma*), the endangered orchid *Malaxis brachypoda*; and roseroot stonecrop, *Sedum rosea*.

Beachhead iris, *Iris hookeri*, is found on several of the islands as well as the point.

Two new unique plants were discovered this year. In June, Volunteer Widrig discovered Botrychium lunaria, a rare species of moonwart, on Petit Manan Point. This is the only the second site in the State for this plant. Susan Gawler, a botanist for Maine Critical Areas Program, found an endangered plant on the refuge in September. She discovered a rare reed grass, Calamagrostis pickeringii, near Big Pond. This too is the second site for this plant in the State.

Several sites on the refuge were approved last year by the Maine Department of Environmental Protection as suitable for the land application of wood ash from a nearby biomass plant. The first load of ash was delivered in December 1990. The ash is used as a soil sweetener and good source of nutrients (minerals and lime) for refuge fields. Disposal of the ash has been a problem for the plant, so they are offering to spread it on fields for free. An attempt to spread the ash on the blueberry fields with the Moosehorn tractor and a borrowed manure spreader met with little success. Overwintering caused the materials to clump and harden. Permitting, delivery and subsequent spreading was handled by Resource Conservation Services in Bangor. Their specialized equipment arrived in June to spread the remaining material.

Abbot Island underwent a preliminary plant survey completed by R. Widrig and R. Stewart, Botany Professor. The survey was conducted on 25 July. Four species of plants were found which were not represented on the point (300' away). Two other significant finds included a large orchid sp. (unk. @ this time) and mature specimens (H=30",dia=8") of striped maple. These botanist felt that botanically, this isolated habitat, may be a rare relic example of old growth in eastern coastal Maine. It should be protected and an intensive survey should be conducted next spring.
Abbot Island is approved for acquisition all we need now is a willing seller, see Section C-3.

The **clamflats** surrounding areas of Petit Manan Point became one of several reasons the Steuben Planning Board opposed the construction of the Cranberry Dike. Board members expressed a belief that waterfowl were responsible for the high coliform counts which resulted in the closure of the flats to clamming. They were concerned the proposed project would attract more waterfowl. Although, the State was able to determine the actual source of bacteria, biologists agreed it was not due to black ducks. The area is frequented by large rafts of eiders and gulls. Pollution may also be coming from overboard discharge and/or malfunctioning septic systems at camps adjacent to the camps. Perhaps this is what prompted the town to encourage installation of new septic systems at several camps.

7. Grazing

One-half of Nash Island is privately owned and is used for sheep pasture. The fence that separated the former lightstation property from the private property has long since been torn down, giving the sheep the run of the island. Replacing the fence would make the island a good test site for research on the effects of sheep on the coastal islands. At an island nesting site in the British Isles, sheep were found to actually eat nestlings, presumably drawn to them as a source of protein.

This year posting crews observed heavy over grazing, 18 July. Four sheep were dead on the island. We suspect dehydration may have been the cause. There are no springs or ponds, all water comes from rainfall, vegetation, or fog droplets collecting on the vegetation. The drought conditions limited this already tenuous water supply.

9. Fire Management

Three burn units on Petit Manan Point were scheduled for burning in May: the Silver Mine, Camp Lot, and Birch Point Trail fields. None of these were accomplished. Delays in hiring the crew, due to drug testing, and training the crew left us with an inexperienced crew and a short window of time to burn. Severe draught conditions confirmed the decision to delay until next year.

Acting Manager Mills attended chainsaw and portable fire pump training, 18-22 March, at Great Dismal Swamp NWR. Fire Crew members Alley and Hafford attended the S-130/190 fire training course during the first week in May at the Minute Man historic park in Concord, MA.

12. Wilderness and Special Areas

The Maine Critical Areas Program gave written notice, 16 December, of their proposal to designate the grassy point south of Big Pond as a Critical Area Station. This designation is desired to provide maximum protection for the very rare Moonwart Grape Fern population, discovered in June by Volunteer Widrig.

Other sites on the Register of Critical Areas are -

* **Petit Manan Island**, 1975, Significance for Tern Nesting.

* **Petit Manan Point Marine Invertebrate Area**, 1978

* **Petit Manan Point Rare Plant Station**, 1985

G. WILDLIFE

1. Wildlife Diversity

Bio. Tech. Widrig completed a 'draft' revised bird checklist which shows the status of 295 species that have been found on the refuge. Hurricane Bob, 12 August, blew in some unusual species for a brief time, such as: a Sandwitch and a Royal tern (8/20), a Carolina wren, seaside sparrow and King rail. A mild November produced record late sightings for eight species of birds, as well as one new species, a Bohemian waxwing, on the 16th.

2. Endangered and Threatened Species

Bald eagles use the refuge throughout the year for feeding and loafing. Several pairs nest in areas adjacent to the refuge. We searched Bois Bubert Island by air this summer for a nest because a pair of adults is usually seen near Big Pond, but none was found.

Peregrine falcons frequent the refuge during the spring and fall migrations, often preying on shorebirds and seabirds on Petit Manan Island. One became a frequent island visitor during the last half of July. Birds were also observed throughout the month of October and November on the point. A peak of 5, of which 3 were immature, were seen on 5 November.

Over half of the **roseate terns** nesting in Maine, 52 pairs, nest on Petit Manan Island. The nesting population has more than doubled since 1984 when we first started gull control. The last Roseates (2) of the season were observed on Petit Manan Island on 26 August.

3. Waterfowl

Freshwater brood surveys were conducted on 18 and 19 July. Four black duck broods (4,3,8,6) were seen on Cranberry and two on Mague (4,3); one teal brood (4) was observed.

During almost any month of the year, rafts of from 3,000 to 10,000 common eiders can be seen off Petit Manan Point and Island. Rafts of up to 15,000 have been reported during the late summer/early fall molt. Rafts of white-winged and black scoters and flocks of goldeneye, oldsquaw, bufflehead, and red-breasted mergansers are often seen with the eiders.

Approximately 25 eiders nest on Nash and Petit Manan Islands.

Female Common Eider.

The refuge's importance to waterfowl lies in providing habitat during the spring and fall migration. The freshwater marshes on the Point attract large numbers of black ducks, teal and other puddle ducks to loaf at high tide and feast on the abundant crops of leafy pondweed (Potamageton foliosus), burreed Sparganium angustifolium, bladderwort (Utricularia spp.) and wild rice (Zizania aquatica) in the Cranberry Bog Marsh. At low tide the black ducks and teal can be found on the refuge's mud flats and saltmarshes. During the third week in August, 200 black ducks arrived in the rice beds, which is early, and peaked at 2,000 in mid-October. Green-winged teal peaked at 100. Pintail and widgeon numbers were down as compared to last year.

The refuge's 11 two-year-old wood duck boxes in the Mague, Meadow Brook and Cranberry Bog flowages were checked by Schick in March. No use was recorded by wood ducks, although each of the attached swallow boxes were used.

4. Marsh and Waterbirds

During the first two weeks in October and in mid-November, a pied-billed grebe and two American bitterns were seen, which is rare for this time of year. An American coot, third sighting for the refuge, was also observed.

5. Shorebirds, Gulls, Terns, and Allied Species

Fifteen puffins were still on Petit Manan Island on 26 August. This was probably a result of late chick activity. The mild weather in November produced record late sightings for puffins,

gannets and greater shearwaters.

Sanderlings failed to show in significant numbers during the fall migration.

Iceland and Bonaparte's gulls are usually seen in the fall and winter. Glaucous (2) and Iceland (3) gulls were seen on Big Pond in November. Adult black-headed gulls (1-3) were present at Over Point 7 November to the first of December.

Sooty shearwaters, common and thick-billed murres, parasitic jaegers, dovekies, black-legged kittiwakes, red and northern phalaropes, Wilson's storm-petrels, northern gannets, and common and red-throated loons are occasionally seen offshore.

Great cormorants were observed migrating with double-crested cormorants. Greats are now nesting in Maine, and are often seen during the summer months also.

The annual woodcock census route was run on 15 May. No significant changes in numbers have been noted over the last several years.

6. Raptors

Each year tens of thousands of raptors pass over Maine's coastal islands and peninsulas during the fall migration. As with waterfowl the raptor migration began in mid-August, which is early. There were several spectacular flights of kestrels, broadwings, redtails, and sharp-shins. Merlins are also commonly seen.

Snowy owls and short-eared owls are sighted each year during the fall and winter months. Snowy owls (2) arrived early this year and remained on Petit Manan Island or point throughout the fall.

Ospreys are common in the area, usually arriving in April and leaving in October. Goshawks were found nesting on the point in June.

Two turkey vultures, second sighting for the refuge, were seen in October.

7. Other Migratory Birds

Nesting species of interest on the refuge include the boreal chickadee, Lincoln's sparrow, and 14 species of warblers, including the palm.

Only nine species of warblers were observed during the fall migration. Kinglets and robins were abundant. Swainsen's Thrushes and several yellow-billed cuckoos were seen mid-October.

8. Game Mammals

The annual pellet count deer survey was not conducted this year for Petit Manan Point and Bois Bubert. Instead, efforts were concentrated on Cross Island NWR. Winter conditions were mild so deer populations probably fared well. Deer densities were estimated at 36+/- 6 deer/square mile, which are high by Washington County standards. Optimal deer densities for inland areas are approximately 15 deer/square mile. There is little obvious habitat damage on the point, perhaps because deer eat so much seaweed. Consequently, the carrying capacity for coastal areas might be higher than inland areas. In response to this and other concerns about coastal deer management, the state made a separate deer management unit out of the coastal zone, west of Washington County. Antler growth seemed greater than last year.

A bobcat was seen in the parking lot on 5 March. Moose sightings were reported throughout late July and early Aug on the point. Coyote activity appears to have diminished on the point compared to last year. A bear cub was spotted twice during the first week in April.

9. Marine Mammals

Harbor seals and harbor porpoises are both frequently seen around the refuge units. Minke and finback whales, and gray seals are less commonly seen. However, this year whales were feeding in closer to the mainland and at times could be observed from Mount Desert Island. A dead Minke whale washed ashore on Petit Manan Island on 24 August.

10. Other Resident Wildlife

Spruce and ruffed grouse both nest on the refuge. Ravens are year round residents on the mainland, but we didn't expect to find them nesting on the island.

Michael Roberts, Entomologist, reported that from a needle-mining larva on **Pinus banksiana** collected on the refuge on 18 September, there emerged on 1 December a moth which he identified as **Coleotechnites canusella** (Freeman), Lepidoptera: Gelechiidae. This moth lays its eggs in summer, hatches and winters over, and mates in spring - tough going by most moths standards of living. It may be circumpolar in distribution. Other known sightings include Schoodic, Quoddy, British Columbia and Northern Europe.

DS

This ravens nest was found in the boathouse when we returned to Petit Manan Island in the spring. No birds were observed in the area.

11. Fisheries Resources

This year saltwater fish of importance to terns and alcids were in abundance within the vicinity of Petit Manan. This abundance of prey species undoubtably, combined with the good weather, had a positive effect on the birds fledgling success. Observers frequently saw flocks of 50 to 100 terns feeding within 100 m of the island's shore. Both arctic and common terns were seen on numerous occasions carrying two or even three fish in their bills. Neither of these observations were observed with any frequency in the past.

The impact of changes in the Maine fishing economy raises serious management concerns for Petit Manan Refuge, and indeed for inshore island management throughout the Gulf of Maine. Many species of fish, clams, lobster, and sea urchins have been overharvested.

This year the island was visited by a number of fishermen collecting periwinkles (Littorina sp.), sea snails which are primarily exported for human consumption. Collecting parties ranged in size from one to four, and frequently remained on the island for several hours. Periwinkles were raked off the rocks throughout the intertidal zone. We estimate that a diligent party would collect over hundred kilograms in a single trip. Periwrinklers usually remain below high water mark, but their presence created a noticeable disturbance, especially if they brought dogs. Fishermen contacted often were not aware that the

island was a refuge. Obviously we need a local education program.

15. Animal Control

Gull control using 1339 Gull Toxicant was not used on Petit Manan or Green Island this year. Last year 421 nests were baited on Green Island. A single pair of herring gulls attempted to nest on Petit Manan. The nest was abandon following collection of one member. A total of 29 gull nests were counted on Green on 20 June. Ten gull chicks were seen at the time of the count. Flocks of over 200 herring and black-backed gulls utilized the intertidal area throughout the season.

The dark ages open dump in Steuben as well as the high overall gull numbers on the east coast make gull control a never-ending battle at the present time. This demonstrates the necessity of having a human presence constantly monitoring the tern colony during the nesting season. Without people on the island, gull predation will again increase and gulls will again takeover the islands. Complete removal of all nesting gulls by avicide alone is probably impossible. Even though the tern colony is well-established, some sort of gull discouragement, such as nest destruction or harassment will probably always be necessary on both islands.

Eight herring and great black-backed gulls were shot this year while raiding the tern colony on Petit Manan.

16. Marking and Banding

A total of 519 terns were banded, of which 66 were adults. One puffin chick was banded and 117 guillemots, of which 12 were adults. Of 213 laughing gulls banded, 15 were adults. USFWS incoloy bands are used. See Section D-5.

Do to staff changes and vacancies there was no waterfowl banding again this year.

17. Disease Prevention and Control

No incidents of avian cholera in eiders were reported this year.

H. PUBLIC USE

1. General

It is difficult to get an accurate picture of public use on the refuge when located in an off-refuge office. Generally, it is "nature-oriented", with hiking, birding, and cross-country skiing the most common uses. Clam digging is permitted, but hunting, camping, and trapping are not at this time. The past several years have brought a noticeable increase in the number of visitors to the refuge.

New Entrance Sign greatly enhances refuge visibility especially on a local level.

The Petit Manan Point entrance road was closed 25 October, a standard procedure for the last several years. We informed the public, through a regulatory sign, that we do not maintain the road for winter use, special use permits will be issued for clammers, tours, etc. All private inholders were notified to the closure, which involves closing a gate, but not locking it. Private inholders are supportive of this action as it provides added security to dwellings that are only seasonally inhabited.

4. Interpretive Foot Trails

There are two trails on the Point, the three mile long Birch Point trail and the one mile long Shore Trail. Both are popular

with visitors and require a minimum of annual maintenance. The new trail head signs ordered last year were installed this spring.

6. Interpretive Exhibits/Demonstrations

Six eagle programs were presented to local schools this year by Acting Manager Mills. The program features a film, talk, and a crippled eagle "Bart", who does a great job holding everyone's attention. The following schools were contacted:

School	# Students	
Columbia Falls Elem.	86	(K-6)
Harrington Headstart	10	(pre-school)
Cherryfield Christian Acad.	20	(K-12)
Milbridge Elem.	150	(K-6)
Steuben Elem.	40	(K-6)
Jonesport Elem.	160	(K-6)
Total	474	

Office Assistant Kimmel and Volunteer Bahrt assisted on these talks.

News Releases/Media Contacts: Seven news releases and one television spot occurred on the following topics:

WABI-TV, Channel 5	Petit Manan Island Research
Maine Sunday Telegram, Portland	Gull Control vs Terns (full page article w/photos)
"Feathers'n Fins", Bangor Daily	*Cranberry Marsh/DU project (full feature)
Local Papers	*New Manager *Cranberry Dike Town Permit *Abbott Island, Revenue Sharing

7. Other Interpretive Programs

Dave Schick provided a tour of the proposed Cranberry Dike to several members of the Acadia Chapter of Ducks Unlimited in September. They took still and video photos to show membership at Banquets how funds were being spent locally. They continued their video documentation throughout the fall including wildlife of the point. They began spreading the word about the project "in our backyard" and gave a 30 minute presentation to the Blue Hill Garden Club (20) and to the Blue Hill Fire Dept (30). Not only are they spreading the word, but they are gaining new members and donations.

11. Wildlife Observation

About 120 people visited Petit Manan Island this summer for the purposes of viewing wildlife. The bulk of these visitors came with two College of the Atlantic Classes, a class from the University of Maine, the COA Board of Trustees, and trips sponsored by the Champlain Society. A few private yachtsmen also stopped by, as did a party of sea kayakers. The decline in visitation over the last year is due to the lack of tour boats from Bar harbor willing to come to the island. All visitors were greeted at the ramp and given a brief history. They are then escorted up the boardwalk to blinds or observation points. The average stay on the island is about one hour. Puffins are clearly the primary attractant for most visitors.

13. Camping

Camping is generally not allowed on the refuge. However, it does occur, especially on the offshore islands. A new organization, the Maine Island Trail Association, an offshoot of the Island Institute, was formed several years ago to "legitimize" camping, confine it to certain areas, take care of the areas, and to encourage stewardship of the islands. Fortunately at this point in time, camping is not a big problem on the islands. We agree with the principles of MITA, particularly because we can not patrol the islands as we should, and realize we need help monitoring use. We also agree with their commitment to instilling the importance of stewardship in their members.

Through a cooperative agreement with the Island Institute a primitive campsite on Bois Bubert Island has been designated for use. If eagles are nesting in the area, the site will either be changed or camping will not be allowed. MITA must keep the site clean and make annual reports to the refuge manager. Three parties (8) camped on Bois Bubert Isle and one (4) on Cross Isle. The sites were kept very clean, with no problems reported.

16. Other Non-Wildlife Oriented Recreation

Clam-digging is a popular commercial and recreational activity in this area and there are several areas on the refuge open to digging. High fecal coliform counts forced a state closure of one area off Over Point last year. Source of the coliform is unknown, but possible sources include gulls, eiders, failing septic tanks, or animals using the flats such as deer or raccoons. Unfortunately, the state can not afford to determine the exact cause of the pollution, so limits its activity and closures and reopenings.

17. Law Enforcement

Although deer hunting is not permitted on the refuge, considerable activity was noted on Bois Bubert Isl. throughout the entire season. Bois Bobert is not adequately signed on the periphery. This has been a traditional problem, and many including State personnel have believed it was open. Areas such as this and Cross I. should perhaps be considered for opening.

Refuge staff visited the Salmon - Aquaculture pens at Cross Island, 17 October. The house/barge and one pen were in obvious violation of the COE Section 10 Permit. FWS have no authority to enforce the 1/4 mile buffer zone. Both COE and FWE-Orono field staff were notified. At years end the status quo prevailed after many more persistent contacts with the COE. See Cross Island NR91 - Section G.11.

I. EQUIPMENT AND FACILITIES

1. New Construction

Work began on the replacement of the stone dam at Cranberry Marsh, 70 acres. This is the last dam of three to be tackled. Last year the Mague and Meadow Brook dikes were replaced. All involved the replacement of 100-year-old stone dams that were initially constructed for cranberry bog management. Funding for this project is provided by FWS, $40,000, and a matching amount from Ducks Unlimited.

Because the COE 404 permit did not arrive until the end of May the bid for materials was not awarded until mid-August. The bid was awarded to Elmer Tracy, Jr. for $24,070. This year the dike site was cleared, brush burned, four cords of low grade firewood removed by volunteers, two culverts installed and a road completed to the dike by the end of September. Construction was brought to a halt due to the lateness in the season and permit restrictions, actual construction (in wetland areas) will begin next summer.

2. Rehabilitation

The Petit Manan Point Road was upgraded and maintained when 546 cys of gravel, $2,457, were placed and graded, $700; 400 cys of this were placed on the Meadow Brook section, bringing it to finished grade level.

The Connecticut Air National Guard, again this year, assisted with operations at Petit Manan Island by airlifting supplies on 23 April. A refrigerator, composting toilet and various other supplies were lifted. Moosehorn's Maintenance Worker Jones

assisted.

The Petit Manan Island dory received a new coat of paint.

Spring freezing and thawing action caused a leak in the new Meadow Brook dike/watercontrol structure in early March. Water levels were dropped 16" until refuge crews could excavate and repack with clay and bentonite on 21 and 22 May. After topsoil, seeding and rip-rapping were in place the control boards were replaced 4 June. Moosehorn NWR provided staff to assist Schick. machine work and trucks were contracted, and a compacter rented. Total cost was estimated at about $5,000.

Meadow Brook - Take II DS

Work continues on the historic Petit Manan Lightstation buildings. A grant from the SHPO for Phase III of the rehabilitation, $39,000, was approved last year. Essentially, this phase will complete the exteriors of the buildings.

On 31 July Project Engineer Saulnier, Dave Schick, and 7 Contractor Representatives went to the island for a pre-bid inspection. PARCON was awarded the bid for $27,901. Add-Ons to the original contract cost an additional $9,000.

PARCON began work on 4 September, which is late in the season by

island standards, heavy rains and high winds plagued the project. One contractor was stuck on the island for a week at the end of October and found it necessary to ration food!

The exterior of the Keepers House was painted, a new cedar roof installed with felt paper/sub-roofing, red cedar clapboards placed on gable, interior walls completed to prime and interior trim completed. The upstairs and downstairs interior walls/ceilings sustained considerable water damage when the entire roof was removed at one time; naturally, that is when we had a heavy rain. High winds while trim painting was going on resulted in black splatter dots over several walls, which had to be corrected. Masonry was repointed on several other buildings.

Schick conducted two inspection trips in October completed on exterior and to track progression on interior. Contractors completed work on 28 october; however, due to gale force winds the last days of the month, a final inspection was not completed until 7 November. The contractors had to return to repair deficiencies noted. The final cleanup day was on the 15th. Schick provided four support trips to the Island in November, one in snow and two in high winds. Dave Schick did an outstanding job tracking the progress and ensuring contract specs were met.

The Compound was winterized on 2 December.

Although, reconstruction of the boathouse was not funded with Grant money, EOY money was made available through Engineer Saulnier for materials. Schick provided a material lists, collected bids, and discussed construction with RO and local contractors. A Materials Bid was awarded to PINKHAMS for $11,847.34 in October.

Project Engineer Saulnier has provided a tremendous amount of support and assistance over the last few years on this project. His efforts are greatly appreciated.

Phase III: Restoration of Historic Petit Manan Lightstation,
Keepers House.

Before... **DS**

During.... **DS**

After. DS

4. Equipment Utilization and Replacement

Funding for a new 32' aluminum workboat was received last year. Several bids were received last year, ranging from $69,000 to $139,774. The contract was awarded to the low bidder, Kingscraft, of Florence, Alabama. Contract modifications resulted in a final price of $85,695. Maintenance Mechanic Schick went to Alabama in February for 'sea trials'. The boat was delivered 9 March. Schick spent three weeks documenting problems estimated to cost about $2000 over and above motor damage. Some of the problems were a result of not properly draining cooling water from the motor, which froze when it hit the frigid north country. Involvement with the builder was finalized in August. By years end, Schick had put in 102 hours on remedying deficiencies, purchasing and installing equipment. We never made it to water. Electronics were ordered and a purchase order issued to Launder's Electronics for redoing the primary wiring and to install a panel and wiring for the electronics package, total costs for materials and labor $5620. This does not include Schick's labor.

There is a lesson to be learned here, CGS take note - closely scrutinize the lowest bidder, especially when it is 50% less than the highest bidder. There is also a great deal to be said for buying within a geographical region. A builder in Alabama is not familiar with our requirements and needs. It also makes it

extremely difficult to monitor building progress when you are over a 1,000 miles away, and equally difficult to get them to correct errors once they've delivered.

A new 1991 Jeep Cherokee arrived 25 June, $11017, to replace the Ram Charger. A new 155 hp Johnson outboard motor, $5545, replaced the old 120 hp motor on the Sea Ox. The additional hp was really needed, since we often tow heavy loads out to the island. An auxiliary 15 hp outboard motor, $1223, was also purchased for the Sea Ox.

Shop equipment received or replaced included a bandsaw, $720, and a tablesaw, $1077.

5. Communications System

A second phone line was installed in November to accommodate the FAX and additional staff.

6. Computer Systems

The following items were received and installed:

Modem	$ 415
FAX	$1474
Computer Furniture/Center	$1037
Desktop microcomputer and associated software	$4150
Total	$7076

8. Other

Property lines were cruised and posted on the point and sections of Bois Bubert. Nash Isle was also posted.

The decrepit Davis house on Bois Bubert Island, a serious visitor safety hazard, although cleared for demolition, remained standing primarily due to staff changes.

J. OTHER ITEMS

3. Items of Interest

A Regional Office Contingent including Associate Manager Frickie, Regional Biologist Gavutis, Long Island RM Stewart and Moosehorn staff Mullen, Sepik, and Mills visited Petit Manan Island and Point on 27 June.

Refuge Manager Anderson attended the Take Pride Awards in

Director Turners Office on 7 July. Anderson accepted an Award in recognition of volunteer work completed on the Whaley Homestead, Lee Metcalf NWR.

Revenue Sharing checks were distributed as follows: Steuben, $38,929, up from $32,399; Milbridge, $11,928 up from $9,027; Addison,$844, up from $702.

4. Credits MA: All sections. DS/JK: Editing.

K. FEEDBACK

Having recently transferred from one Region to another, I was again reminded of how "differently" the individual Regions (kingdoms) operate. Certain operations need to be standardized throughout the country. For instance, the computerized budgeting process should be standardized to one program (Rbase, Dbase, etc.). All Real and personal property inventories should be done on a standardized computer program, no more property card, and each field station should issue property numbers (Region 6 has an excellent program). The only way this will happen is if Washington takes the initiative and dictates "it will be so". I think Washington should bring all of the key players within these areas of responsibility from each Region for a 'show and tell' of how they are operating, factor in field support/issues, and decide on a Nationwide program. After, the decision is made and the single operating method instituted, I feel these people should meet on an annual basis to insure modifications or improvements to the system are unified. This will not erode the individuality of each Region, but unify us in some of our daily operations. This would be a tremendous benefit to the field, because, hopefully the most efficient and 'field service oriented' program would be selected, and less time would be spent by employees participating in inter-regional transfers learning **regional nuances.**

Computers and FAX machines are wonderful tools. I would hate to have to revert back to a typewriter. But, we seem to be receiving an inordinate amount of FAXed questionnaires and information inquiries from within our Agency that have very short turn around times. I wonder how many trees we consume on a daily basis with this uncontrollable craving for information. I thought we had an initiative to reduce paperwork.

CROSS ISLAND NWR

CROSS ISLAND NATIONAL WILDLIFE REFUGE

Cutler, Maine

ANNUAL NARRATIVE REPORT

Calendar Year 1991

INTRODUCTION

Cross Island National Wildlife Refuge is a 1,703 acre island complex donated to the Fish and Wildlife Service in 1980 by Thomas and Virginia Cabot through The Nature Conservancy. Located in the town of Cutler, Washington County, Maine, the complex is composed of six islands: Cross Island, 1,654 acres; Scotch Island, 10 acres; Outer Double Head Shot, 14 acres; Inner Double Head Shot Island, eight acres; Mink Island, 11 acres; and Old Man Island, six acres.

The refuge was authorized under 16 U.S.C. 715 d., Migratory Bird Conservation Act for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.

Twenty acres on Cross were retained by the Cabot family for their noncommercial use, with the Service retaining first rights of refusal should they decide to sell. Nineteen acres are owned by Hurricane Island Outward Bound, Inc., an environmental education/ survival/confidence building organization. It owns and maintains the former Coast Guard station, now known as the Cabot Biological Station.

Like many of the islands on the Maine coast, Cross has a long history of human habitation. Known by the Indians as Sebohegonet, it was used as a fishing base by both Indians and early mariners through the 19th century. In the latter half of the 19th century it had several saltwater farms and even a small village with a school and store. There were copper mines near Seal Cove and on Outer Double Head Shot, although virtually no evidence of this remains today.

The U.S. Lifesaving Service built a station on Cross in 1874, which became a Coast Guard station in 1928. The Coast Guard soon abandoned the old lifesaving station, and built a new station at Northeast Harbor in the 1930's. The island was owned by a paper company that clearcut it between 1939 and 1941. It was then purchased by a businessman who hoped to turn in into a hunting preserve. After World War II began, expecting little business, he sold it to the Cabots, and it became known as the Avelinda Forest Preserve.

Cross, Mink and Scotch Islands are forested with dense stands of red and white spruce, balsam fir, yellow and paper birch, and red maple. The shoreline is generally rocky, with some cliffs over 100 feet high on the southern shore of Cross. The maximum elevation is 160 feet.

The Double Head Shots and Old Man are valuable colonial seabird nesting islands, vegetated largely by grasses and forbs with some white spruce. Old Man Island is one of only four nesting sites for razorbills in the Gulf of Maine. At the turn of the century, Old Man was the site of the sole surviving common eider colony in Maine, the rest having fallen victim to egg, feather, and meat market hunting.

B. CLIMATIC CONDITIONS

The climate of coastal Washington County is moderated by the Atlantic Ocean. Summer temperatures are significantly cooler and winter temperatures are significantly milder than inland areas. In the Machias area the average annual temperature is 43 degrees F., average annual precipitation is 45 inches, average annual snowfall is 75 inches, and average growing season is 132 days. The cold Labrador current has an important influence on Cross Island, helping make one out of every three days foggy during the summer months. The average tidal range is 13 feet; spring tides reach 15 feet. The area receives an average of 14 thunderstorms per year.

This year the island experienced less fog and more sunshine than normal, probably a result of draught conditions on the mainland. Hurricane Bob which arrived on 8 August did little damage.

D. PLANNING

4. Compliance with Environmental and Cultural Resource Mandates

The Cross Island Lifesaving Station was scheduled for demolition this summer. This building has been a serious fire and visitor safety hazard for some years. The Maine Historic Preservation Commission determined that this building was ineligible for inclusion to the National Register of Historic Places on 24 July 1989. However, The Maine Maritime Museum, Bath, ME expressed an interest in salvaging all or part of the building. In a letter dated 6 June 1991 to the Director of the Museum, ARD Young requested that they make arrangements to visit the site before the end of the month. Refuge staff made several attempts to coordinate a meeting over the next two months to no avail. By that time, other issues, new staff, Hurricane Bob and subsequent storms prevented us from making arrangements for demolition.

5. Research and Investigations

Cross Island NR91 - An Evaluation of the Potential Impacts of a Salmon Aquaculture Facility on Waterbirds and Marine Mammals, Cross Island NWR, Cutler, ME Biological Technician Norman Famous, USFWS.

Biological Technician Famous was hired with funds donated by ATLANTIC SALMON (Maine), Inc., to document the effects of aquaculture operations (See Section G.11) on wildlife species using Cross Island. Development of the aquaculture industry is

widespread in eastern Maine and the Canadian Maritimes. The ecological impacts of individual sites may be small. However, the potential for cumulative impacts exists. Human disturbance, fouling of the bottom at poorly flushed sites, nutrient enrichment of confined or restricted water bodies, entrapment of diving birds in anti-predator nets, accidental release of genetically inferior salmon stocks, and increased survival of juvenile herring gulls have been sighted as potential negative impacts of aquaculture on birds. Beneficial effects include increased productivity at the local level, creation of artificial 'reef-like' environments, supplemental feeding for bald eagles and other fish/carrion eaters, and increases in benthic invertebrate populations.

The balance between negative and positive impacts is both delicate and site specific. Pre-development and post-development studies are needed to evaluate the ecological balance of a site. The objectives of this study are:

- to document existing waterbird and marine mammal habitat usage in the vicinity of an expanding aquaculture facility,

- to document pre-development waterbird and marine mammal populations at a proposed aquaculture facility,

- to document bird and marine mammal populations at a nearby ecologically sensitive area, and

- to document bird and marine mammal populations at a control site within the region (Roque Island *).

* Unfortunately, the study was initiated after the pens were already in place. Consequently, a control site had to be found.

Norm began observations in April, and a progress report was submitted 12 November. The following results, to date, were gleaned from that report.

Three grids were established in the vicinity of Cross Island and are censused for 10 and 15 minute intervals once every half hour per visit. A fourth grid was established on Rogue Island and was censused in late fall and winter.

Distribution maps showing primary feeding and resting areas were developed for 27 regularly occurring water dependent bird species and two species of seals. Censusing documented bird usage, feeding, and resting areas during different seasons and stages of the tide. The greatest number of birds occurred during the early breeding and post-breeding stages when large numbers of dependant fledglings were present. Fish densities were also highest from August through September when large schools of herring brit,

mackerel, and pollock were present.

Black guillemot, great blue heron, osprey, terns, juvenile herring gulls, and surf scoter are attracted to the salmon pens during the spring and summer months. Aquaculture workers report common eiders are attracted to the pens in the winter. The beneficial impacts of the facility varies among species, both in time and duration, and is dependant on a variety of factors including stage of the breeding cycle, availability of food associated with the pens, and food outside the direct influence of the pens. The impacts can be relatively short (days to weeks - terns), long (black guillemots), seasonal (terns, herons, eiders), or a combination of season and duration (juvenile and all age classes of gulls).

Bald eagles were frequently observed in the SW section of NW Harbor and in the Mink Island area. During early spring and summer, 1-5 bald eagles were present in the Mink Island area. Eagle numbers in this area decreased July to September and increased slightly in October. By contrast, numbers in NW Harbor were low April to June, increased in July, and remained constant through October.

Among the three census areas, bird species diversity was highest in the Cross Island/Mink Island narrows. It was lowest in the NW Harbor (salmon pen) area. Diversity levels were slightly higher in the Grassy Point narrows than in the NW Harbor/salmon pens area.

Harbor seal usage in the Cross Island narrows area was highest during the pupping season through mid-summer, while highest levels of seal usage of the salmon pens area occurred during the fall. Seal predation and damage to salmon increased through the summer season. An undetermined number of gray seals were present with the harbor seals. A single minke whale was recorded in the eastern section of the Cross/Mink Island narrows. Surprisingly, no harbor porpoises were observed.

Wind speed and direction effect the distribution and behavior of birds as well as their detectability. Unusual species observed included the endangered roseate tern and red-necked phalaropes in the Cross/Mink Island narrows and a Skua in the Grassy Point narrows.

Additional data followed by statistical analysis are needed to evaluate species showing no obvious tendencies (common loon, bald eagle, double crested cormorant), species during the winter months and migration (grebes, waterfowl, large alcids), and permanent residents during fall, winter, early spring (gull, guillemot,eider). Studies are recommended to

continue through spring of 1993 to provide two years of baseline data.

E. ADMINISTRATION

1. Personnel

The refuge is administered and funded out of the Petit Manan office in Milbridge. Biological Technician (GS-0404-5) Norm Famous entered on duty 24 March on an Intermittent Appointment. Norm's position was funded through a donation, $5,000, from ATLANTIC SALMON (Maine), Inc., an aquaculture operation. All work assignments revolve around the salmon pens located off Cross Island.

2. Volunteer Programs

Hurricane Outward Bound participants again provided beach cleanup and trail maintenance, resulting in about 800 student use-days and 450 hours of service project time. See Section H-1.

F. HABITAT MANAGEMENT

1. General

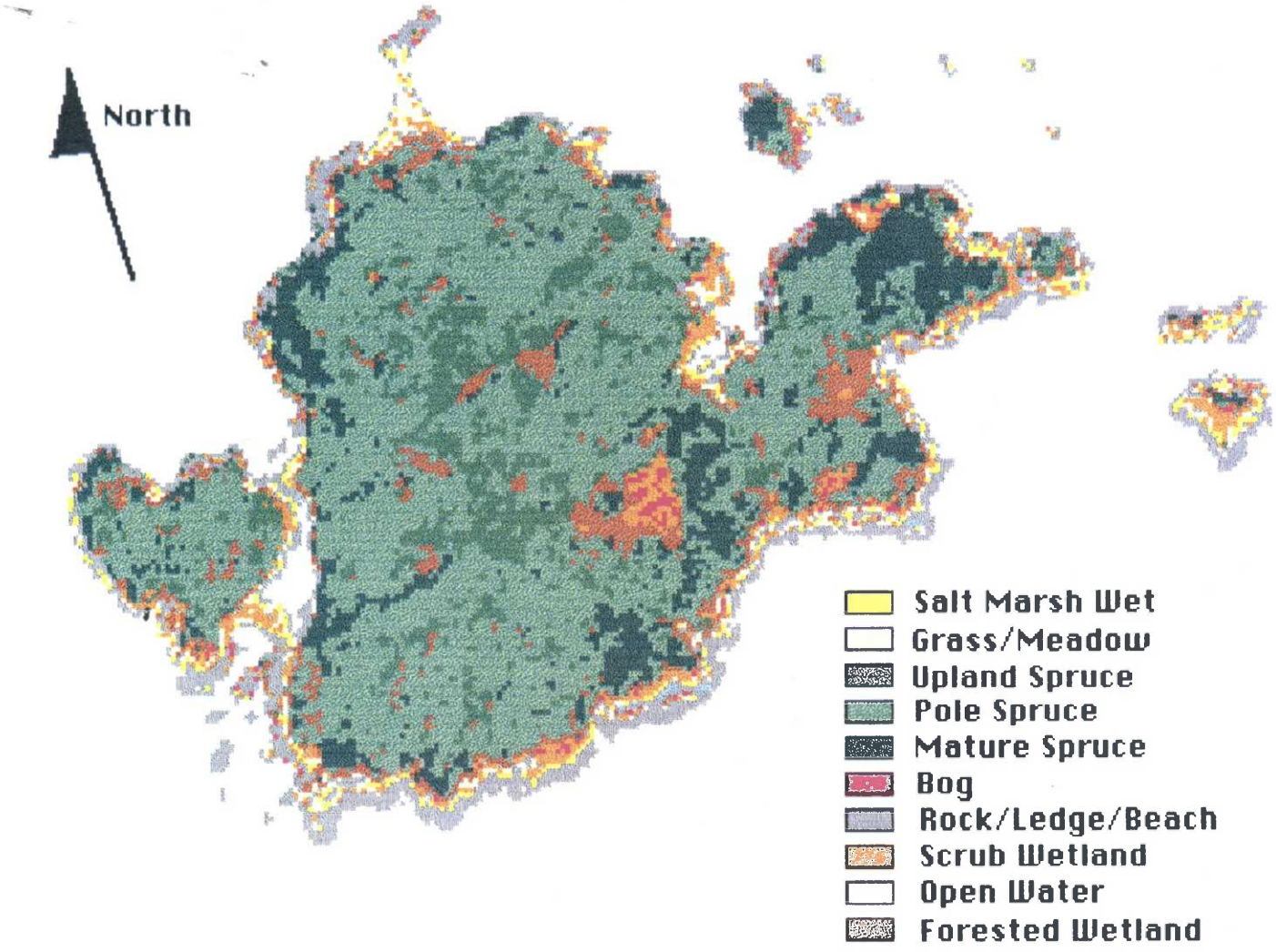
At the present staffing level there is no active habitat management on the Cross Island complex. Our emphasis is on habitat preservation and protection for bald eagles and colonial seabirds.

Last year, using $5,000 in donated funds from Atlantic Salmon (Maine), Inc., the refuge purchased a SPOT satellite image of the refuge from the Rockland, Maine based Island Institute. See Figure 1: Cross Island - SPOT Satellite Image/Land Cover-Type Map.

The SPOT multispectral image has ground resolution of 20 meters square with sensors in three spectral bands: blue, green and near infra-red. It can distinguish between 256 reflectance values within each of its three bandwidths, giving 1.7 million possible values for any given pixel. Clustering and classifying the data produces 60 possible spectral classes; however, any land cover-type is generally represented by more than one class.

Nine land cover-types were selected: rock/ledge/beach; bog; forested wetlands; scrub wetland; saltmarsh/wet meadow; grass/meadow; mixed woods; mature spruce; and pole spruce. "Pole spruce" is defined as young, even-aged stands of spruce with less

Figure 1. Cross Island NWR - SPOT Satellite Image/Land Cover Type Map.



than 12" DBH. "Mature spruce" is defined as greater than 12" DBH with an open understory. Mixed woods is defined as woods of mixed age and species.

Minimal ground truthing was completed by the Institute; a more intensified ground truthing of each color on the image is needed. This information will be used in future management plans for the refuge, including hunting, fire, public use and forest management, It will also be used to help assess impacts on the waterfowl and eagle use from aquaculture lease sites.

2. Wetlands

Approximately 240 acres on Cross is classified as wetland, most of which is forested or shrub-wetland, created by poorly drained soils in low-lying depressions or seeps. Dense thickets of alders have grown up along streams and drainages.

There are two significant saltmarshes, one at Northeast Harbor, and the other between Northwest Head and Cross. When covered by the tide, they provide good black duck feeding habitat; when exposed, they provide good shorebird feeding habitat.

During the first week in April, FWS biologists conducting a deer pellet count noted considerable eelgrass, a common aquatic, windrowed on the saltmarsh and extensive lush green beds were visible in the salt pond lagoon. The pools were already "alive" with shrimp and sandworms.

3. Forests

Most of Cross is boreal forest, dominated by second growth red and white spruce, with some balsam fir and mixed hardwoods such as yellow and paper birch and red maple as subdominants. Cross was last commercially logged between 1939 and 1941; old logging roads can still be seen throughout the island.

The biggest threat to the forests on Cross today is acid precipitation and fog. The average pH of fog on the Maine coast is 3.8; of rain, 4.3. Once the acidic water is in the soil, the granitic bedrock of this area provides little natural buffering.

A very heavy fuel load throughout most of the island poses some threat from fire, usually coastal conditions provide a damp environment.

Both Mink and Scotch Islands are forested like Cross.

4. Grasslands

Grassy Point is an unusual sand and gravel barrier beach called a Tombolo Bar. It is vegetated with a variety of seaside grasses and forbs such as oysterleaf and beachhead iris.

On the edges of Cross' southern cliffs are interesting meadow communities of grasses, blueberries, black crowberry, cranberry, and stunted spruce, over a thick peat layer. Establishment and maintenance of these seaside meadows is not well understood.

5. Other Habitats

Other interesting habitats include the cobble beaches, dominated by salt-adapted species such as beachpea, sea rocket, and oysterleaf, and the cliff faces, which are dominated by roseroot stonecrop, black crowberry, and a variety of lichens.

A sea cave, accessible only at low tide, can be found on the southern shore. Several sea anemones inhabit the cave.

The Double Head Shots are noted for their raspberry thickets that provide good eider nesting habitat.

Old Man Island is treeless, although old stumps and snags remain from years past. It is thickly vegetated with a variety of grasses and forbs such as cow parsnip.

12. Wilderness and Special Areas

Cross Island was listed on the State Register of Critical Areas in November 1989 for the unique value of a 5 acre stand of old-growth yellow birch. The stand is located on a west facing slope of the southwest point of Cross Island.

G. WILDLIFE

2. Endangered and Threatened Species

The Machias Bay area is an important area throughout the year for bald eagles. Both Mink Island and Northwest Head are noted as popular eagle loafing and hunting areas. A historical nest exists on Mink Island, and active nesting has occurred on both Cross or Double Head Shot Islands since the 1980's.

The Cross Island eagle nest (State idn. 121A) was first observed in 1981. The State of Maine conducts aerial surveys of eagle nest, censusing in early spring to determine activity and again later in the summer for hatching success. This year one eaglet was produced, unfortunately, the nest fell sometime in late

summer. It was assumed the eaglet did not survive. The following is a summary of bald eagle nesting activity for this area, provided by Charles Todd, State Endangered Species Biologist.

BALD EAGLE NESTING AREA #121
HISTORIES OF SITE STATUS, NESTING & PRODUCTION

Year	Cross Island (#121A)	Double Head Shot (#121B)
1981	Tree/nest* intact Occupied: 1 Ad. **Eaglets: 0**	
1982	Tree/nest intact Active **Eaglets: 0**	Tree/nest intact Unoccupied (eagles) Occupied (osprey)
1983	Tree/nest intact Unoccupied	Tree/nest intact Unoccupied
1984	Tree/nest intact Unoccupied	Tree/nest intact Unoccupied (eagles) Occupied (osprey)
1985	Tree/nest intact Unoccupied	Tree/nest intact Active **Eaglets: 0**
1986	Tree/nest intact Unoccupied	Tree damaged/nest fallen Unoccupied
1987	Tree/nest intact Active **Eaglets: 1**	Tree not found
1988	Tree/nest intact Active **Eaglets: ?**	Tree not found
1989	Tree/nest intact Active **Eaglets: 2**	"
1990	Tree/nest intact Active **Eaglets: 1**	"
1991	Tree/nest intact ** Active **Eaglets: 1 observed, 0 fledged **	"

*** Apparently an older nest structure.**
**** Nest tree damaged/nest fell during the interval between surveys in the course of the breeding season.**

This summer Bio. Tech Famous observed a single **Roseate Tern** on two different occasions in the Cross Island narrows.

3. Waterfowl

The saltmarshes of Cross are locally important black duck staging areas. Approximately 200 common eiders nest on the Double Head Shots and Old Man Islands. During the first week in April the following species were observed: Canada goose, black duck, green-winged teal, blue-winged teal, bufflehead, common goldeneye, red-breasted merganser, oldsquaw, common eider and white-winged and surf scoters.

On 14 June several State Biologists saw evidence of goose use on Old Man island, but there was no sign of nesting.

5. Shorebirds, Gulls, Terns, and Allied Species

Nesting seabirds on the complex include 200 pairs of black guillemots, 270 pairs of double-crested cormorants, several hundred pairs of herring and great black-backed gulls, and 30 pairs of razorbills.

Old Man Island is one of only four nesting sites for razorbills in the Gulf of Maine. The entire nesting population in the Gulf is less than 200 pairs, making it the rarest nesting seabird in the continental United States. State Biologists Allen, Schaeffer, David, and Woodward landed on the island on 14 June to conduct a nest census. Petrel burrows were sniffed for musky smell; auks and guillemots were flying too much for a good estimate, and one auk chick was observed. Table 1 summarizes results.

Table 1: Old Man Island Survey/Census of Nesting Pairs, 1991.

Species	Nest Pairs	Method
Common Eider	100	Complete Nest Count
Double Crest.Cormorant	306	CNC
Great Black-B. Gulls	29	CNC
Herring Gull	26	CNC
Leach's Petrels	50+	Partial Nest Count
	Total Pop.	Method
Black Guillemot	50-60	Visual Estimate
Razorbill Auk	100	Visual Estimate

On 21 June refuge staff censused Old Man and estimated there were 29 nesting pairs of razorbills. Unknown numbers of Leach's storm-petrels nest on Old Man and the Double Head Shots.

A first-winter Iceland gull and ten first-winter Glaucous gulls were observed on 26 December.

6. Raptors

There were five active osprey nests on Cross this year. Migrating hawks utilize coastal islands. In April, sharp-shinned hawks, harriers and kestrels were observed and evidence of owls (pellets and a fresh kill).

7. Other Migratory Birds

During the first week in April the following species were observed on Cross Island: bohemian waxwings, feeding on juniper berry; phoebes and golden-crowned kinglets, feeding on the abundant flies in the tide wrack; and killdeer and great blue herons were observed in the salt pond. Other species observed included common loon, horned grebe, belted kingfisher, woodcock, song sparrow, slate colored junco, and robin. These islands are also important migrating and nesting areas to many warblers.

8. Game Animals

A Deer Pellet Group Count census was conducted on 2-4 April. This was the first time a census like this has ever been conducted on the Island. Weather conditions were unusually cooperative, sporting unseasonably warm temperatures in the 70's. The ground was still frozen in the woods with patches of ice and snow. Of the 848 plots established, 68 (8%) had to be deleted due to ice or snow masking potential pellet groups. Thus, there were 780 "good" 100 ft. sq. (4'x25') plots established along 10.4 miles of the 20 transects.

Acting Manager Mills (PMN), Maintenance Man Schick (PMN), Zone Biologist Atwell, Regional Biologist Gavutis, and Refuge Biologists Healey (PKR) and Gallegos (MSQ) spent 33.5 person-hours running the transects which translated into one-third mile of transect per hour.

Thirty-nine pellet groups fell within 34 plots, yielding 4 to 10 deer/sq. mi. according to a program run by State Biologist Lavigne.

However, the quality of the data may be questionable because of lack of participant experience in dealing with coastal deer, ground/pellet conditions, and unreliability associated with pellet counts.

Regional Biologist Gavutis, who had participated in the Bois Bubert Island census last year, noted some of these issues in a trip report. ... "... at least one or two people in the survey crew were not familiar with the soft mass type deer droppings we

were finding along with the traditional droppings. In both years this wasn't apparent until .. well into, or after, the surveys when we held informal feedback sessions. I've always been told that the soft mass droppings, normally typify summer foraging on soft (non-woody) vegetative materials on most deer range, and most, if not all, winter droppings are the typical groups of firm pellets. Apparently, this is not the case on coastal islands where deer may rely heavily on seaweed, cranberry, etc., especially in winter. Snow cover, depth and duration are probably less in coastal locations, due to ameliorated (ocean) temperatures and salt spray making even grasses and forbes more available.

Possibly as many as 50% of the pellets I saw on the counts the last two years were the soft mass type, but no differentiation was made on the data forms... I included the freshest soft masses, but perhaps shouldn't have...not sure what the others did. I was not sure what the start time (age, ie.Oct.1 - Nov. 15, etc.) was for pellet groups to be counted, and how you could really be sure of their age, especially if they had been entombed in ice and snow all winter. In short, I saw an awful lot of likely potential observer variability in the technique..."

Subsequent to the survey Gavutis discussed these concerns with several biologists with deer expertise. Apparently, most favor vegetative (browse) surveys or health indices due to the unreliability of pellet count data. In spite of these concerns, everyone felt both the survey and biological visit to the island were valuable. Deer sign was more common in the peripheral areas of the island where the thick spruce gave way to shrubs, forbs, and ericaceous species, along with grasses and sedges. A few bones of one deer were located, but it had died prior to this past winter. Only two live deer were observed. Overall deer densities appeared to be low. The habitat is relatively poor (overmature), with the exception of the shoreline where most of the sign was observed; there was no browse line.

Although black bear are reported to be on the island, no sign has been seen in several years. Moose are occasionally seen.

11. Fisheries Resources

Atlantic Salmon (Maine), Inc., was granted a lease for up to 96 pens on 25 acres just north of Northwest Head. The pens were installed in the winter of 1989-1990 and were fully operational last year. Each pen can hold between 5,000 and 10,000 seven to ten pound fish. A Section 10 permit is required from the U.S. Army Corp of Engineers and the State. Originally they had requested a site much closer to the island, but agreed to put the pens a ¼ mile offshore to minimize disturbance to nesting and loafing bald eagles. The permittee is also required to monitor

water quality around and under the pens. Water test results are submitted to the Bangor Ecological Services office.

On 20 April staff from Moosehorn and Petit Manan documented violations of the 1/4 mile buffer zone by the existing aquaculture operation. This minimum setback distance from a refuge boundary was agreed upon between the Service and the Corps. Ten circular pens and a two story block building on a barge were moored well within the zone. In addition, portions of a walkway had washed up on shore.

Aerial view of salmon pen violation of a 1/4 mile buffer zone from refuge lands.

The FWS does not have authority to write a citation on these violations, however, a verbal warning was given along with recommendations to move the structures within two weeks. The Army Corp of Engineers, Augusta, was notified. On 17 October, Manager Anderson visited the site for the first time; the barge and one pen were still in violation. Both the COE and our FWE office were notified by phone. The COE advised us to send a map showing the approximate area of violation, and they would take care of it. Nothing happened and when the COE was contacted again, they told us they needed an aerial picture. A flight was arranged 21 November. Slides were sent to the COE. At year end the status quo at the pens and the COE office prevailed. After another call was placed to the COE, we were informed that our slides were not good enough, and they were going to order an aerial photo from a professional company. It was suggested they visit the site, but since our boats had been winterized they did not want to ride out with the permittee. Needless to say the permittee is getting the message that no one is willing to

enforce the permit. Other applicants who were denied a permit based on the 1/4 mile limitation are beginning to stand up, take notice and complain.

On 2 May, Moosehorn Manager Mullen and Biologist Rosier, Orono FWE, attended a meeting in Cutler concerning new applications for more salmon pens within the 1/4 mile zone of Cross Island.

9. Marine Mammals

No harbor porpoise were observed in the narrows this year; however, Bio.Tech. A Minke Whale was observed on 21 June in the eastern section of the Cross/Mink Island narrows. Harbor seals are year round residents, the larger gray seal is also observed. Hundreds of harbor seals were seen during the first week in April northeast of the island.

10. Other Resident Wildlife

During the Pellet Deer Census in April, coyote scat was observed by several people. Raccoon and fox sign were also seen. Red Squirrels and red-breasted nuthatches were the most abundant and noisy life forms observed.

Six grouse, ruffed and spruce, were seen or heard, and remains of a ruffed grouse were found. Other resident birds noted were raven, common crow, boreal and black-capped chickadee, gray jay and down woodpecker.

H. PUBLIC USE

1. General

In 1968 Thomas Cabot gave 19 acres of Cross Island, including the former Coast Guard Station, to Hurricane Island Outward Bound, an environmental education/ survival/ confidence building organization. Since 1983 the former Coast Guard headquarters has been known as the Cabot Biological Station, run by the Island Institute, an offshoot of Outward Bound. It has been their Downeast base of operations since that time.

They currently use Cross for environmental education programs and overnight solo camping. A cooperative agreement formalizing our relationship was approved 31 May 1990 by the Regional Director and President of HIOBS. The Agreement designates what areas of the refuge can be used and when, sets a maximum number of student use-days, and requires that each student spend a minimum of two hours on service projects.

Other use of the refuge is by occasional picnickers, fishermen, kayakers, day-use by boaters, and hunters.

The three seabird nesting islands are closed to all public use during the nesting season, April 1 through July 31.

8. Hunting

Cross Island has been closed to all hunting by state law for many years at the request of the previous owners. However, the law has never been enforced, and deer and waterfowl hunting is common. The lack of staff in the area makes meaningful law enforcement difficult.

11. Other Wildlife Oriented Recreation

The appeal of colonial nesting seabirds such as razorbills, guillemots and puffins is not going unnoticed by enterprising commercial boat operators. Bold Coast Charter Company, Cutler, advertises trips to Cross Island NWR. Most of his clientele are birders. With the limitations of number of visits and visitors to Machias Seal Island strictly enforced islands like Old Man, Petit Manan and Seal will see increasing pressures placed upon them.

I. EQUIPMENT AND FACILITIES

3. Other

Demolition of the decrepit 1874 Lifesaving Station has been cleared by the Maine Historic Preservation Officer. Funding is needed to take it and the lookout tower down. Both are serious visitor safety hazards. See Section D. 4.

All property lines were checked and cleared as needed. Three signs were set at locations most frequently used for landing by the public.

J. OTHER ITEMS

3. Items of Interest

A revenue sharing check for $18,944 was presented to the town of Cutler this year as compared to $15,776 last year.

4. Credits MA: All Sections. DS/JK: Editing.

SEAL ISLAND NWR

SEAL ISLAND NATIONAL WILDLIFE REFUGE

Matinicus Isle Plantation, Maine

ANNUAL NARRATIVE REPORT

Calendar Year 1991

INTRODUCTION

Seal Island National Wildlife Refuge is a remote, relatively inaccessible 65 acre island located 21 miles south of Rockland, Knox County, Maine, in the plantation of Matinicus Isle. It is a treeless, rocky island composed of igneous rock, chiefly granite and gabbro with a maximum elevation of 65 feet. It served as a bombing and shelling target from World War II until 1952. It was transferred to the Service from the Navy in 1972. Transfer was authorized under 16 U.S.C. 667b-d, an Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes. The purpose of the refuge as stated in the National Wildlife Refuge System Draft EIS (7 Dec 89), Appendix B, is "... of particular value in carrying out the national migratory bird management program."

Seal Island was once the site of the largest Atlantic puffin colony in the Gulf of Maine. For over 200 years it was a summer campsite for fishermen harvesting herring, groundfish, and lobster. The fishermen also used their nets to harvest the nesting seabirds for meat, eggs, and feathers, which eventually lead to the demise of the colonies by 1887. An old dug well, mooring chains, tarred rocks where the fishermen tarred their nets, and an occasional bottle or piece of iron are all the evidence that remains of this era.

Seal Island was recolonized by herring and great black-backed gulls, common eiders, double-crested cormorants, and arctic terns during the first half of this century but was never recolonized by puffins. The more adaptable and mobile terns nested on the island until 1953, but were crowded off by gulls, a typical scenario repeated on many islands in New England.

In spite of the Navy bombing exercises, the island still supports some of the best colonial seabird nesting habitat in the Gulf - ie. boulder fields for puffins, razorbills, and black guillemots, grass/ledge areas for terns, raspberry and grass thickets for eiders, and peat/glacial till substrate for Leach's storm-petrels.
In 1984 the National Audubon Society in cooperation with the USFWS and the Canadian Wildlife Service began a puffin and tern restoration project on this island.

Matinicus Rock, owned by the U.S. Coast Guard for over 155 years, is a 27 acre island with a maximum elevation of 35 feet. It is located 25 miles south of Rockland and is similar to Seal in that it too is treeless and rocky. Although not a component of Seal Island Refuge, it has been posted as a wildlife sanctuary by the Service since 1966 under a cooperative agreement with the U.S, Coast Guard. It is the site of the historic Matinicus Rock Light Station which was staffed by the USCG until automation in 1984.

Matinicus Rock was one of two islands in the Gulf of Maine where a relict breeding population of puffins, 1-2 pairs observed in 1902, survived the market hunting. Survival of the puffin and tern colonies is probably due to a long history of gull control initiated by the lighthouse keepers. In 1939 the National Audubon Society established a field station on Matinicus Rock to protect these colonies and has been a presence ever since. The island supports healthy colonies of arctic terns, Leach's storm petrels, black guillemots and puffins. Common eiders, common terns, razorbill auks and gulls also nest on the island.

Seal Island and Matinicus Rock are two of the most important colonial seabird nesting islands in the Gulf of Maine. The surrounding waters are rich with an abundance of food resources these birds depend on. Both islands are also important stopovers for migrating songbirds, shorebirds and raptors.

A. HIGHLIGHTS

Roseate Terns nested on both Seal Island and Matinicus Rock. (Section G-2).

More puffins were seen on Seal Island this year than in any other year of the project. (Section D-5).

Terns had an exceptional year on Seal Island. Numbers of nesting pairs increased, and they achieved a high degree of reproductive success. (Section D-5).

B. CLIMATIC CONDITIONS

The climate of the Rockland area is moderated by the surrounding ocean. Temperatures are significantly cooler in the summer and warmer in the winter than nearby inland areas. The average annual temperature is 46 °F., precipitation is 47 inches, snowfall is 60 inches, and the annual growing season is 143 days. During the summer fog, an important influence on coastal ecosystems, occurs about 21% of the time. The average tidal range is nine feet.

This year the summer was notable for its good weather on the islands. A draught on the mainland provided weeks of sun and a fog free existence. On Seal Island there were only 10 days on which there was appreciable rainfall from mid-May to mid-August, most of the rain came in mid-June and late August. The terns undoubtedly benefited from the dry conditions that predominated during their chick season.

D. PLANNING

5. Research and Investigations

53534-01. Re-establishment of Atlantic Puffins (Fratercula arctica) and Arctic Terns (Sterna paradisea) on Seal Island, Penobscot Bay, Maine. Steve Kress, Principal Investigator, National Audubon Society (NAS), Canadian Wildlife Service, and Fish and Wildlife Service.

Objectives:

a. To re-establish Atlantic puffins and arctic terns to historical nesting habitat on Seal Island.

b. To examine features of growth, post-fledgling survival, and movements of puffin chicks transplanted from Newfoundland to Maine.

c. To further refine and test management techniques for re-establishing nesting populations of Atlantic puffins and arctic terns.

PUFFINS

Between 1984 and 1989, 912 puffin chicks were transplanted from Great Island, Newfoundland, and handraised in sod burrows by NAS interns. They were banded with color and monel bands before they fledged. After fledgling, puffins go to sea where they spend their first two to three years before returning to land. They normally do not nest until they are four to five years old. Nesting occurs in rock burrows where a single egg is laid. Puffins are a very long lived bird, the oldest on record was 34 years of age.

This was the eighth year of the project. NAS researchers arrived on 15 May and except for 7 days the island was continuously occupied until 12 August. Gull control was again employed by FWS staff in May, see Sec. G-15. The field season was notable for its good weather, with only 10 days of appreciable rainfall.

Because puffins are reluctant colonizers of new islands, social stimulation is an important factor in determining whether a prospecting bird will explore an island. Therefore, puffin and razorbill decoys are placed in suitable nesting habitat on the island.

The number of returning translocated puffins doubled this year to 102, of which 66 put in an appearance on Seal Island and the remaining 36 were observed on Machias Seal, Petit Manan and Matinicus Rock islands. Prior to 1990, only six of 591 chicks

transplanted (1984-1987) had returned. The project took a positive turn last year when a total of 52 birds of 912 chicks transplanted (1984-1987) returned to these islands. A total of 113 Seal Island translocated puffins have returned to date. Eighty percent of the birds observed in 1990 were also sighted in 1991. The majority of the returning Seal Island puffins belong to the 1988 transplant group. This group made an excellent showing in 1990 with 41 of the 190 transplants returning as two-year olds. This summer an additional 31 members of this age group were observed, bringing the 1988 total returns to 72. This represents a return rate of 38%. Survival rates vary greatly (6% - 56%) between years, consequently one or two years with high survival rates are necessary for successful re-establishment (Kress/pers.comm.). Returns by the 1989 group are promising; to date, 29 of 190 birds have returned. Since most of the returning puffins will be four years old next summer, a few may be old enough to breed for the first time; however, most puffins usually wait until they are five.

More puffins were seen on Seal Island in 1991 than in any other year of the project. NAS staff take cover in observation blinds for three-hour stints and wait for puffins to land and show their leg bands. In 1991 they devoted 508 hours observing and recording a total of 548 puffin sightings at various blind sites. Puffins landed on Seal every day from 16 May, when the first bird was observed, through mid-August. Not only did the number of translocated returns increase (see Table 1.), but frequency of use, daily totals (See Figure 1: Puffin Daily High Counts - Seal Island.), numbers of unbanded birds and burrow prospecting did as well as compared to last year.

Table 1: Breakdown of individual translocated birds returning to Seal Island over the last two years.

Release Year	# of returning puffins 1990	1991
1987	2	1
1988	21	53
1989	0	12
TOTAL	**23**	**66***

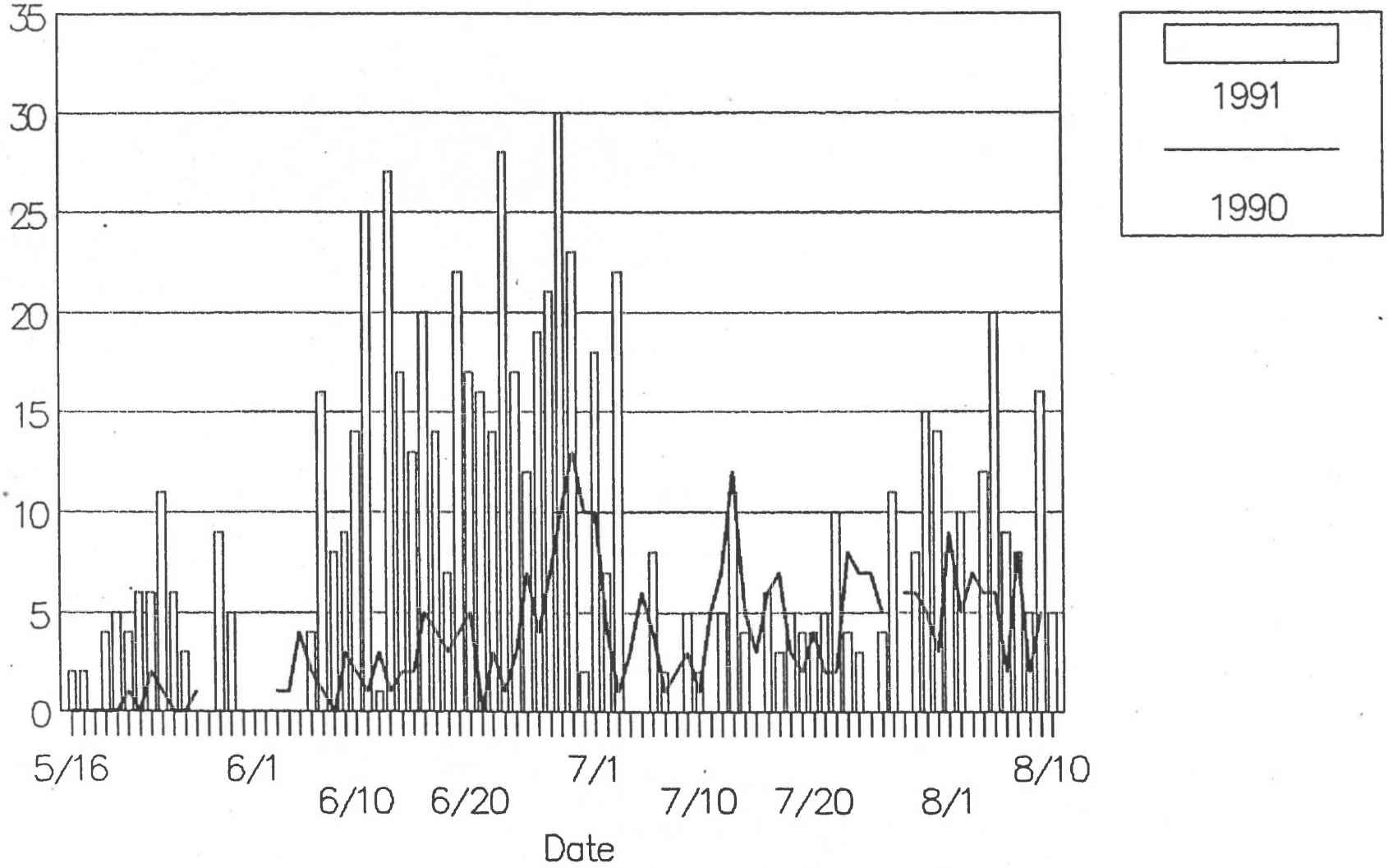
* In addition to the translocated puffins, as many as ten unbanded puffins were observed at one time this summer.

The 1988 year class accounted for the vast majority of sightings in both years with 60 known individuals. This represents a minimum of 32% of the birds fledged that year since there were several birds with worn bands that could not be read.

Data indicate only about a third of the birds return to their natal island as two-year olds. If this holds true for the 1989 birds (12 observed this year), we hope to see 30 to 40 next year.

Figure 1: Puffin Daily High Counts

Seal Island, 1991



Seal Island is well on the way to establishing a puffin colony. Colonial nesting seabird recolonization projects require a great deal of time, patience, money and a longterm commitment by everyone involved. In the case of Seal Island there was no "breeding memory" by any birds since they had been extirpated over 100 years ago, consequently transplanted birds were necessary. Researchers recognized at the beginning of the project that the reluctance of this species to colonize new islands, late sexual maturity (4 to 5 years), and highly variable survival rates of returning chicks would require a minimum commitment of ten years. It remains a mystery why the return rate varies so greatly between years. Puffin chicks do not receive any parental care after they fledge. They spend the first three years at sea dodging fishing nets, bilge slicks, gulls, and dealing with other uncontrollable factors such as weather and food supplies. The lesson, however, is that variable survival rates affect both populations and efforts to restore species. Restoration projects which run for just a few years, could miss the occasional high survival year that makes the difference in whether a project succeeds or fails. Delays in recolonization on Seal Island may also be due to competition from the nearby puffin colony on Matinicus Rock. The encouraging high chick survival rates in 1988 and 1989 hold tremendous promise for the 1992 season.

TERNS

Nest Counts - Arctic and common terns again returned to nest on Seal Island; they nested in 1989 for the first time since the 1950's. Throughout the Gulf of Maine 1991 was an exceptional year for nesting terns. On Seal Island they increased their numbers significantly and achieved a high degree or reproductive success. A total of 610 nests were found (corrected to 650) as compared to 260 last year. Interestingly, this year about 57% of the nests were common terns and 43% arctic, whereas last year approximately 30% were common and 70% arctic. They again nested on the north hill, in the gull-free zone.

Productivity - Reproductive success of the colony was estimated by monitoring 22 Arctic and 7 Common nests in three enclosures. The enclosures were checked daily at hatching time to determine A and B chicks and to band chicks. All nests in the enclosures achieved 100% hatching success. In the feeding study areas five eggs out of 37 failed to hatch, yielding 89% hatching success. The nests in the feeding study areas, all Arctics, produced 1.25 chicks/nest. Arctics in the enclosure did considerably better at 1.68 chicks/nest. The Commons each fledged two chicks, but it is really too small a sample to do more than suggest that the Commons also did well.

After hatching, enclosures were checked every other day to determine if chicks were still alive. If a chick reached 15 days old it was assumed to have fledged. In the 24 enclosure nests, 100% of the A chicks survived to fledge and 92% of the B chicks. Two of the Common terns had C chicks, both of which disappeared before fledgling.

Feeding Study - On 23 June observations were begun to determine prey species composition, feeding rate, and feeding recipient in Arctic terns. Usable data was obtained from 15 nests, from which 1,962 feedings were observed. Nine of the nests had two chicks and the rest had one. The average rate at which food was brought into the nests, per chick, was slightly higher in the single chick nests, 1.79 feedings/hour/chick, as opposed to 1.27 in two chick nests. In nests with two chicks the A chick, on average, received between 50.4% to 53.5% of the feeding, with the B chicks receiving the rest.

The species composition of all feedings was 60% herring, 19% hake, 3% sand lance, 2% miscellaneous and 16% unidentified. One-chick nests tended to have less herring (58%) and more hake (31%) and sand lance (8%). Two-chick nests averaged 76% herring, 20% hake and 2% sand lance.

Banding - A total of 93 terns were banded; 20 were Common, 72 Arctic, and one a questionable Roseate.

Matinicus Rock Seabird Project, Penobscot Bay, Maine. Steve Kress, Principal Investigator, National Audubon Society (NAS).

Objectives:

a. Continue identification of banded puffins noting origin and monitoring puffin breeding success.

b. Continue Arctic tern feeding studies, assessment of their reproductive success and chick growth.

c. Continue study of burrow use by Leach's Storm-petrels.

PUFFINS

Banded Birds - Puffin observations were conducted 60 days between 7 June and 9 August. A total of 175 banded birds were seen throughout the season with a maximum of 59 bands identified in one day. Origin of banded birds were as follows:

Eastern Egg Rock	13
Matinicus Rock	95
Seal Island	57
Machias Seal Island	12

In the Bag! NAS collecting puffin data - Matinicus Rock. Hopefully, in the not so distant future, we will be performing similar tasks on Seal Island.

A total of 24 chicks were banded. Seven adults were banded or had worn bands replaced.

Burrow Sites/Productivity - A total of 107 burrows were located and checked for activity and availability of chicks for banding. Of these, 70 were judged to be active. Four active nests contained dead eggs or chicks, and one fledgling was found dead trapped in a lobster trap. A rough reproductive success estimate is .61 chicks/nest.

TERNS

Nest Counts - On 14 June a total of 1241 tern nests were counted (corrected to 1361). This represents a total increase of 11% over 1990, in part due to an increase in Common Terns. There has been a change in nest distribution as well, with Arctic Terns moving farther north on the island and numbers thinning mid-island.

Productivity - Arctic Tern fledgling success was determined through several methods. The most accurate assessment of 1.1

chicks/nest was based on close monitoring of 68 nests - 49 in two enclosures and 19 from the feeding study areas. From these 68 nests, 76 chicks reached 15 days of age.

Table 2: Reproductive Success of Arctic Terns, Matinicus Rock 1991.

	#Nests	#Eggs	#Chicks Fledged	Fledging Success
Enclosure I	18	34	20	1.1
Enclosure II	31	58	34	1.1
Plot A	19	40	17	0.89
Plot C	23	45	22	0.95
Plot D	31	61	30	0.96
Plot E	22	40	17	0.77
Plot F	30	55	8	0.26
Feed. Study A	6	12	5	1.0
Feed. Study B	4	8	5	1.25
Feed. Study C	5	10	6	1.2
Feed. Study D	5	10	6	1.2
TOTALS	194	373	170	

Arctic Tern Chick Growth - Two enclosures were monitored throughout the season. Nests were marked and checked daily throughout the hatch period. Shortly after hatching chicks were banded and thereafter weighed and measured (wing cord every third day. Success of "A" chicks vs. "B" chicks vs. "C" chicks is summarized in Table 3.

Table 3: Fledgling Success of "A","B", and "C" chicks, Matinicus Rock, 1991.

	Enclosure I	Enclosure II	Totals
# Nests	18	31	49
2 egg clutches	16	27	43
1 egg clutches	2	4	6
"A" Chicks			
# Eggs	16	27	43
# Hatched	16	27	43
# Fledged	13	23	36
"B" Chicks			
# Eggs	16	27	43
# Hatched	15	26	41
# Fledged	5	7	12
"C" Chicks			
# Eggs	2	4	6
# Hatched	1	3	4
# Fledged	1	2	3

Arctic Tern Feeding Study - A study of provisioning for Arctic tern chicks was conducted in June and July. A total of 1028 nest observer hours were logged. In this time 2,265 feedings were observed; 1,878 of these were identified to species or taxonomic group. Of the identified food items 64% were fish and 37% invertebrates. Species break down is summarized in Table 4.

Table 4: Arctic Tern Feedings: % Breakdown by Food Species. Matinicus Rock, 1991.

Species	Number	% of total	% of ident. items	
Hake	578	25.5	30.8	
Herring	494	22.8	26.3	
Bluefish	15	0.7	0.8	
Sandlance	38	1.6	2.0	
Stickleback	28	1.2	1.5	63%
Butterfish	9	0.4	0.5	fish
Silverside	2	0.1	0.1	
Lumpfish	4	0.2	0.2	
Snipefish	5	0.2	0.2	
Unidentified Fish	208	9.1	---	
Amphipod	641	28.3	34.1	
Ants	34	1.5	1.8	
Euphausid	3	0.1	0.2	37%
Crustacean	3	0.1	0.2	inverts
Polychaete	11	0.5	0.6	
Insect	12	0.5	0.6	
Unidentified	179	7.9	---	
Total	2265			

Banding - A total of 366 terns were banded in 1991; of which 17 were adult Arctics and one Roseate Tern chick.

E. ADMINISTRATION

The refuge is administered out of the Petit Manan office in Milbridge. Support funding amounted to about $2500 for gull control on Seal Island.

3. Other Manpower Programs

The National Audubon Society maintains a research station on Seal Island for the Puffin Project. Usually two to four paid employees or volunteers are on the island at a time. This year NAS staff Rick Schauffler, Roy Taylor, Peter Duley, Manolo Fajardo, Wacho Arevalo, and Trip Dennis spent time on the island during the mid-May to mid-August field season. Volunteers Kirstie Forbes-Robertson, Ingrid Slammer, Deborah Zombek, Anne Paterson, Nancy Dennis, Beth Oreinstein and Carey Rowsom also provided assistance.

F. HABITAT MANAGEMENT

1. General

Seal Island is vegetated with a variety of grasses and forbs interspersed with granitic ledge and rocks. Representative plant species include New York aster, beach pea, yarrow, raspberry, gooseberry, chickweed, shepherd's purse, creeping juniper, ragweed, and red fescue. The only trees on the island are balsam poplars which reach a maximum height of only three to four feet before they die back from the salt spray. The uncommon plant roseroot stonecrop, Sedum rosea, is exceptionally abundant on Seal island, making it one of the most significant southern stations of this species in the eastern United States, along with scotch lovage, Liguisticum scothicum, and seaside angelica, Coelopleurum lucidum. Other rare plants are oyster leaf, Mertensia maritime, and seabeach sandwort, Arenaria peploides.or the rare plant Sedum rosea, roseroot stonecrop.

Although not used as a target since 1952, the effects of the bombing and shelling can still be seen. Small craters and scarred granite are abundant, but the rank growth of grasses and raspberry has concealed most of the damage. Even the effects of the 1978 peat fire are fading beneath a quickly growing peat layer.

Matinicus Rock is also treeless and vegetated with a variety of native and exotic grasses and sedges, and herbaceous species such as aster, yarrow, beach pea, chickweed and raspberry.

No active habitat management is planned.

12. Wilderness and Special Areas

Seal Island was listed on the State Register of Critical Areas in January 1976 for its unique value to nesting black guillemots and Leach's Petrels. At the time of designation, the island supported the largest petrel colony in the eastern United States with 2,000 pairs, and one of the largest black guillemot colonies, 200 pairs, in Maine. An updated guillemot census was conducted by the Audubon Society in 1988. They located 454 guillemot burrows, with a total estimate of 500 pairs nesting.

G. WILDLIFE

1. Wildlife Diversity

We have supported the seabird colony restoration project for several reasons. Our concern for terns is based on the well-documented region-wide population decline which began in the 1940's, much of which is due to competition with herring and great black-backed gulls for nest sites, and predation by gulls on tern eggs and chicks. Any restoration work is realistically limited to field station sites because gull control is a never-ending task. Therefore, the Audubon Society and the Service had to make a long-term commitment and establish a field station if there was to be any hope of success.

Although far from endangered, Atlantic puffins have been declining in the western Atlantic since the 1920's. The Great Island, Witless Bay, Newfoundland colony has declined by 20-30% since 1975 because of gull predation, food scarcity, environmental contamination, mortality from fishing nets, and illegal hunting.

The environmental education impact of this project should not be underestimated. Puffins are very popular birds and attract quite a bit of attention from the general public, not just dedicated birders. By getting their attention with puffins, we have been able to show people the problems associated with the burgeoning gull population, with ocean fisheries overharvesting, and marine contamination.

2. Endangered Species

Four pairs of Roseate Terns were observed nesting on Seal Island and five pairs were found on Matinicus Rock in late June! At least three checks fledged in August off of Matinicus. One chick was banded, two of the adults were previously banded (# 882-87534 and 882-70969).

3. Waterfowl

During the 1990 gull nest count NAS personnel counted 889 eider nests this year. An extensive nest count was not conducted in 1991, however, actual number of nests is probably over 900.

The Audubon Society reports that since the gull control began, more eider chicks are surviving to flight size. The first year it was rare to see a chick more than a couple days old, as most were gobbled up by the gulls. Since 1988, many creches now

remain near Seal and many older chicks are seen throughout the season.

Occasionally, other species such as blue-winged teal and black ducks use the small freshwater pools on the island.

5. Shorebirds, Gulls, Terns, and Allied Species

The Audubon Society made an effort to get a good estimate of the number of nesting guillemots on Seal island in 1988. They located a total of 454 burrows, with a total estimate of 500 pairs nesting. Therefore, the high count of 1,609 individuals in the water around the island is not surprising. This makes Seal Island one of the largest guillemot colonies in Maine. This survey was not repeated this year or last.

There are 1000+ pairs of Leach's storm-petrels and 45 pairs of double-crested cormorants nesting on Seal. The storm-petrel estimate is very conservative. Petrels are difficult to census since they are nocturnal and nest in burrows in the sod. For the past two years NAS has tried to determine the role of olfaction as a stimulus for colony formation in Leach's Petrels. Due to contamination of the data by many factors it was impossible to come to any conclusions. The study needs better techniques to determine whether a petrel really visited a burrow and if scent attracted it there. NAS continued the ages long study on burrow use by storm petrels on Matinicus Rock. Of the 150 burrows which were sought, only 91 were located; many of the missing have not been found for 5 or 6 years. Fifty-four birds were banded: 45 adults, 9 chicks. Some of these were from burrows other than 1 to 150.

Razorbills again nested on Matinicus Rock. A burrow check was conducted in August after the "bills" had left the island. Evidence of burrow occupation (guano accumulation) and chick presence (eggshells or observations of chicks earlier) was sought. Fifteen nests were found and all were deemed active - 10 with eggshells, 2 with dead eggs, and 3 with large accumulations of guano but no eggshells. Three banded birds were observed.

Laughing gull numbers declined on Matinicus Rock from 203 last year to 181 this year. Herring and Greater Black-backed gull numbers are discussed in Section G-15.

6. Raptors

The Maine coastal islands are very important to raptors during the spring and fall migrations. Peregrine falcons and merlins in particular use the outer islands.

9. Marine Mammals

If Seal Island did not have seals, we'd have to change the name! Both harbor and gray seals are common throughout the year.

Fin, minke and humpback whales are sometimes seen in the surrounding waters. Minkes, like terns and puffins, feed primarily on small herring, and often come into the coves on the western side of the island.

15. Animal Control

The success of the puffin and tern colony restoration is contingent upon many variables, but the first step is to clear the island of nesting herring and great black-backed gulls to eliminate nest site competition and reduce egg and chick predation.

The avicide 1339 Gull Toxicant was again used on Seal this year. It had not been used in 1990 but was used for three consecutive years, 1986-1988. On 29 May former Manager Goettel returned to conduct the gull control activities on the island. Area 1 was excluded since only 2 nests had been found earlier and destroyed. The method was the same as in previous years. A total of 356 nests were baited of which 281 had eggs. Researches collected and destroyed 155 black-backed carcasses and 45 herring gulls. The northern end of the island where the terns nest is virtually gull-free.

In general, this year the remaining large gulls on Seal Island did not constitute a threat to the other nesting seabirds. Although as many as a couple of hundred would often be loafing on the northeast point, they largely stayed out of the tern colony area. Attempts by the gulls to fly over the colony drew a sharp response from the terns and no significant tern predation was observed. On the western end of the island, where the gulls nested and raised chicks in spite of the poisoning, there was evidence of predation on the guillemots. Several dozen guillemot remains, turned inside out, were found over the course of the summer. Occasional shooting is necessary to keep gulls out of the tern and puffin recolonization areas.

No poison was distributed on Matinicus Rock this year, although it was used last year on 25 gull nests at the request of the National Audubon Society. Throughout the summer 14 herring and 5 great black backed gulls were shot. This was prompted by "problem birds" which seemed aggressive toward puffins or razorbills or repeatedly encroached into the "gull free zone". Only 5 nests were found and destroyed early in the season. Gull control in one form or another has been practiced on Matinicus Rock periodically since the 1930's.

A spin-off benefit that we saw on Petit Manan and that we expect here is increased eider production, because the large gulls are significant predators of eider chicks.

16. Marking and Banding

A total of 93 tern chicks were banded on Seal and 366 on Matinicus. Chicks observed in the feeding study were dyed with picric acid in various locations to distinguish "A","B" and "C" chicks. In addition 24 puffins and 54 Leach's storm petrels were banded on Matinicus Rock.

17. Disease Prevention and Control

Last year in early July over 40 dead eiders and numerous dead gulls were found by NAS researchers on the southern end of the island. Avian cholera, which is endemic among Maine's nesting eider population, was suspected. Because the island is only resupplied every two weeks, and because there is no refrigeration, no fresh carcasses could be sent to the National Fish and Wildlife Health Lab. No dead birds were reported this year.

H. PUBLIC USE

1. General

Due to the presence of unexploded ordnance on the island, it is closed to all public use. The National Audubon Society team is issued a Special Use Permit for their work and are individually required to sign releases absolving the Service of any liability should someone be injured by the ordnance.

11. Wildlife Observation

Boating trips to Seal Island increased this year. In the past Maine Whalewatch regularly runs birding trips to Seal Island and Matinicus Rock on weekends in May and June. This year Seal Island received a visit from Capt. Bob Bowman in the "Island Queen" almost on a daily basis. "Watchers" do not land, but they do stop long enough to allow the Audubon folks to get on board and give a short talk on the seabird restoration project. Ten to 15 people normally come on the daylong trips.

Only about seven visiting boats moored and put people ashore at Matinicus Rock.

J. OTHER ITEMS

3. Items of Interest

A revenue sharing check for $1,593 was presented to Knox County this year as compared to $1,325 last year.

4. Credits

MA: All Sections. DS: Editing.

FRANKLIN ISLAND NATIONAL WILDLIFE REFUGE

Friendship, Maine

ANNUAL NARRATIVE REPORT

Calendar Year 1991

INTRODUCTION

Franklin Island is located in Muscongus Bay, Maine, six miles from the town of Friendship, in Knox County. This 12 acre island is all upland, vegetated with red spruce, raspberry, rugosa rose, and various grasses and forbs. It has a very acidic, organic duff soil layer over glaciated granite and schists. Maximum elevation is 35 feet, and the average tidal range is nine feet. It was acquired in 1973 from the Coast Guard, which still maintains an automated lighthouse tower.

Acquisition was authorized under 16 U.S.C. 667b-d, an Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes. The purpose of the refuge is ".. of particular value in carrying out the national migratory bird management program" (Appendix B, National Wildlife Refuge System Draft EIS).

The Two Bush Island unit of the refuge is located about 16 miles east of Franklin Island, and seven miles south of the town of Owls Head. Two Bush is a small, eight acre island owned by the Coast Guard. It is leased at no charge to the Fish and Wildlife Service for five year periods. It, too, has an automated lighthouse tower.

B. CLIMATIC CONDITIONS

The climate of the Muscongus Bay area is moderated by the surrounding ocean. Summer temperatures are significantly cooler and winter temperatures warmer than nearby inland areas. In the Rockland area the average annual temperature is 46, precipitation is 47 inches, and the growing season is 143 days. Fog is an important influence on coastal ecosystems, occurring an average of 21% of the time during the summer.

E. ADMINISTRATION

1. Personnel

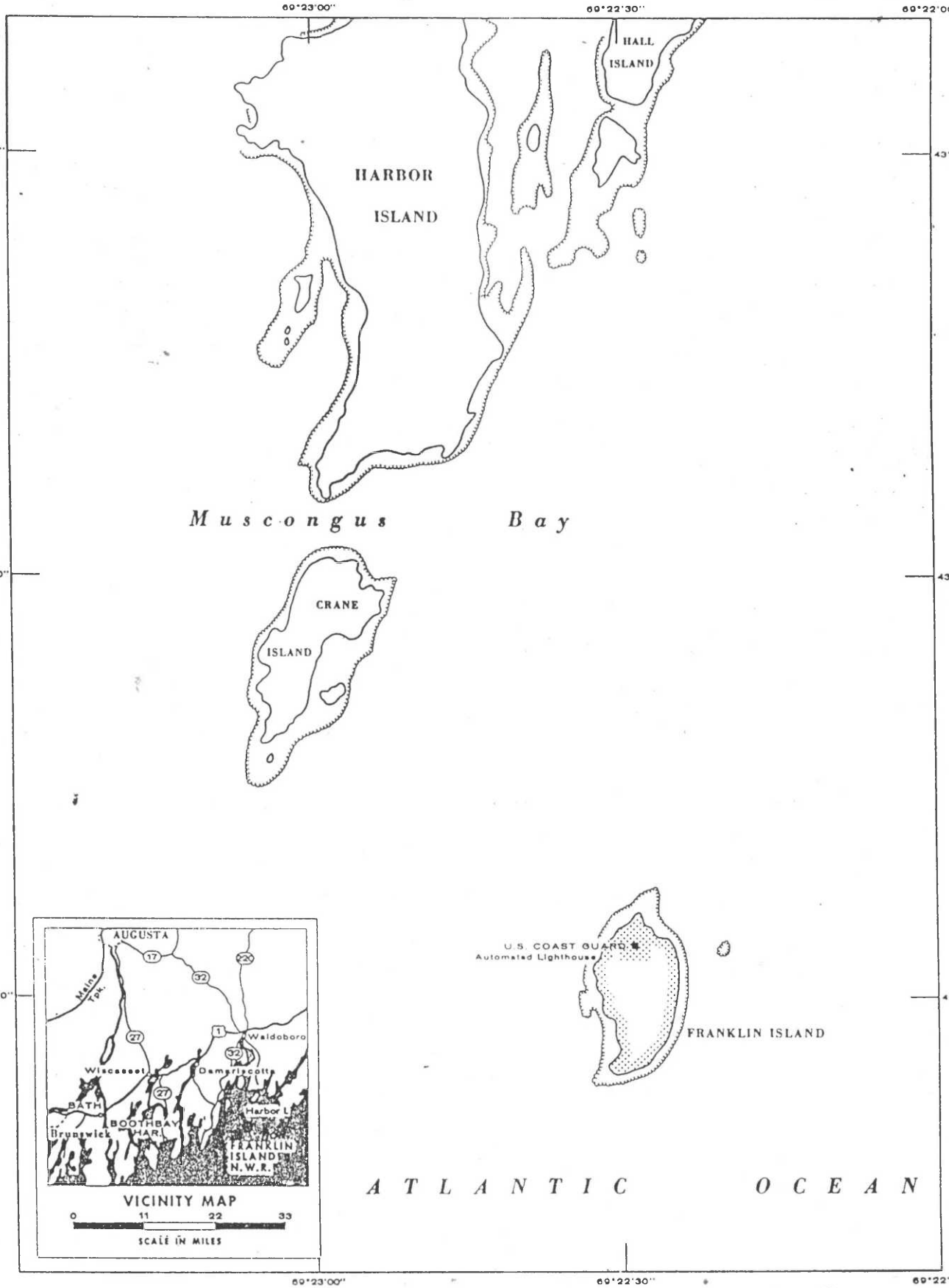
The refuge is administered and funded out of the Petit Manan office in Milbridge.

FRANKLIN ISLAND NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

KNOX COUNTY MAINE

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF ENGINEERING
FROM SURVEYS BY O.S. AND B.S.F. & W.

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Magnetic N. 18° True North
MEAN DECLINATION 1953

BOSTON, MASSACHUSETTS JULY 1974

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F. HABITAT MANAGEMENT

1. General

Franklin Island is vegetated primarily with raspberry, rugosa rose, and various grasses and forbs. About half of the island is sparsely treed with red spruce, with a dense raspberry understory. The raspberry stands provide excellent eider nesting cover.

Two Bush is treeless but densely vegetated. Typical plants include raspberry, timothy, yarrow, nightshade, angelica, bayberry, rugosa rose, scotch lovage, and buttercup.

There is no active habitat management on the refuge at this time.

2. Forests

Franklin Island was undoubtedly forested at one time with red spruce. About half of it was cleared when the light-station was built in 1806. Some say that the dead trees on islands like this were killed by the acidic droppings of cormorants, but this has never been proven.

Two Bush Island may have been forested at one time, but is now treeless.

12. Wilderness and Special Areas

Franklin Island was listed on the State Register of Critical Areas in October 1977 for its unique value to nesting eiders. Registry Title is **"Franklin Island Eider Nesting Area"**, see Section G.3.

G. WILDLIFE

3. Waterfowl

The dense raspberry understory on Franklin provides excellent nesting habitat for common eiders. Nesting density is the highest in the State with over 1400 nests packed into less than six acres.

Approximately 75 eiders have nested on Two Bush Island. Last year in June, approximately 500 eiders were flushed from the lee of the island, indicating that the actual number might be higher.

Due to staff transfers no visits were made to this refuge this year.

Eiders on the wing.

4. Marsh and Water Birds

Franklin Island has a growing colony of approximately 30 pairs of black-crowned night herons. The island's sparse spruce stand with many snags provides good heron nesting habitat.

5. Shorebirds, Gulls, Terns, and Allied Species

Franklin Island has approximately 20 nesting pairs of black guillemots and 20 pairs each of herring and great black-backed gulls.

Two Bush has approximately 50-75 nesting pairs of herring gulls, five pairs of great black-backed gulls, 15 pairs of guillemots and 20 pairs of double-crested cormorants.

Leach's storm-petrels also nest on both islands; they were encouraged to nest on Franklin by the National Audubon Society in the early 1980's through the use of vocalization recordings and burrow construction.

Two Bush Island was identified as a good potential tern recolonization site by the Gulf of Maine Tern Working Group in 1990. The island supports suitable common, arctic and roseate tern habitat. Its past history as a tern colony, its strategic

location in Penobscot Bay, federal ownership, and similarities to Petit Manan Island make it an ideal spot for expanding tern restoration efforts. The Coast Guard was supportive of the project and expressed a desire to have interns use the automated tower for living and observation. Establishment of a field station on the island and initiation of gull control was scheduled for the 1991 field season, but staff transfers prevented this from occurring.

Meetings continued regarding the Two Bush Tern Restoration Project. There is some hesitancy from the State to embrace this effort. According to State records terns have not nested there in nearly 100 years. However, over the past years Bill Drury and John Anderson have observed "roving" bands of common terns in the area. Goettel and Drury visited the island on 29 June 1990 and observed a lone common tern nesting on Little Two Bush, which is 100 yards off shore from Two Bush and owned by the State. This bird successfully hatched its clutch.

A joint meeting was held in December with the State and College of the Atlantic to clarify some of the misinformation. The State wanted to focus tern restoration on Ship and Trumpet Islands, which are preferred sites. However, these islands are owned by the Nature Conservancy, and gull control is an activity they do not want to pursue. The State thinks the Nature Conservancy is now willing to turn the islands over to them. If this were to happen and the State could guarantee long term funding, the College would prefer working on Ship and Trumpet. Logistically it would be easier, and the resource potential is greater. However, given the economic "uncertainty" of State funds and island ownership, it was decided this office would write an EA for Two Bush, apply for the necessary permits, and we would evaluate the situation next field season.

6. Raptors

Two pairs of ospreys nest on Franklin.

H. PUBLIC USE

1. General

Both units of the refuge are closed to all public use during the seabird nesting season, April 1 through July 31.

Pleasure boat traffic is more common in this area of Maine than in the Milbridge area, and the picturesque lighthouses do attract some visitors. Fortunately, landing on both islands is difficult, which discourages most.

3. Outdoor Classrooms-Teachers

Students from the nearby Audubon Ecology Camp in Medomak regularly visit Franklin Island during the summer on their field trips around Muscongus Bay.

J. OTHER ITEMS

3. Items of Interest

A revenue sharing check for $835.00 was presented to the town of Friendship this year, up from $695 last year.

4. Credits MA: All Sections. DS: Editing.

FRANKLIN ISLAND
NWR

POND ISLAND NATIONAL WILDLIFE REFUGE

Popham, Maine

ANNUAL NARRATIVE REPORT
Calendar Year 1991

INTRODUCTION

Pond Island is located at the mouth of the Kennebec River in Casco Bay, Maine. The island is about 16 miles northeast of Portland in the town of Popham Beach, Sagadahoc County. This 10 acre treeless island is all upland, about 75% vegetated with mixed grasses and shrubs. The base is chiefly Algonquian sedimentary schist with numerous white quartz intrusions. The soil is a thin mantle of sandy loam grading to sterile sand around the perimeter. Most of the shoreline is rugged, cleaved rocks except for a small sand beach area in the northwest corner. The island surface grades from MSL to a rather flat top at the 30 foot MSL contour. There is a fast rip-tide past the island, with an average daily rise and fall of 9 feet.

The island was acquired from the U.S. Coast Guard in 1973. The Coast Guard maintains a remote navigational aide (lighthouse) and fog signal in the north-central part of the island by a right-of-way. Transfer of lands was authorized under 16 U.S.C. 667b-d, an Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes. The purpose of the refuge as stated in Appendix B to the National Wildlife Refuge System Draft EIS (Dec 89) is, "... of particular value in carrying out the national migratory bird management program."

Colonial nesting seabirds include eider ducks, and herring and great black-backed gulls. Migrating black ducks, teal and Canada geese rest and feed in the area. In the early 70's the area was identified for its value to nesting common terns and Leach's petrels. Neither of these species have been observed since the early 80's. As has happened on many of the tern nesting islands in Maine, the nesting gulls probably usurped the terns.

B. CLIMATIC CONDITIONS

The climate is oceanic, subject to oceanic fogs and storms, but is tempered somewhat by the moderating effect of the Atlantic Ocean. Temperature extremes range from -20 to 90. Summer days in the 70's are common, and winters in the 20's are seasonal averages. Generally, the temperature is 15 cooler in summer than the mainland. Precipitation varies annually, with 45 inches being average. "Nor'easters" may drop up to four inches of rain during a 24 hour period. Due to wind action, very little snow stays on the island, though total fall annually may exceed 100 inches. (Biological Reconnaissance Report, 1972)

C. LAND ACQUISITION

2. Easements

The U.S. Coast Guard has an easement on a 120 foot wide swath from the lighthouse plot (40'x40') to the water for buried telephone lines (under-water/land-connected). These lines recharge and operate the lighthouse and fog signal.

E. ADMINISTRATION

The refuge was administered by Parker River NWR in Massachusetts from 1973 through 1990. Administrative duties transferred to Petit Manan NWR in 1991.

F. HABITAT MANAGEMENT

1. General

There is no active habitat management on the refuge at this time. Management has been directed towards resource protection due to budget and personnel constraints.

5. Grasslands

About 75% of the island is vegetated. The vegetation consist of mixed grasses, dune grass, bayberry, blueberry, Juneberry, poison ivy and beach rose. There is a two acre area of sand with large patches of dune grass that resembles a low-dune type habitat.

6. Other Habitats

The island is glaciated, wave-worn, hard, schist ledge rock. The shoreline is steep and rugged with many bare, vertical faces except a small sand beach area. Even here, rocks fringe the sand and make a boat landing treacherous due to high winds and tides.

G. WILDLIFE

No survey trips were made to Pond Island by Refuge, Maine Department of Inland Fish and Wildlife, or Maine Audubon personnel in 1991.

3. Waterfowl

The average population of nesting Common Eiders has been about 100. Black ducks and Canada geese benefit from the shelter and vegetation on the island, primarily during migration.

5. Shorebirds, Gulls, Terns and Allied Species

Nesting common terns, Leach's petrel, and herring and great black-backed gulls were recorded in the early 70's. Since the early 80's only gulls have been recorded. The nesting population of gulls observed during the last visits to the island (1988/1989) were about 1,000 herring and 200 great black-backed. Take over by gulls occurred on many tern islands in Maine at this time. Perhaps it is time to consider gull control.

7. Other Migratory Birds

Nesting sharp-tailed and seaside sparrows have been observed on the island.

10. Other Resident Wildlife

Meadow voles are the only year-round residents that have been noted on the island.

17. Disease Prevention and Control

No outbreaks of Avian Cholera were reported this year. The last two incidents occurred in 1983 and 1989.

H. PUBLIC USE

1. General

Rocky shorelines, high winds and tides severely limit public use. Access to the island is by boat only, with a limited area of shoreline suitable for safe landing. The refuge is closed during the nesting season, March 1 to July 31.

9. Fishing

Pond Island was opened to public fishing in 1985. Fishing opportunities are limited to saltwater fishing from a small area on shore. During peak runs of bluefish and striped bass, some visitors rest or fish from the lower rocky edge along the westerly shore. Visitation attributed to this type of fishing is minimal. Most fishermen prefer the mobility and increased water access via boat.

16. Other Non-Wildlife Oriented Recreation

Sea Kayaking has become an increasingly popular sport in the northeast. Many people are enjoying this sport on their own or paying various guiding services for package trips. This is a sport that requires a high degree of skill, understanding of tidal currents, weather impacts, and respect for cold water. The Maine Island Trail Association (MITA) has produced a guide book

which directs kayakers to islands where camping is permitted, warns them of hazards, and promotes safe, responsible use of the Maine Coast.

Unfortunately, a fatality occurred on 26 August, when Barbara Shea, 36, and her partner left Pond Island. The following information was taken from the MITA analysis of the accident.

The mouth of the Kennebec River is classified as a "Danger Area" in the MITA guide book. The principal reason for this classification is the frequent combination of large, onshore-directed waves and seaward-directed, strong ebb tidal currents of the Kennebec. As the onshore-directed swell or waves move into the area where the river currents are running against them, the wave height not only increases dramatically in proportion to the current velocity, but the resulting wave steepness produces large, plunging-**DUMPING**-waves. The Kennebec flow bifurcates at Pond Island; the stronger branch flows to the east of the island. Shea, a relatively inexperienced kayaker, was unable to manage either the wind pushing her easterly or the ebb current that was quickly carrying her seaward past the protection of Pond Island and into the zone where offshore waves met the ebbing current creating large dumping waves. Further adding to the normal spring tide flow of the Kennebec that day was the residual runoff from Hurricane Bob's earlier rainfall. Her partner left the island to help her when he saw her capsize. He too capsized but elected to swim back to Pond Island. Shea, an excellent swimmer but wearing only a bathing suit and blue PFD, elected to stay with her kayak. She was washed out to sea where she had to contend with currents and rough sea conditions from strong southwest winds.

It took her partner about an hour before he was able to hale a lobsterman, at which time the Coast Guard was notified. Unfortunately, nightfall was only an hour away, and the lobsterman, fearing for the safety of his craft, left the search to the Coast Guard.

Shea's body was not found until the next morning from the air. Neither paddler was wearing a wet or dry suit, neither had flares, radio, strobe light, spare paddle, reflective tape on PFD/paddles/boat, or spare clothes, and neither were knowledgeable of or recognized the hazardous conditions. In addition to the omissions of safety equipment, timing and location of the accident conspired to forestall a speedy rescue of Shea; timing - because of impending darkness, and location - because her partner was marooned on Pond Island with no means of signaling or contacting anyone. The dark colors of her kayak, PFD, and paddle without reflective tape, meant she was nearly invisible in the darkness amongst the waves.

Sea Kayaking will continue to be a popular activity along the Maine Coast, hopefully incidents such as this will not be frequent.

J. OTHER ITEMS

3. Items of Interest

A Refuge Revenue Sharing Check for $814.00 was presented to the town of Phippsburg this year, $137.00 more than last year.

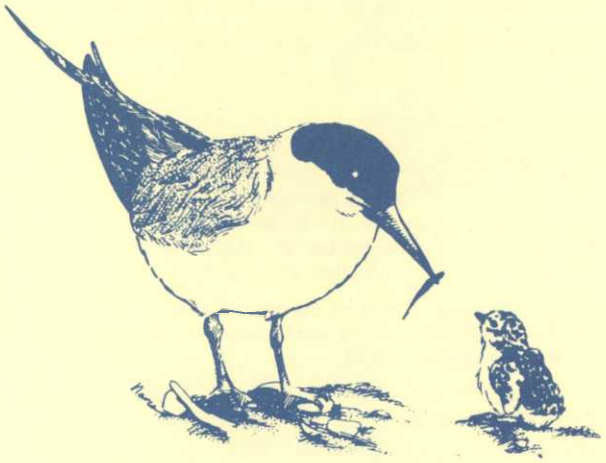
4. Credits

MA: All Sections. DS: Editing.

Birds

Petit Manan

National
Wildlife
Refuge



Maine

PETIT MANAN NATIONAL WILDLIFE REFUGE is a 3,335-acre refuge complex on the eastern Maine coast, consisting of portions of Petit Manan Point and Island in Steuben; Bois Bubert Island in Milbridge; and Nash Island in Addison.

Petit Manan Refuge has a variety of habitats, including spruce and hardwood forests, jackpine stands, cedar swamps, raised peatlands, blueberry barrens, fresh and saltwater marshes, and treeless islands. This variety has made the Point a noted birding area for many species of seabirds, shorebirds, songbirds, waterfowl, and raptors, including the endangered bald eagle, peregrine falcon, and roseate tern.

The Point is accessible by car off U.S. Rte 1 in Steuben, at the end of the Pigeon Hill Road. There are two unimproved trails that start at the parking lot near the information exhibits.

Because the seabird colonies are very sensitive to disturbance, access is restricted on Petit Manan Island and Nash Island during the nesting season, April 1st through July 31st. Please contact the refuge manager before attempting to visit these island units.

This folder lists over 250 birds that have been identified on the refuge, and is in accordance with the Sixth American Ornithologists' Union Checklist. Most birds are migratory, therefore their seasonal occurrence is coded as follows:

Season:

s - Spring	March 21 - June 20
S - Summer	June 21 - September 20
F - Fall	September 21 - December 20
W - Winter	December 21 - March 20

† - Nesting has occurred on the refuge within the past 5 years.
* - A species which occurs and/or nests in only one or two locations in the refuge.

Relative Abundance:

a - abundant	a species which is very numerous.
c - common	certain to be seen or heard in suitable habitat.
u - uncommon	present, but not certain to be seen.
o - occasional	seen only a few times during a season.
r - rare	seen at intervals of 2 to 5 years.

	s	S	F	W
LOONS - GREBES				
____ Red-throated Loon	u		u	
____ Common Loon	c	c	c	c
____ Pied-billed Grebe			o	
____ Horned Grebe	c		c	c
____ Red-necked Grebe	c		c	c
SHEARWATERS - STORM PETRELS				
____ Sooty Shearwater	r	r		
____ Manx Shearwater		r		
____ Wilson's Storm-Petrel		o		
____ Leach's Storm-Petrel †	u	u	u	
GANNET - PELICANS - CORMORANTS				
____ Northern Gannet	o	o	o	
____ Great Cormorant	c	o	c	o
____ Double-crested Cormorant †	a	a	a	
BITTERNS - HERONS - IBISES				
____ American Bittern †	u	u	u	
____ Great Blue Heron	u	u	u	o
____ Snowy Egret	r	r		
____ Little Blue Heron	r			
____ Tricolored Heron		r		
____ Cattle Egret	r			
____ Green-backed Heron	r	r		
____ Black-crowned Night-Heron	r	r		
SWANS - GEESE - DUCKS				
____ Snow Goose	o			
____ Brant	u		o	
____ Canada Goose	o		o	o
____ Wood Duck †	u	u	u	
____ Green-winged Teal †	c	c	a	
____ American Black Duck †	c	c	a	c
____ Mallard	o	o	u	
____ Northern Pintail	o		u	
____ Blue-winged Teal †	u	u	u	
____ American Wigeon	o	r	u	
____ Ring-necked Duck	r			
____ Greater Scaup	o		o	
____ Lesser Scaup			o	
____ Common Eider †	a	a	a	a
____ King Eider	r			
____ Harlequin Duck	r			
____ Oldsquaw	c		a	c
____ Black Scoter	a	o	u	
____ Surf Scoter	c	o	u	
____ White-winged Scoter	c	o	u	u
____ Common Goldeneye	c		c	c
____ Bufflehead	u		u	u
____ Hooded Merganser †	u	u	u	
____ Common Merganser			o	
____ Red-breasted Merganser	c	u	c	c
____ Ruddy Duck			o	
VULTURES - HAWKS - FALCONS				
____ Turkey Vulture	o			
____ Osprey †	u	u	u	

	s	S	F	W
____ Bald Eagle †	u	u	u	u
____ Northern Harrier †	c	c	c	
____ Sharp-shinned Hawk †	u	o	a	o
____ Cooper's Hawk	o		o	
____ Northern Goshawk †	u	u	u	u
____ Broad-winged Hawk	o	o		
____ Red-tailed Hawk		o	o	
____ Rough-legged Hawk	o		o	o
____ American Kestrel	c		c	
____ Merlin	o		c	
____ Peregrine Falcon	u	o	c	
____ Gyrfalcon				r
GROUSE - QUAIL - TURKEY				
____ Spruce Grouse †	o	o	o	o
____ Ruffed Grouse †	c	c	c	c
RAILS - CRANES				
____ Sora			r	
____ American Coot			r	
PLOVERS - SANDPIPERS				
____ Black-bellied Plover	c	c	c	
____ Lesser Golden-Plover			o	
____ Semipalmated Plover	c	c	c	
____ Piping Plover	r	r		
____ Killdeer	o	o	o	
____ Greater Yellowlegs	c	c	c	
____ Lesser Yellowlegs	o	u	u	
____ Solitary Sandpiper		o	o	
____ Willet †	u	u		
____ Spotted Sandpiper †	u	u	u	
____ Whimbrel		u	u	
____ Hudsonian Godwit		o	o	
____ Ruddy Turnstone	c	c	c	
____ Red Knot	u	u	u	
____ Sanderling	o	u	u	
____ Semipalmated Sandpiper	u	c	c	
____ Western Sandpiper			o	
____ Least Sandpiper	u	u	u	
____ White-rumped Sandpiper	o	u	u	
____ Baird's Sandpiper			o	
____ Pectoral Sandpiper			o	
____ Purple Sandpiper	u		u	u
____ Dunlin	o		u	u
____ Short-billed Dowitcher	u	c	c	
____ Long-billed Dowitcher		o		
____ Common Snipe	o		o	
____ American Woodcock †	u	u	u	
____ Red-necked Phalarope	u	u	u	
JAEGERS - GULLS - TERNS - AUKS				
____ Pomarine Jaeger		o		
____ Parasitic Jaeger	o	o		
____ Laughing Gull †	c	c	c	
____ Little Gull			r	
____ Common Black-headed Gull †	o	r		

	s	S	F	W
____ Bonaparte's Gull	o	u	u	o
____ Ring-billed Gull	u	u	c	u
____ Herring Gull †	a	a	a	a
____ Iceland Gull	u			u
____ Great Black-backed Gull †	c	c	c	c
____ Black-legged Kittiwake		o		
____ Roseate Tern †	u	u	u	
____ Common Tern †	c	c	c	
____ Arctic Tern †	c	c	c	
____ Black Tern	o	o		
____ Dovekie				r
____ Common Murre	o	o		
____ Thick-billed Murre				r
____ Razorbill	u	u		
____ Black Guillemot †	c	c	c	u
____ Atlantic Puffin †	u	u	u	
DOVES - PARROTS - CUCKOOS - OWLS - SWIFTS - HUMMINGBIRDS				
____ Rock Dove			o	
____ Mourning Dove †	u	u	u	
____ Black-billed Cuckoo	r	r	r	
____ Yellow-billed Cuckoo			r	
____ Great Horned Owl †	u	u		
____ Snowy Owl	r		r	o
____ Northern Hawk-Owl			r	
____ Barred Owl †	u	u		
____ Short-eared Owl	r		r	
____ Northern Saw-whet Owl	r		r	
____ Common Nighthawk	o		o	
____ Whip-poor-will †	u	u	u	
____ Chimney Swift †	u	o		
____ Ruby-throated Hummingbird	u	u	u	
____ Belted Kingfisher	u	u	u	
WOODPECKERS - FLYCATCHERS				
____ Red-headed Woodpecker			r	
____ Yellow-bellied Sapsucker			u	
____ Downy Woodpecker †	c	c	c	c
____ Hairy Woodpecker †	u	u	u	u
____ Black-backed Woodpecker	r			
____ Northern Flicker †	c	c	c	
____ Pileated Woodpecker	o		o	
____ Olive-sided Flycatcher	o	o	o	
____ Eastern Wood-Pewee †	u	u	u	
____ Yellow-bellied Flycatcher †	u	u	u	
____ Alder Flycatcher †	c	c	c	
____ Least Flycatcher †	u	u	u	
____ Eastern Phoebe †	u	u	u	
____ Great-crested Flycatcher †	u	u	u	
____ Eastern Kingbird	u	u	u	
LARK - SWALLOWS - JAYS - CROWS				
____ Horned Lark			u	
____ Purple Martin	o			
____ Tree Swallow †	c	c	u	
____ Northern Rough-winged Swallow	o			

	s	S	F	W
____ Bank Swallow †	c	c		
____ Cliff Swallow †	c	u		
____ Barn Swallow †	c	c	u	
____ Gray Jay	o	o	o	
____ Blue Jay †	u	u	u	
____ American Crow †	c	c	c	c
____ Common Raven †	c	c	c	c
TITMICE - NUTHATCHES - WRENS				
____ Black-capped Chickadee †	c	c	c	c
____ Boreal Chickadee	o	o		o
____ Red-breasted Nuthatch †	u	u	u	u
____ White-breasted Nuthatch	r		r	
____ Brown Creeper †	u	u	u	
____ Winter Wren †	u	u	u	
____ Marsh Wren		r		
KINGLETS - THRUSHES - THRASHERS				
____ Golden-crowned Kinglet †	c	c	c	u
____ Ruby-crowned Kinglet †	c	c	c	
____ Blue-gray Gnatcatcher	r			
____ Eastern Bluebird	r	r	r	
____ Veery †	u	u	u	
____ Gray-cheeked Thrush			r	
____ Swainson's Thrush †	c	c	c	
____ Hermit Thrush †	c	c	c	
____ Wood Thrush	o		o	
____ American Robin †	c	c	a	u
____ Gray Catbird †	c	c	c	
____ Northern Mockingbird †	r	r	r	
____ Brown Thrasher †	r	r	r	
WAXWINGS - SHRIKES - STARLING				
____ Water Pipit			u	
____ Cedar Waxwing †	o	c	c	o
____ Northern Shrike	o		o	o
____ Loggerhead Shrike		r		
____ European Starling †	c	c	c	c
VIREOS - WOOD WARBLERS				
____ Solitary Vireo †	u	u	u	
____ Yellow-throated Vireo	r		r	
____ Warbling Vireo	u	u		
____ Philadelphia Vireo	u	u	u	
____ Red-eyed Vireo †	c	c	c	
____ Blue-winged Warbler		r		
____ Tennessee Warbler	u	u	u	
____ Orange-crowned Warbler	o		o	
____ Nashville Warbler †	c	c	c	
____ Northern Parula †	c	c	c	
____ Yellow Warbler †	c	c	c	
____ Chestnut-sided Warbler †	c	u	c	
____ Magnolia Warbler †	c	c	c	
____ Cape May Warbler	r	c	c	
____ Black-throated Blue Warbler	o	o		
____ Yellow-rumped Warbler †	c	c	c	
____ Black-throated Green Warbler †	c	c	c	
____ Blackburnian Warbler †	c	c	u	

		s	S	F	W
____	Prairie Warbler			r	
____	Palm Warbler †	c	u	c	
____	Bay-breasted Warbler †	u	c	c	
____	Blackpoll Warbler	u		u	
____	Black-and-white Warbler †	c	c	c	
____	American Redstart †	c	c	c	
____	Ovenbird †	u	u	u	
____	Northern Waterthrush	o	o		
____	Common Yellowthroat †	c	c	c	
____	Wilson's Warbler †	u	u	u	
____	Canada Warbler †	u	o	o	
____	Yellow-breasted Chat	r		r	
TANAGERS - SPARROWS					
____	Summer Tanager	r			
____	Scarlet Tanager	u	u	u	
____	Northern Cardinal	o		o	
____	Rose-breasted Grosbeak †	u	u	u	
____	Indigo Bunting		o		
____	Dickcissel			r	
____	Rufous-sided Towhee †	u	u	u	
____	American Tree Sparrow	u		u	u
____	Chipping Sparrow †	u	u	u	
____	Field Sparrow	o		o	
____	Vesper Sparrow		r		
____	Lark Sparrow		r	r	
____	Savannah Sparrow †	c	c	c	
____	Grasshopper Sparrow			r	
____	Sharp-tailed Sparrow	o		o	
____	Fox Sparrow	u		u	
____	Song Sparrow †	c	c	c	
____	Lincoln's Sparrow †	u	u	u	
____	Swamp Sparrow †	c	c	c	
____	White-throated Sparrow †	c	c	c	
____	White-crowned Sparrow	o		o	
____	Dark-eyed Junco †	c	u	c	
____	Lapland Longspur			o	
____	Snow Bunting			c	o
BLACKBIRDS - FINCHES					
____	Bobolink †	u	u	u	
____	Red-winged Blackbird †	c	c	c	
____	Eastern Meadowlark	r		r	
____	Yellow-headed Blackbird			r	
____	Rusty Blackbird	u			
____	Common Grackle †	c	c	c	
____	Brown-headed Cowbird †	u	u	u	
____	Orchard Oriole	r			
____	Northern Oriole	u	u	u	
____	Pine Grosbeak	u		u	u
____	Purple Finch †	u	u	u	
____	House Finch	r		r	
____	Red Crossbill	r	r	r	r
____	White-winged Crossbill	u	u	u	u
____	Common Redpoll	u		u	c
____	Hoary Redpoll				r

		s	S	F	W
____	Pine Siskin †	u	u	u	u
____	American Goldfinch †	u	u	u	u
____	Evening Grosbeak	u		u	

These additional 12 species are considered accidentals:

American Oystercatcher
Bar-tailed Godwit
Curlew Sandpiper
Sooty Tern
Black Skimmer
Common Barn Owl
Chuck-will's Widow
Couch's Kingbird
Black-billed Magpie
Townsend's Solitaire
Kentucky Warbler
Western Meadowlark

NOTES

Date _____ Time _____

Observers _____

Weather _____

Tides _____

Director Turners Office on 7 July. Anderson accepted an Award in recognition of volunteer work completed on the Whaley Homestead, Lee Metcalf NWR.

Revenue Sharing checks were distributed as follows: Steuben, $38,929, up from $32,399; Milbridge, $11,928 up from $9,027; Addison,$844, up from $702.

4. Credits MA: All sections. DS/JK: Editing.

Petit Manan N.W.R.
P.O. Box 279
Milbridge, ME 04658

K. FEEDBACK

NR 1991

Having recently transferred from one Region to another, I was again reminded of how "differently" the individual Regions (kingdoms) operate. Certain operations need to be standardized throughout the country. For instance, the computerized budgeting process should be standardized to one program (Rbase, Dbase, etc.). All Real and personal property inventories should be done on a standardized computer program, no more property card, and each field station should issue property numbers (Region 6 has an excellent program). The only way this will happen is if Washington takes the initiative and dictates "it will be so". I think Washington should bring all of the key players within these areas of responsibility from each Region for a 'show and tell' of how they are operating, factor in field support/issues, and decide on a Nationwide program. After, the decision is made and the single operating method instituted, I feel these people should meet on an annual basis to insure modifications or improvements to the system are unified. This will not erode the individuality of each Region, but unify us in some of our daily operations. This would be a tremendous benefit to the field, because, hopefully the most efficient and 'field service oriented' program would be selected, and less time would be spent by employees participating in inter-regional transfers learning regional nuances.

Computers and FAX machines are wonderful tools. I would hate to have to revert back to a typewriter. But, we seem to be receiving an inordinate amount of FAXed questionnaires and information inquiries from within our Agency that have very short turn around times. I wonder how many trees we consume on a daily basis with this uncontrollable craving for information. I thought we had an initiative to reduce paperwork.

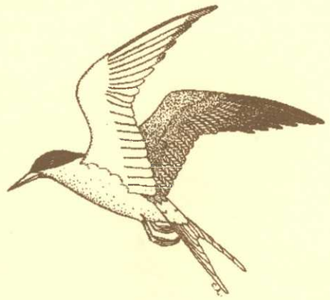
Petit Manan

National Wildlife Refuge

Steuben, Maine

Wildlife of the Coast

Refuge forests, grasslands, rocky outcrops, tidal wetlands and mud flats and the rich fish resources of surrounding waters attract wildlife throughout the year. Spring and fall migrations draw flocks of waterfowl, particularly black ducks, common eiders, goldeneyes and oldsquaws. Raptors and songbirds also use the islands to rest and feed during migration. Shorebirds feast on invertebrate animals in the marshes and mud flats, putting on fat to carry them on their long flight to South America.



Some migratory birds stay here in other seasons. Rafts of black ducks and eiders spend the winter feeding offshore and in protected bays. Songbirds, eiders and ospreys stay through the summer to nest in grass, thickets or trees. One special group of nesting birds is the seabirds.

The offshore islands, particularly treeless ones, offer valuable nesting sites for a great variety of seabirds. Common and arctic terns, endangered roseate terns, Atlantic puffins, razorbills, black guillemots, Leach's storm-petrels, laughing, herring and great black-backed gulls and double-crested cormorants all find prime habitat in which to raise their young. The islands are crucial to nesting success because they are usually free of mammalian predators and are surrounded by the ocean's rich fisheries resources for a food base.

Endangered species are a special concern. Peregrine falcons and bald eagles use refuge lands during spring and fall migration. Eagles also nest on remote, forested islands and over-winter here where they can feed on fish and carrion. Roseate terns nest with other terns on some of the grass-covered islands.

Marine mammals also use this region extensively. Harbor seals are here throughout the year, using refuge and other islands for loafing, basking and giving birth to their pups. Gray seals are less common but are present year-round, usually on the outer islands. Harbor porpoises, finback and minke whales, and endangered right whales occasionally explore the bays seeking the rich supply of fish and invertebrates providing by ocean upwellings near islands and ledges.

On Petit Manan Point and some of the larger islands deer, bobcats, foxes, coyotes, porcupines, snowshoe hares, beaver and raccoons are common. Moose and black bear are also sometimes seen.

Managing for Wildlife

Habitat protection is the most important management goal for these refuges, but refuge staff also actively manage certain areas and populations for key species in need of help.

Biologists monitor population trends and nesting success for many species.

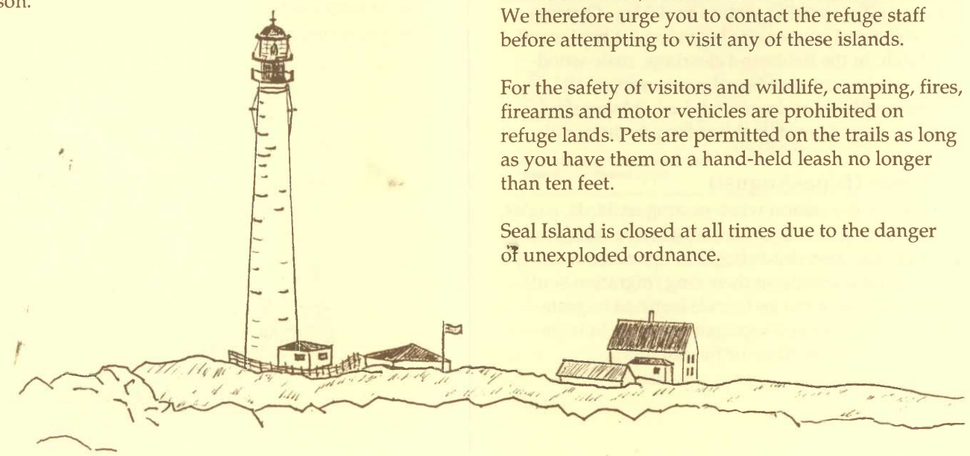
On Petit Manan Point blueberry fields are burned on a three-year rotation to keep areas open for courting woodcock and to provide a food source for deer, whimbrels, ruffed grouse and a variety of songbirds. Hayfields are mowed periodically for similar purposes.

Some of the freshwater marshes on the Point are managed to provide optimum waterfowl habitat. The water level in former cranberry bogs is raised or lowered to create additional food and nest sites. Nest boxes are placed in the marshes, providing safe, dry nest cavities for wood ducks and hooded mergansers as well as songbirds.

On the seabird nesting islands, herring and great black-backed gull populations are maintained at levels that reduce competition for nesting space for the less common species such as terns, laughing gulls, puffins, razorbills and black guillemots.

On Petit Manan Island, which has historically been one of the most important seabird colonies in Maine, growing populations of herring and great black-backed gulls displaced nesting terns and laughing gulls in the late 1970's. The refuge's seabird management program, which included removal of the nesting gulls starting in 1984, successfully restored the tern and laughing gull colonies. As a side benefit, a colony of Atlantic puffins also began nesting here. A similar program is now underway on Seal Island, in cooperation with the National Audubon Society and the Canadian Wildlife Service. Puffin chicks are being transplanted from Canada to restore a former colony and some nesting gulls have been removed to prevent gull predation. Biologists are using decoys and sound recordings to encourage terns to reestablish a colony.

Some areas of the refuge must remain closed to visitors to protect nesting species and their habitat from human disturbance during the nesting season.



Enjoying the Refuge

Petit Manan Point has two foot trails that offer visitors a chance to see and photograph wildlife in several coastal habitats. Birch Point Trail (3 miles round trip) is a gently sloping walk through blueberry fields and woods to the salt marshes on the northeastern corner of the point. The Shore trail (1 mile, round trip) is a more rugged, strenuous hike that leads to the eastern shore of the point with views of several heaths and cobble beaches. To minimize wildlife disturbance we ask that you stay on established trails.

To enjoy the refuge trails, you can park in the small lot at the end of Pigeon Hill Road off U.S. Route 1 in Steuben. The Point is open from sunrise to sunset all year. Snowshoeing and cross-country skiing on the trails are good ways to see winter wildlife. Shellfishing is permitted according to State and town laws. For more information contact the Refuge Manager.

The island units in these refuges are accessible only by boat. To protect nesting seabirds, which are very sensitive to human disturbance, all islands except Bois Bubert and Cross are closed to the public during the seabird nesting season, April through July. Landing on the islands can be hazardous because of tides, currents and weather conditions. We therefore urge you to contact the refuge staff before attempting to visit any of these islands.

For the safety of visitors and wildlife, camping, fires, firearms and motor vehicles are prohibited on refuge lands. Pets are permitted on the trails as long as you have them on a hand-held leash no longer than ten feet.

Seal Island is closed at all times due to the danger of unexploded ordnance.

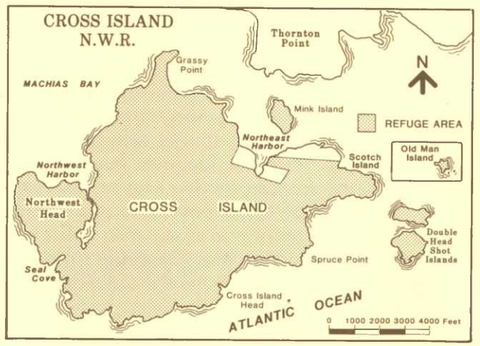
Bois Bubert Island (1,155 acres, Milbridge) is much like Petit Manan Point in character and wildlife. It runs parallel to the point, about one mile to the east. Although most of the island is refuge, some private inholdings remain.

Petit Manan Island (9 acres, Steuben) lies two and a half miles south of the Point. This treeless island has long been one of the most important islands in the Gulf of Maine for colonial nesting seabirds. It is also the site of an automated U.S. Coast Guard light station with an imposing 123-foot tall granite lighthouse tower that is on the National Register of Historic Places.

Nash Island (5 acres, Addison) is a nine-acre treeless island lying about seven miles east of the point. It is a former tern nesting island that now hosts nesting eider ducks and gulls.

Cross Island National Wildlife Refuge

is a 1,703-acre island complex donated to the Fish and Wildlife Service in 1980 by Thomas and Virginia Cabot (through The Nature Conservancy). Located in Cutler, the complex includes six islands: Cross Island (1,654 acres); Scotch Island (10 acres); Outer Double Head Shot (14 acres); Inner Double Head Shot (8 acres); Mink Island (11 acres); and Old Man Island (6 acres).

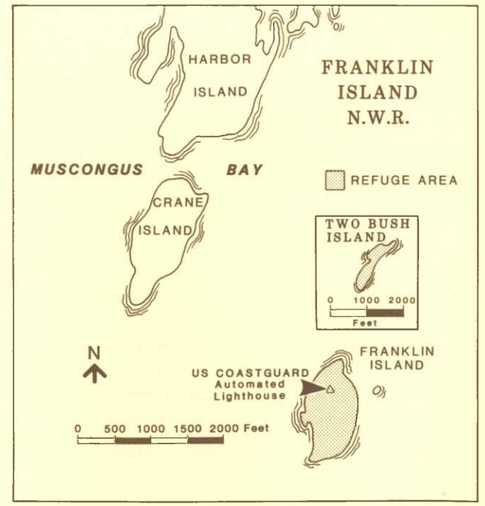


dense stands of red and white spruce, balsam fir, yellow and paper birch and red maple. Rocky cliffs, some over 100 feet high, cobble beaches and salt marshes dominate the shoreline.

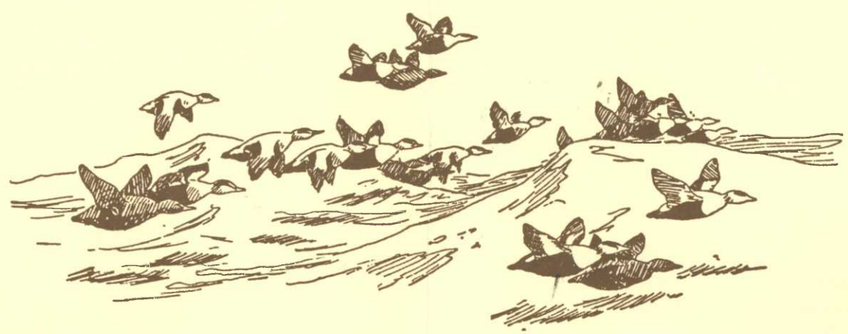
Cross Island has resident populations of white-tailed deer and furbearers as well as nesting bald eagles and osprey. Waterfowl, shorebirds and raptors stop here on their migrations. The Double Head Shots and Old Man Islands are covered with grasses and raspberry thickets, with some stunted red spruce trees. They are important for colonial nesting seabirds, attracting colonies of common eiders, Leach's storm-petrels, black guillemots, and double-crested cormorants. Old Man Island is one of only four nesting sites for razorbills in the Gulf of Maine.

Franklin Island National Wildlife Refuge

is a two-island complex totalling 20 acres. It includes 12-acre Franklin Island in Muscongus Bay, about six miles from the town of Friendship. Covered with spruce trees and raspberry thickets, the island has one of the largest common eider colonies in Maine with over 1,300 nests. Osprey and black-crowned night herons also nest here. The island was acquired in 1973 from the U.S. Coast Guard, which still maintains an automated lighthouse tower here.

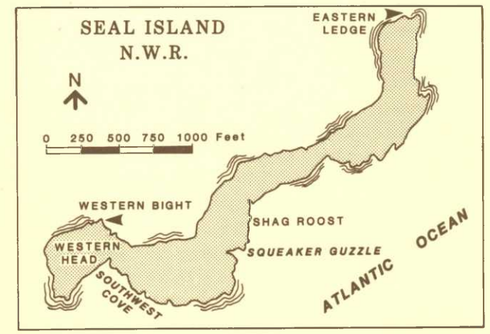


Two Bush Island lies about sixteen miles east of Franklin Island and seven miles south of the town of Owl's Head. This eight-acre treeless island is owned by the U.S. Coast Guard which maintains an automated lighthouse tower. The Coast Guard leases the island to the U.S. Fish and Wildlife Service at no charge, so that we can protect and manage valuable seabird nesting habitat.



Seal Island National Wildlife Refuge

is a 65-acre treeless island lying about 21 miles south of Rockland in Knox County. A bombing and shelling target from World War II until 1952, it became a refuge when it was transferred from the Navy in 1972.



This remote, grass and granite island offers prime seabird nesting habitat with boulder fields and ledges for puffins, razorbills and black guillemots; grass and ledge areas for terns; raspberry and grass thickets for eiders; and soft peat and glacial till soils for burrowing Leach's storm-petrels. As the name implies, harbor and gray seals frequent the island, attracted to the rich fishing grounds offshore.

Seal Island once had the largest Atlantic puffin colony in the Gulf of Maine. For over 200 years, however, fishermen used the island as a summer campsite while fishing for herring, groundfish and lobsters. They also harvested the nesting seabirds for meat, eggs and feathers, eventually wiping out the colonies by the late 1800's. Although herring and great black-backed gulls, common eiders, double-crested cormorants and arctic terns recolonized the island during the first half of this century, puffins never returned. Terns nested on the island as recently as the 1950's but were crowded off by increasing numbers of gulls, a typical scenario repeated on many islands in New England. Seal Island is now the site of a joint project involving the U.S. Fish and Wildlife Service, National Audubon Society and the Canadian Wildlife Service to restore the puffin and tern colonies.

Welcome

The coastal islands and peninsulas of Maine form a chain of stopover points along the ocean's shore that is critically important for countless migrating birds. Each year large flocks of waterfowl, raptors (hawks, falcons and owls), shorebirds and songbirds follow this chain as they migrate between northern nesting grounds and southern wintering grounds. Undisturbed offshore islands also offer valuable nesting sites for seabirds. Some of the most important natural areas along this coast are protected and managed by the U.S. Fish and Wildlife Service.

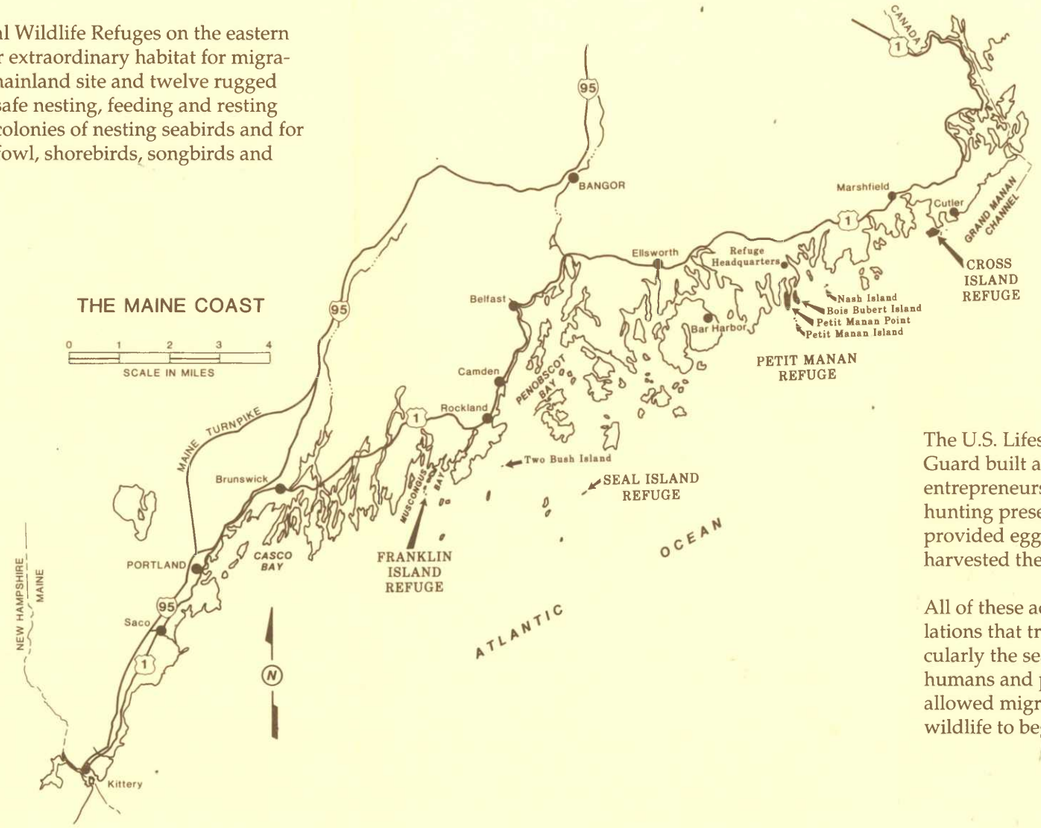
The four National Wildlife Refuges on the eastern Maine coast offer extraordinary habitat for migratory birds. The mainland site and twelve rugged islands provide safe nesting, feeding and resting habitat both for colonies of nesting seabirds and for migrating waterfowl, shorebirds, songbirds and raptors.

The mainland property, Petit Manan Point, has foot trails where you can observe a variety of coastal wildlife.

Hardly a Wilderness

Though refuge islands are regaining their wild character, they still show signs of their long human history. Native Americans probably used the islands almost from the time the glaciers retreated. Various tribes of the Algonquin Nation used the coast of Maine, fishing and hunting big game, furbearers and birds. Europeans arrived in the 1500's, attracted by the extensive forests and rich resources of the sea. By the 1800's, most of the larger islands supported people for at least part of the year.

Two refuge islands had villages with schools and stores, supporting the mariners who made a living from fishing. Farmers established "saltwater farms" to grow hay and graze sheep. Most islands were clearcut; some even had mines and stone quarries.



The U.S. Lifesaving Service and then the U.S. Coast Guard built and maintained light stations. Several entrepreneurs tried to develop rustic resorts or hunting preserves. And always, seabird colonies provided eggs, feathers and meat for those who harvested them.

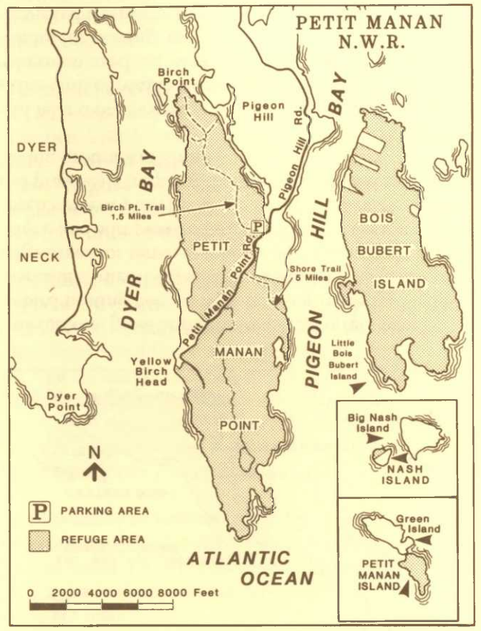
All of these activities affected the wildlife populations that traditionally used the islands, particularly the seabirds. The gradual abandonment by humans and protection of many Maine islands has allowed migratory bird populations and other wildlife to begin to return.

The Refuges

Refuge lands have been obtained through transfer or purchase with the help of the U.S. Coast Guard, The Nature Conservancy and private individuals.

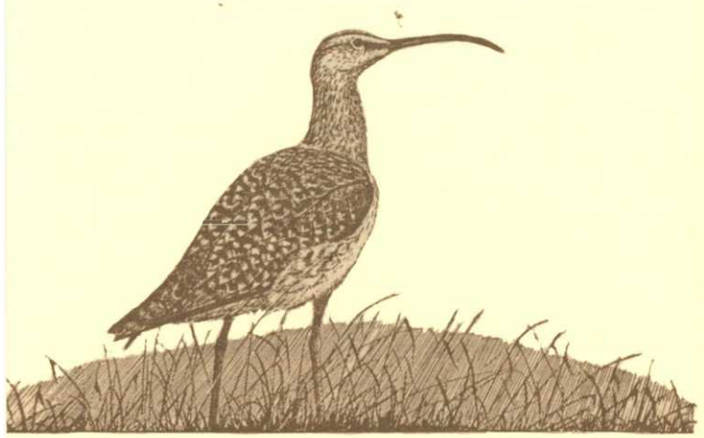
Petit Manan National Wildlife Refuge

is a 3,335-acre Refuge that includes property on Petit Manan Point, Petit Manan Island and portions of two other islands, Bois Bubert and Nash.



Petit Manan Point (1,991 acres, Steuben) has a rugged, windswept character with over ten miles of ocean shoreline. Habitats include red and white spruce forests with some mixed hardwoods, jack pine stands, coastal raised heath peatlands, blueberry barrens, old hayfields, fresh and salt-water marshes, cedar swamps, granite shores and cobble beaches.

A Wildlife Calendar



Events may vary by one or two weeks, depending on weather conditions.

Spring (March-May)

Waterfowl migration begins after ice-out, usually by the end of March. Herring gulls, great black-backed gulls and eiders begin to nest in April, followed by terns, laughing gulls and the alcids (puffins, guillemots and razorbills) around mid-May. Ospreys arrive in April, and eagles begin to nest by the end of March. In the fields and clearings, male woodcocks can be seen and heard performing their courtship flights at dawn and dusk. Male ruffed and spruce grouse start drumming in the woods.

Summer (June-August)

Summer is the season when nesting seabirds, eagles, ospreys, songbirds and waterfowl raise their young. By mid-July, shorebirds begin to arrive from northern nesting grounds on their long migration south. In August, the terns and alcids begin to migrate. Male eiders start to congregate offshore in large floating flocks, or rafts, for the fall molt.

Deer give birth to their fawns in June. Wildflowers such as orchids, azaleas and iris bloom throughout the spring and summer.

Fall (September-November)

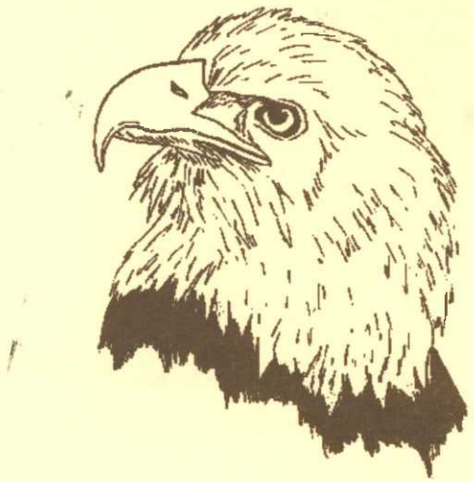
The shorebird migration peaks in September and the raptor, waterfowl and songbird migrations begin. By late October, large rafts of oldsquaws and bufflheads can be seen offshore. Flocks of black ducks collect on the ponds and bays. Peregrine falcons and merlins glide along the shore. Deer begin the breeding season in November.

Winter (December-February)

Common and red-throated loons, large flocks of sea ducks and an occasional dovekie, king eider or harlequin duck ride the waves offshore. Great cormorants and Bonaparte's gulls are common. In most years, snowy owls migrate here from the northern tundra. Boreal chickadees, spruce grouse and ruffed grouse are easier to see.

Year-round

White-tailed deer, snowshoe hare, porcupines, raccoons, bobcats, coyotes and other wildlife species can be seen year-round. The best viewing times are early morning and late afternoon.



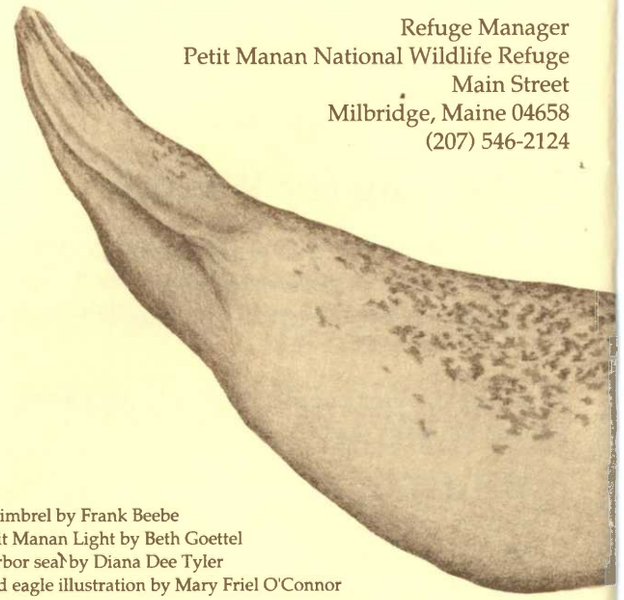
U.S. Fish and Wildlife Service

Petit Manan is one of more than 445 refuges in the National Wildlife Refuge System administered by the U.S. Fish and Wildlife Service. The National Wildlife Refuge System is a network of lands and waters managed specifically for the protection of wildlife and wildlife habitat and represents the most comprehensive wildlife management program in the world. Units of the system stretch across the United States from northern Alaska to the Florida Keys and include small islands in the Caribbean and South Pacific. The character of the refuges is as diverse as the nation itself.

The Service also manages National Fish Hatcheries, and provides Federal leadership in habitat protection, fish and wildlife research, technical assistance and the conservation and protection of migratory birds, certain marine mammals and threatened and endangered species.

For further information contact:

Refuge Manager
Petit Manan National Wildlife Refuge
Main Street
Milbridge, Maine 04658
(207) 546-2124



Whimbrel by Frank Beebe
Petit Manan Light by Beth Goettel
Harbor seal by Diana Dee Tyler
Bald eagle illustration by Mary Friel O'Connor

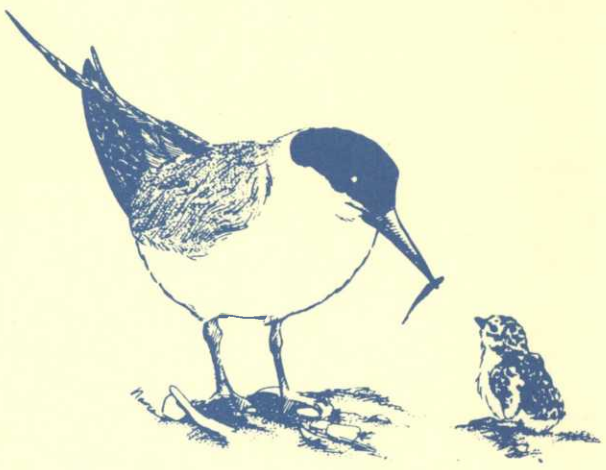
UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

RL-53533-1 February 1991

Birds

Petit Manan

National
Wildlife
Refuge

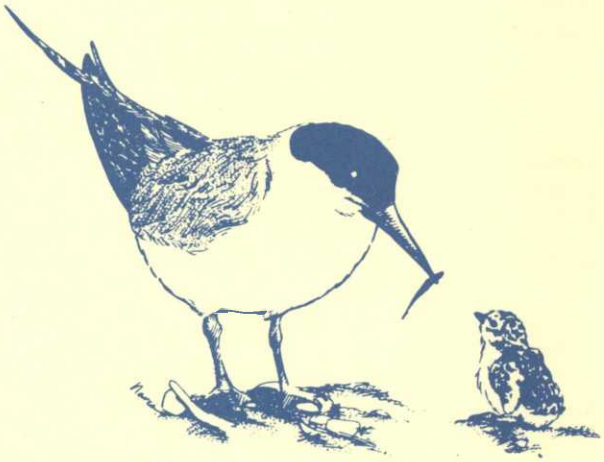


Maine

Birds

Petit Manan

National
Wildlife
Refuge



Maine

PETIT MANAN NATIONAL WILDLIFE REFUGE is a 3,335-acre refuge complex on the eastern Maine coast, consisting of portions of Petit Manan Point and Island in Steuben; Bois Bubert Island in Milbridge; and Nash Island in Addison.

Petit Manan Refuge has a variety of habitats, including spruce and hardwood forests, jackpine stands, cedar swamps, raised peatlands, blueberry barrens, fresh and saltwater marshes, and treeless islands. This variety has made the Point a noted birding area for many species of seabirds, shorebirds, songbirds, waterfowl, and raptors, including the endangered bald eagle, peregrine falcon, and roseate tern.

The Point is accessible by car off U.S. Rte 1 in Steuben, at the end of the Pigeon Hill Road. There are two unimproved trails that start at the parking lot near the information exhibits.

Because the seabird colonies are very sensitive to disturbance, access is restricted on Petit Manan Island and Nash Island during the nesting season, April 1st through July 31st. Please contact the refuge manager before attempting to visit these island units.

This folder lists over 250 birds that have been identified on the refuge, and is in accordance with the Sixth American Ornithologists' Union Checklist. Most birds are migratory, therefore their seasonal occurrence is coded as follows:

Season:

s - Spring	March 21 - June 20
S - Summer	June 21 - September 20
F - Fall	September 21 - December 20
W - Winter	December 21 - March 20

† - Nesting has occurred on the refuge within the past 5 years.
* - A species which occurs and/or nests in only one or two locations in the refuge.

Relative Abundance:

a - abundant	a species which is very numerous.
c - common	certain to be seen or heard in suitable habitat.
u - uncommon	present, but not certain to be seen.
o - occasional	seen only a few times during a season.
r - rare	seen at intervals of 2 to 5 years.

	s	S	F	W
LOONS - GREBES				
____ Red-throated Loon	u		u	
____ Common Loon	c	c	c	c
____ Pied-billed Grebe			o	
____ Horned Grebe	c		c	c
____ Red-necked Grebe	c		c	c
SHEARWATERS - STORM PETRELS				
____ Sooty Shearwater	r	r		
____ Manx Shearwater		r		
____ Wilson's Storm-Petrel		o		
____ Leach's Storm-Petrel †	u	u	u	
GANNET - PELICANS - CORMORANTS				
____ Northern Gannet	o	o	o	
____ Great Cormorant	c	o	c	o
____ Double-crested Cormorant †	a	a	a	
BITTERNS - HERONS - IBISES				
____ American Bittern †	u	u	u	
____ Great Blue Heron	u	u	u	o
____ Snowy Egret	r	r		
____ Little Blue Heron	r			
____ Tricolored Heron		r		
____ Cattle Egret	r			
____ Green-backed Heron	r	r		
____ Black-crowned Night-Heron	r	r		
SWANS - GEESE - DUCKS				
____ Snow Goose	o			
____ Brant	u		o	
____ Canada Goose	o		o	o
____ Wood Duck †	u	u	u	
____ Green-winged Teal †	c	c	a	
____ American Black Duck †	c	c	a	c
____ Mallard	o	o	u	
____ Northern Pintail	o		u	
____ Blue-winged Teal †	u	u	u	
____ American Wigeon	o	r	u	
____ Ring-necked Duck	r			
____ Greater Scaup	o		o	
____ Lesser Scaup			o	
____ Common Eider †	a	a	a	a
____ King Eider	r			
____ Harlequin Duck	r			
____ Oldsquaw	c		a	c
____ Black Scoter	a	o	u	
____ Surf Scoter	c	o	u	
____ White-winged Scoter	c	o	u	u
____ Common Goldeneye	c		c	c
____ Bufflehead	u		u	u
____ Hooded Merganser †	u	u	u	
____ Common Merganser			o	
____ Red-breasted Merganser	c	u	c	c
____ Ruddy Duck			o	
VULTURES - HAWKS - FALCONS				
____ Turkey Vulture	o			
____ Osprey †	u	u	u	
____ Bald Eagle †	u	u	u	u
____ Northern Harrier †	c	c	c	
____ Sharp-shinned Hawk †	u	o	a	o
____ Cooper's Hawk	o		o	
____ Northern Goshawk †	u	u	u	u
____ Broad-winged Hawk	o	o		
____ Red-tailed Hawk		o	o	
____ Rough-legged Hawk	o		o	o
____ American Kestrel	c		c	
____ Merlin	o		c	
____ Peregrine Falcon	u	o	c	
____ Gyrfalcon				r
GROUSE - QUAIL - TURKEY				
____ Spruce Grouse †	o	o	o	o
____ Ruffed Grouse †	c	c	c	c
RAILS - CRANES				
____ Sora			r	
____ American Coot			r	
PLOVERS - SANDPIPERS				
____ Black-bellied Plover	c	c	c	
____ Lesser Golden-Plover			o	
____ Semipalmated Plover	c	c	c	
____ Piping Plover	r	r		
____ Killdeer	o	o	o	
____ Greater Yellowlegs	c	c	c	
____ Lesser Yellowlegs	o	u	u	
____ Solitary Sandpiper		o	o	
____ Willet †	u	u		
____ Spotted Sandpiper †	u	u	u	
____ Whimbrel		u	u	
____ Hudsonian Godwit		o	o	
____ Ruddy Turnstone	c	c	c	
____ Red Knot	u	u	u	
____ Sanderling	o	u	u	
____ Semipalmated Sandpiper	u	c	c	
____ Western Sandpiper			o	
____ Least Sandpiper	u	u	u	
____ White-rumped Sandpiper	o	u	u	
____ Baird's Sandpiper			o	
____ Pectoral Sandpiper			o	
____ Purple Sandpiper	u		u	u
____ Dunlin	o		u	u
____ Short-billed Dowitcher	u	c	c	
____ Long-billed Dowitcher		o		
____ Common Snipe	o		o	
____ American Woodcock †	u	u	u	
____ Red-necked Phalarope	u	u	u	
JAEGERS - GULLS - TERNS - AUKS				
____ Pomarine Jaeger		o		
____ Parasitic Jaeger	o	o		
____ Laughing Gull †	c	c	c	
____ Little Gull			r	
____ Common Black-headed Gull †	o	r		

	s	S	F	W
____ Bonaparte's Gull	o	u	u	o
____ Ring-billed Gull	u	u	c	u
____ Herring Gull †	a	a	a	a
____ Iceland Gull	u			u
____ Great Black-backed Gull †	c	c	c	c
____ Black-legged Kittiwake		o		
____ Roseate Tern †	u	u	u	
____ Common Tern †	c	c	c	
____ Arctic Tern †	c	c	c	
____ Black Tern	o	o		
____ Dovekie				r
____ Common Murre	o	o		
____ Thick-billed Murre				r
____ Razorbill	u	u		
____ Black Guillemot †	c	c	c	u
____ Atlantic Puffin †	u	u	u	
DOVES - PARROTS - CUCKOOS - OWLS - SWIFTS - HUMMINGBIRDS				
____ Rock Dove			o	
____ Mourning Dove †	u	u	u	
____ Black-billed Cuckoo	r	r	r	
____ Yellow-billed Cuckoo			r	
____ Great Horned Owl †	u	u		
____ Snowy Owl	r		r	o
____ Northern Hawk-Owl			r	
____ Barred Owl †	u	u		
____ Short-eared Owl	r		r	
____ Northern Saw-whet Owl	r		r	
____ Common Nighthawk	o		o	
____ Whip-poor-will †	u	u	u	
____ Chimney Swift †	u	o		
____ Ruby-throated Hummingbird	u	u	u	
____ Belted Kingfisher	u	u	u	
WOODPECKERS - FLYCATCHERS				
____ Red-headed Woodpecker			r	
____ Yellow-bellied Sapsucker			u	
____ Downy Woodpecker †	c	c	c	c
____ Hairy Woodpecker †	u	u	u	u
____ Black-backed Woodpecker	r			
____ Northern Flicker †	c	c	c	
____ Pileated Woodpecker	o		o	
____ Olive-sided Flycatcher	o	o	o	
____ Eastern Wood-Pewee †	u	u	u	
____ Yellow-bellied Flycatcher †	u	u	u	
____ Alder Flycatcher †	c	c	c	
____ Least Flycatcher †	u	u	u	
____ Eastern Phoebe †	u	u	u	
____ Great-crested Flycatcher †	u	u	u	
____ Eastern Kingbird	u	u	u	
LARK - SWALLOWS - JAYS - CROWS				
____ Horned Lark			u	
____ Purple Martin	o			
____ Tree Swallow †	c	c	u	
____ Northern Rough-winged Swallow	o			

	s	S	F	W
____ Bank Swallow †	c	c		
____ Cliff Swallow †	c	u		
____ Barn Swallow †	c	c	u	
____ Gray Jay	o	o	o	
____ Blue Jay †	u	u	u	
____ American Crow †	c	c	c	c
____ Common Raven †	c	c	c	c
TITMICE - NUTHATCHES - WRENS				
____ Black-capped Chickadee †	c	c	c	c
____ Boreal Chickadee	o	o		o
____ Red-breasted Nuthatch †	u	u	u	u
____ White-breasted Nuthatch	r		r	
____ Brown Creeper †	u	u	u	
____ Winter Wren †	u	u	u	
____ Marsh Wren		r		
KINGLETS - THRUSHES - THRASHERS				
____ Golden-crowned Kinglet †	c	c	c	u
____ Ruby-crowned Kinglet †	c	c	c	
____ Blue-gray Gnatcatcher	r			
____ Eastern Bluebird	r	r	r	
____ Veery †	u	u	u	
____ Gray-cheeked Thrush			r	
____ Swainson's Thrush †	c	c	c	
____ Hermit Thrush †	c	c	c	
____ Wood Thrush	o		o	
____ American Robin †	c	c	a	u
____ Gray Catbird †	c	c	c	
____ Northern Mockingbird †	r	r	r	
____ Brown Thrasher †	r	r	r	
WAXWINGS - SHRIKES - STARLING				
____ Water Pipit			u	
____ Cedar Waxwing †	o	c	c	o
____ Northern Shrike	o		o	o
____ Loggerhead Shrike		r		
____ European Starling †	c	c	c	c
VIREOS - WOOD WARBLERS				
____ Solitary Vireo †	u	u	u	
____ Yellow-throated Vireo	r		r	
____ Warbling Vireo	u	u		
____ Philadelphia Vireo	u	u	u	
____ Red-eyed Vireo †	c	c	c	
____ Blue-winged Warbler		r		
____ Tennessee Warbler	u	u	u	
____ Orange-crowned Warbler	o		o	
____ Nashville Warbler †	c	c	c	
____ Northern Parula †	c	c	c	
____ Yellow Warbler †	c	c	c	
____ Chestnut-sided Warbler †	c	u	c	
____ Magnolia Warbler †	c	c	c	
____ Cape May Warbler	r	c	c	
____ Black-throated Blue Warbler	o	o		
____ Yellow-rumped Warbler †	c	c	c	
____ Black-throated Green Warbler †	c	c	c	
____ Blackburnian Warbler †	c	c	u	

	s	S	F	W
____ Prairie Warbler			r	
____ Palm Warbler †	c	u	c	
____ Bay-breasted Warbler †	u	c	c	
____ Blackpoll Warbler	u		u	
____ Black-and-white Warbler †	c	c	c	
____ American Redstart †	c	c	c	
____ Ovenbird †	u	u	u	
____ Northern Waterthrush	o	o		
____ Common Yellowthroat †	c	c	c	
____ Wilson's Warbler †	u	u	u	
____ Canada Warbler †	u	o	o	
____ Yellow-breasted Chat	r		r	
TANAGERS - SPARROWS				
____ Summer Tanager	r			
____ Scarlet Tanager	u	u	u	
____ Northern Cardinal	o		o	
____ Rose-breasted Grosbeak †	u	u	u	
____ Indigo Bunting		o		
____ Dickcissel			r	
____ Rufous-sided Towhee †	u	u	u	
____ American Tree Sparrow	u		u	u
____ Chipping Sparrow †	u	u	u	
____ Field Sparrow	o		o	
____ Vesper Sparrow		r		
____ Lark Sparrow		r	r	
____ Savannah Sparrow †	c	c	c	
____ Grasshopper Sparrow			r	
____ Sharp-tailed Sparrow	o		o	
____ Fox Sparrow	u		u	
____ Song Sparrow †	c	c	c	
____ Lincoln's Sparrow †	u	u	u	
____ Swamp Sparrow †	c	c	c	
____ White-throated Sparrow †	c	c	c	
____ White-crowned Sparrow	o		o	
____ Dark-eyed Junco †	c	u	c	
____ Lapland Longspur			o	
____ Snow Bunting			c	o
BLACKBIRDS - FINCHES				
____ Bobolink †	u	u	u	
____ Red-winged Blackbird †	c	c	c	
____ Eastern Meadowlark	r		r	
____ Yellow-headed Blackbird			r	
____ Rusty Blackbird	u			
____ Common Grackle †	c	c	c	
____ Brown-headed Cowbird †	u	u	u	
____ Orchard Oriole	r			
____ Northern Oriole	u	u	u	
____ Pine Grosbeak	u		u	u
____ Purple Finch †	u	u	u	
____ House Finch	r		r	
____ Red Crossbill	r	r	r	r
____ White-winged Crossbill	u	u	u	u
____ Common Redpoll	u		u	c
____ Hoary Redpoll				r

	s	S	F	W
____ Pine Siskin †	u	u	u	u
____ American Goldfinch †	u	u	u	u
____ Evening Grosbeak	u		u	

These additional 12 species are considered accidentals:

American Oystercatcher
Bar-tailed Godwit
Curlew Sandpiper
Sooty Tern
Black Skimmer
Common Barn Owl
Chuck-will's Widow
Couch's Kingbird
Black-billed Magpie
Townsend's Solitaire
Kentucky Warbler
Western Meadowlark

NOTES

Date _____ Time _____

Observers _____

Weather _____

Tides _____

U.S. FISH AND WILDLIFE SERVICE

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For further information or to report unusual sightings, please contact:

Refuge Manager
Petit Manan National Wildlife Refuge
P.O. Box 279
Milbridge, Maine 04658
Telephone: (207) 546-2124

This bird list was compiled largely through the efforts of a volunteer, Ralph Widrig. It summarizes literally hundreds of hours of daily, year-round observation and record-checking.

UNITED STATES
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FISH AND WILDLIFE SERVICE

RL-53533-2

August 1988