Ecosystem Classification Mapping of Atlantic Region National Wildlife Areas, 1978:

Wallace Bay National Wildlife Area

Shepody National Wildlife Area -
Germantown Marsh Unit

Chignecto National Wildlife Area -
John Lusby Marsh Unit

Portage Island National Wildlife Area

Cape Jourimain National Wildlife Area

Michael F. Malone
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CANADIAN WILDLIFE SERVICE

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CAPE JOURIMAIN NATIONAL WILDLIFE AREA

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I. Introduction

The resource inventory program of Atlantic Region National Wildlife Areas continued in 1978 with the mapping of four existing and one newly established National Wildlife Areas.

In addition to colour-coding of the major Level One ecosystems, dominant and common plant species were mapped within the ecosystems. Thus each map characterizes both the broadscale habitat (i.e. salt marsh, bog, forest, etc.) and the specific habitat (i.e. densely-stocked second growth forest of 60% wire birch and 40% Balsam fir). A description of the classification scheme is outlined by Zoltai (1976); the scheme as applied to the resource inventory program has been previously reported by Malone (1977) This report was written to supplement interpretation of the completed maps.

The author gratefully acknowledges the assistance of Marc Spence, summer student, in performing both field work and drafting of maps, and Dr. H. Harries, Department of Biology, Mount Allison University, in aiding with plant species identification and offering advice.

II. Methods

Uncorrected air-photo mosaics of each Area were obtained from the Maritime Resource Management Service and then enlarged to a final working scale from which the base maps were drawn. This scale was dependent on the shape of an Area and was limited to 100 cm x 100 cm work surface. Base maps were drafted onto acetate film overlying the mosaic. Thus all features of the landscape could be traced directly. Vegetation species lists were typed onto an acetate page which was then cut into the base map

and taped around the edges. The completed acetate base map was then reproduced onto paper and coloured by hand.

Forest associations were mapped in the field by estimating coverage of the species to within the nearest 10%. Thus in the following example - $\frac{wiB_7wS_2bF_1}{5 - 1}$: wire birch comprises 70% of the stand, white spruce 20%, and balsam fir 10%. Various other trees may be present but do not account for at least 10% of the stand. To interpret data below the horizontal line in the above example; the first numeral denotes the average height of the stand according to the following scale:

Height (feet)	Code
0 - 10	1
11 - 20	2
21 - 30	3
31 - 40	4
40 - 50	5
etc.	

Thus in the example the average height is 40 to 50 feet. The second numeral below the line denotes stand density, a subjective observation according to the following scale:

Stand Density (%)	Code
67 - 100	1
34 - 66	2
0 - 33	3

Thus in the example the stand is stocked at a density of 67% to 100%. Common forest ground flora are listed on some maps under the forest reference.

All plant species observed were subjectively recorded as being either dominant, common, or occasional. Dominant species are those having the highest productivity, and are the most highly represented in the plant community. Common species are less highly represented; they do not dominate or characterize the community. Occasional species are those least represented such as scattered individuals or groups that one may have to search for to discover.

Within each ecosystem, dominant plant species are listed first, then common species follow in brackets or are preceded by a hyphen. In cases where ecosystems exhibited similar vegetation species,they are denoted by means of a symbol rather than repeat a list of plants. Both scientific and common names are according to Roland and Smith (1969). Abbreviations for tree species are those adopted by the Canadian Institute of Forestry; for herbaceous plants if it was necessary to abbreviate either the scientific or common name. Vegetation species lists on the maps are generally grouped by ecosystem.

Both colour and black and white air photos were used in the field to obtain a "signature" of each dominance type of vegetation. Through careful observation it was possible to equate field conditions to the texture, colour, tone, or pattern of dominance types evident on the photos as per Jeglum and Boissonneau (1977). Field checks were carried out in all forest stands and in a majority of other ecosystems.

III. Results and Discussion

For each Area one completed (coloured) map was produced to be retained in the Sackville regional office, as well as extra uncoloured

copies for general distribution. The acetate originals will be kept on file in Sackville for duplication if necessary. The following is a description of each site that was mapped.

(A) WALLACE BAY National Wildlife Area

The Wallace Bay NWA is a diverse site of marine and fresh-water wetland, forest and field ecosystems. Field work here was carried out in May and June, hence some of the late maturing species and the forest ground flora were missed. The Bideaux road and causeway generally divides the wetlands of the area into salt marsh to the east, and fresh-brackish marsh to the west.

Salt marshes are predominantly composed of salt-meadow cord grass (*Spartina patens*) with numerous small pans interspersed throughout. Salt-marsh cord grass (*S. alterniflora*) is dominant along the banks of tidal creeks and channels while eelgrass (*Zostera marina*) is common within them. A dominant wide zone of rush (*Juncus Gerardi*) with silverweed (*Potentilla Anserina*), seaside goldenrod (*Solidago sempervirens*), and brome-grass (*Bromus spp.*) commonly occurs above the salt-meadow cord grass area.

At present both of the fresh marsh impoundments have an impoverished variety of species present. Species diversity will likely increase once water regime in the impoundments becomes stabilized. Dominants here include cattail (*Typha glauca*) bulrush (*Scirpus cyperinus*) and meadowsweet (*Spiraea latifolia*). The marsh in the NW sector of the Area is heavily disturbed by grazing cattle and hence has climaxed in various grasses.

Thicket swamps are most common in the poorly drained sections in the W of the Area, with shrub dominants of meadowsweet, wild rose (*Rosa Virgiana*) alder (*Alnus rugosa*) and wire birch (*Betula populifolia*). An additional dominant occurring with the above is broadleaf, (*Spartina pectinata*), the tallest of the cord grasses.

Several minerotrophic fens occur on the SW side. More accurately they could be termed fen-swamp due to a heavy shrub component and low water status, however, creation of the impoundments will eventually accelerate succession toward marsh communities.

Impounded waters and salt-marsh pans are designated on the map as shallow open water. Impoundment 3, constructed in 1974 upon *Spartina patens* and *S. alterniflora* salt marsh, is currently quite brackish and hosts a dense growth of ~~widgeon grass~~ Sago Pondweed (Potamogeton pectinatus) (*Ruppia maritima*). The *Spartina spp* have disappeared. Standing waters of impoundments 1 and 2 are vegetated by small areas of pondweed (*Potamogeton pusillus*). Salt marsh pans commonly host algae (*Cladophora spp.*) as well as widgeon grass in many of them.

The upland forest edge is a second growth stand of mixed spruce (*Picea glauca, P. rubens, P. mariana*), balsam fir (*Abies balsamea*), aspens (*Populus tremuloides, P. balsamifera, P. grandidentata*) red maple (*Acer rubrum*) and wire birch. An interesting mature stand of red oak (*Quercus borealis*) and aspens with an occasional robust white pine (*Pinus strobus*) occurs on an "island" in the salt marsh on the NE side. The stand, being inaccessible due to the tidal channels, remains as a relatively untouched relic of the original climax forest.

Most of the old fields more recently abandoned are growing up in such herbaceous species as bent grass (*Agrostis spp.*), bluegrass (*Poa spp.*), hawkweeds (*Hieracium spp.*), and various other members of the Compositae. Older fields host, in addition to the above, a shrub component of alder, wild rose, and chokecherry (*Prunus virginiana*).

Cattle are pastured on most of the areas designated as agricultural land. Disturbance from grazing and trampling is most prevalent in pastured wetlands of the NW side. Several hectares of hay and grain are also grown within the Area.

(B) SHEPODY National Wildlife Area:
Germantown Marsh Unit

The Germantown marsh has undergone many changes over the past century. The shallow waters of Shepody Lakes once covered much of the site, however, the lake basin was largely drained around the turn of the century and the land used as farmland until it was abandoned in the late 1940's. Deterioration drainage caused a progression toward wet fen, until the early 1970's at which time it was purchased by CWS and subsequently much of it re-flooded through the construction of 8 impoundments. Evidence of past use is encountered throughout the marsh; the Shepody River has been canalized, drainage ditches traverse many sections, and decrepit farm machinery lies partially submerged in the impoundments. Due to this long history of disturbance much of the wetland vegetation remains dynamic and not easily classified.

Prior to alteration by man, the lower end of the marsh was under the influence of the tides and typical of many coastal wetlands around the head of the Bay of Fundy.

The upper end of the marsh, however, has been for many years, and is presently subjected to deposition of relatively nutrient poor parent material originating from the surrounding hills.

In partial fulfillment of a CWS contract with Mount Allison University, Kent and Steeves (1970) prepared a cover map of the Area providing a broad-scale classification of landscape units. That map remains useful in showing ecosystems prior to impoundment.

The marsh and shallow open water components will change rapidly from that which was mapped, during 1978 especially in impoundments D through G where water levels have not been stabilized. The vegetation in impoundments A and B, flooded in 1975 and 1976, respectively, is presently dominated by *Carex paleacea* (present prior to flooding and persisting through changes in water level) burreed (*Sparganium eurycarpum*) cattail (*Typha angustifolia and T. glauca*), common reed (*Phragmites communis*), meadowsweet, bladderwort (*Utricularia vulgaris*) and wild rice (*Zizania aquatica*) which was hand sewn. A variety of pondweeds (*Potamogeton spp.*) occurs occasionally, and *P. pusillus* commonly. All impoundments will likely follow a similar successional sequence as found in A and B. The shallow mesotrophic and meadow marsh at the upper end of the Area is a complex climaxed in burreed, horsetail (*Equisetum fluviatile*), cattail, *Carex paleacea, C. lasiocarpa,* and bluejoint (*Calamagrostis canadensis*) with broadleaf occurring along creek bands (Figure 1). Natural ponds (shallow open water) SW of impoundment E, have climaxed in burreed, bulrush, and *Potamogeton Oaksianus*, with water milfoil (*Myriophyllus spp.*) and cattail common throughout. Dominants in the natural ponds incorporated into impoundments G and F are waterlily (*Nuphar variegatum*), water milfoil and bulrush.

Two bogs are present in the NW of the Area, each with a *Spagnum* and shrub core fringed by black spruce-tamarack (*Larix laricina*) treed bog. True bog species such as black crowberry (*Empetrum nigrum*) pitcher plant (*Sarracenia purpurea*), leather leaf (*Chamaedaphne calyculata*) labrador tea (*Ledum groenlandicum*), and small cranberry (*Vaccinium oxycoccos* are common throughout.

Figure 1: Shepody National Wildlife Area - Natural marsh, upper end; (1) Shallow open water; (2) Mesotrophic marsh with *Sparganium eurycarpum* and *Typha glauca*. (3) Meadow marsh on creek levees with *Spartina pectinata*. (4) Shallow marsh with *Equisetum fluviatile*, *Carex paleacea*, *Sparganium eurycarpum*, and *Scirpus validus*. (5) Waterfowl nesting island with fill from borrow pit piled in centre.

Fens, occurring in areas of restricted drainage and nutrient deficiency, are mostly dominated by such shrubs as andromeda (*Andromeda glaucophylla*), sweet gale (*Myrica gale*), meadowsweet, leather-leaf, and labrador tea. Graminoid fen, dominated by *Carex lasiocarpa* and *C. aquatilis* occurs along the brook emptying into SW corner of impoundment G., while treed fen with tamarack is present near the boundary of impoundments G and F. *Sphagnum spp.* is a component of all fens. Fen-marsh surrounds the large bog in the NW corner.

Shrub swamp dominated by alder and meadowsweet borders the upland edge around the perimeter of the marsh. Within impoundments much of this swamp is being drowned and giving way to marsh. Treed swamp with tamarack and a variety of shrubs is found in impoundment G and behind F. A large swamp-fen dominated by sweet gale and meadowsweet occurs in the SE corner of the Area.

The forested areas are typical second growth fir-spruce-birch, some of it approaching maturity at 60+ feet. Noteworthy, however, is a healthy island stand of red spruce present in impoundment F, and remnants of an original hardwood climax forest observed west of F, where occasional yellow birch (*Betula allegheniensis*) and beech (*Fagus grandifolia*) exist, as well as wood-sorrel (*Oxalis montana*) and shining club-moss (*Lycopodium lucidulum*) in the ground cover. Numerous cutover areas (designated "C") are regenerating in brambles (*Rubus spp.*), pin cherry (*Prunus pensylvanica*), wire birch and white spruce.

The vegetation on abandoned field is similar to that described at Wallace Bay. Raised waterfowl nesting islands in the SW end will likely be vegetated by common field (dryland) species.

(C) CHIGNECTO National Wildlife Area:
John Lusby Marsh Unit

Field work here was carried out during the month of July. Because salt marsh dominants are very homogeneous throughout this large salt marsh we were able to assign a colour to each of the dominance types. Van Zoost (1970) provided a history of use of the marsh over the last several hundred years, and Ganong (1903) described in detail the formation of marshes at the head of the Bay of Fundy. Once extensively used by agriculture, the Area was reclaimed by the sea in approximately 1947 when dykes were destroyed during a storm, and the area was allowed to revert to salt marsh.

Readily evident from the map is the predominance of *Spartina alterniflora*. Morantz (1976) noted three growth forms present: the tall form growing along upper creek slopes, receiving constant nutrient enrichment from tides; an intermediate form occupying low, poorly-drained areas; and a dwarf form associated with goose-grass (*Puccinellia americana*) in higher, better-drained sites. The intermediate form appears most abundantly on the marsh, in addition being found in the numerous drainage ditches persisting throughout.

Spartina patens occupies the areas of high marsh flooded only by the highest tides. Within the Lusby marsh it is most abundant in the NE sector adjacent to the LaPlanche River, and as a narrow band on the rise to upland interphase. Sea lavender (*Limonium Nashii*), seaside goldenrod, and goose tongue (*Plantago maritima*) occasionally occur throughout this association.

Goose grass proliferates on depositional areas, particularly upon natural levees of the creek channels (Figure 2). It is dependent on

some disturbance by flooding tides and tolerates only moderate soil salinities. The species is of major importance as a food source for migrant geese, attracting thousands in spring and smaller numbers during fall.

Also found as dominant on areas of depositional salt marsh, but to a lesser degree, is the samphire (*Salicornia europaea*) - sea-blite (*Sueda maritima*) association, with orach (*Atriplex patula*) occationally interspersed. Ganong (1903) gives a detailed account of the habitat of the two, noting that it is characteristic of newly fomred and forming marsh, occurring typically from the lowest high-tide mark to the

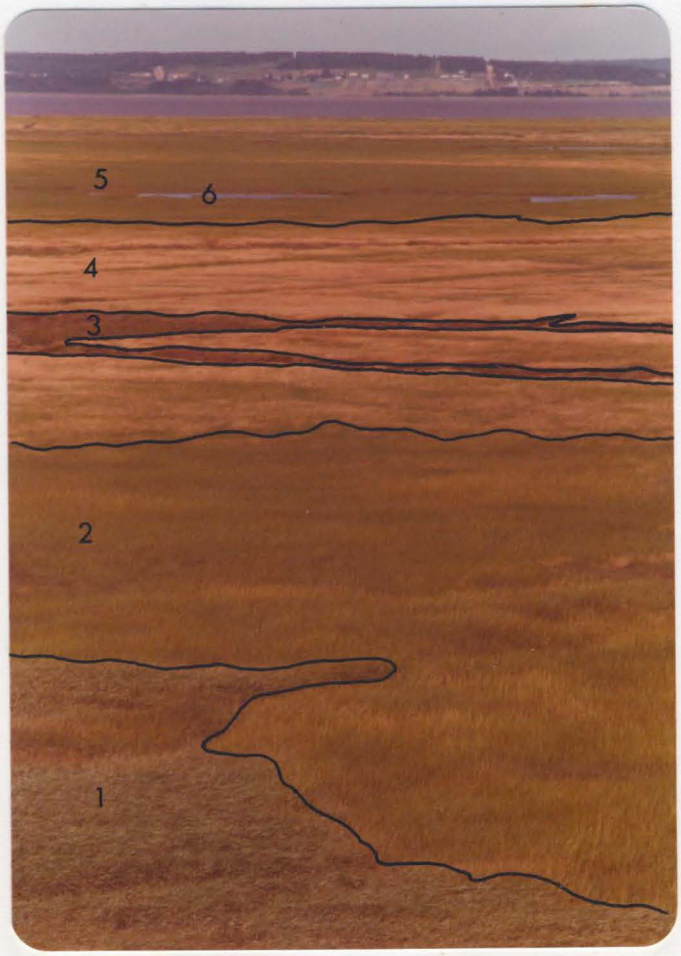


Figure 2: John Lusby salt marsh; (1) Upland interphase with *Carex paleacea*. (2) *Spartina alterniflora* on low-lying, poorly-drained site. (3) *Spartina alterniflora* in creek channel. (4) *Puccinellia americana* on raised creek levees. (5) As (2). (6) Salt marsh pan.

to the highest marsh. He observed that the size of samphire varies inversely with salinity and that sea-blithe is found on somewhat higher ground than the samphire.

Within the higher salt marsh (*Spartina patens*) zone in the NE of the marsh several hectares of *Juncus Gerardi* - arrow grass (*Triglochin elata*) were encountered. It is suspected this habitat to be one of reduced salinity. freshened by rain, and slightly raised above the *Spartina patens* zone but still largely influenced by windborne saline effects from the marsh and sea surrounding it.

Impoundment A was constructed in 1972 upon an area vegetated by *Spartina alterniflora*, with some goose-grass on the W side and upland interphase species on the SE (Morantz 1976). Observations recorded in 1978 showed a small amount of *S. alterniflora* persisting in the strongly brackish standing water and the upland interphase area relatively unchanged. A dense growth of widgeon grass occurs as dominant with sago pondweed (*Potamogeton pectinatus*) common. Impoundment B was constructed in 1971 upon an area of poorly drained peak-marsh with standing water (91%), with the rest being composed of fresh-marsh vegetation. Submerged aquatics such as horned pondweed (*Zannichellia palustris*) and *Potamogeton spp.* flourished (Morantz 1976). Presently the strongly brackish impoundment is sparsely vegetated by sago pondweed with *Cladophora* common throughout.

Most of our data on vegetation in tidal pans was derived from Van Zoost (1970). The pans appear to be little changed since investigated at that time. Two types are recognized: a soft-bottomed, older type with a depth of water of 15 to 25 cm hosting widgeon grass, *Enteromorpha spp*, *Cladophora spp.*, and *Spartina alterniflora*;and a younger second

type having hard bottom, with depth of water at 5 to 10 cm, hosting the above species, however, with much less widgeon grass.

The area designated as marine water/mud is devoid of vegetation, except for occasional patches of *S. alterniflora*, and is swept regularly by the tides.

A small area of fresh marsh dominated by bulrush and cattail exists near the upland interphase on the West end of the unit. The site appears to be freshened by spring water emerging at the base of the upland.

The upland interphase occurs where the salt marsh meets the upland, and is dominated by such species as *Carex paleacea*, broadleaf, and *Juncus Gerardi*. The area is irregularly affected by saline waters from flood tides thus eliminating encroachment by most terrestrial plant species, but is freshened regularly by upland run-off. Also lumped into this section is a small "island" in the west corner hosting couch grass (*Agropyron repens*) and poverty grass (*Dantonia specata*).

Several small areas of dryland are present behind the two impoundments and host typical species of second growth forest and abandoned field, mainly white spruce, tamarack, alder, and wild rose.

Vegetation on old and new dykes throughout the area could not be mapped at this scale, but commonly observed species include fox-tail barley (*Hordeum jubatum*), broadleaf, timothy (*Phleum protense*), bent grass, and various members of the Compositae.

(D) PORTAGE ISLAND National Wildlife Area

Field work on the island took place over the period August 8 through 10 with Dr. H. Harries assisting and accounting for the framework of the classification scheme. The island is coastal sand dune ecosystem with alternating dune ridges and slacks running in a NE to SW direction along its length. Little disturbed by man, it shows a well-defined succession on ridge tops from *Ammophila* dune, through shrub dune, climaxing in lichen and shrub forest. Salt marsh is predominat in dune slacks on the east side, while brackish-fresh marsh and swamp occupy interior slacks. According to local fishermen the jack pine forest of the northern half of the island has burned twice within the past 50 years, the last fire having occurred approximately in the late 1940's.

There is much evidence to suggest that rising ocean levels are steadily eroding the island; fishing shacks present on Gammon Point (NW spit) 25 years past have been levelled by wash over on that bar, and former wells previously on dry land are now on beach. The most striking evidence however is the amount of wrack tossed up on sides of dune slacks in the S end, and the dead forests on the east side. Climax species such as hudsonia (*Hudsonia ericoides*) which is hundreds of years old has been flooded and destroyed by a storm several years past. Much of the forest along the east side has been killed by salt spray, likely during recent storms and erosion of the forest floor is prominent. Figure 3 shows dead wire birch in the interior.

Shrub swamp common in the interior is dominated by meadowsweet, sweet gale, blue-joint (*Calamagrostis neglecta*), water parsnip (*Sium suave*)

and wire birch, with cattail and bulrush common. Brackish-fresh marsh hosts burrush, cattail, and blue-joint.

The majority of interior shallow open water ponds are influenced by marine waters, hence the dense growth of widgeon grass within them. Ponds in coastal salt marsh are often fringed by *Spartina alterniflora*, and hold some widgeon grass and *Cladophora algae*. Eelgrass is dominant in the large pond at the south end. Sago pondweed and the rather rare species - *Sparganium multipedunculatum* are present in the large pond on the east side.

Salt marsh is typically upper salt marsh having such dominants as *Spartina patens* and *Juncus Gerardi*, with broadleaf, red fescue (*Festuca rubra*), *Juncus balticus*, and *Carex paleacea* occurring above them. Some patches with seashore saltgrass (*Distichlis spicata*) as dominant were encountered. Scotch loveage (*Ligusticum scothicum*) is common upon areas enriched by wrack; samphire, orach, and milkwort (*Glaux maritima*) are also well represented.

Figure 3: Portage Island National Wildlife Area. View south from lighthouse; (1) Swamp with *Scirpus validus*. (2) Wire birch killed by flooding sea-water. (3) Shrub dune with white spruce and bayberry. (4) Salt marsh. (5) *Ammophila* dune.

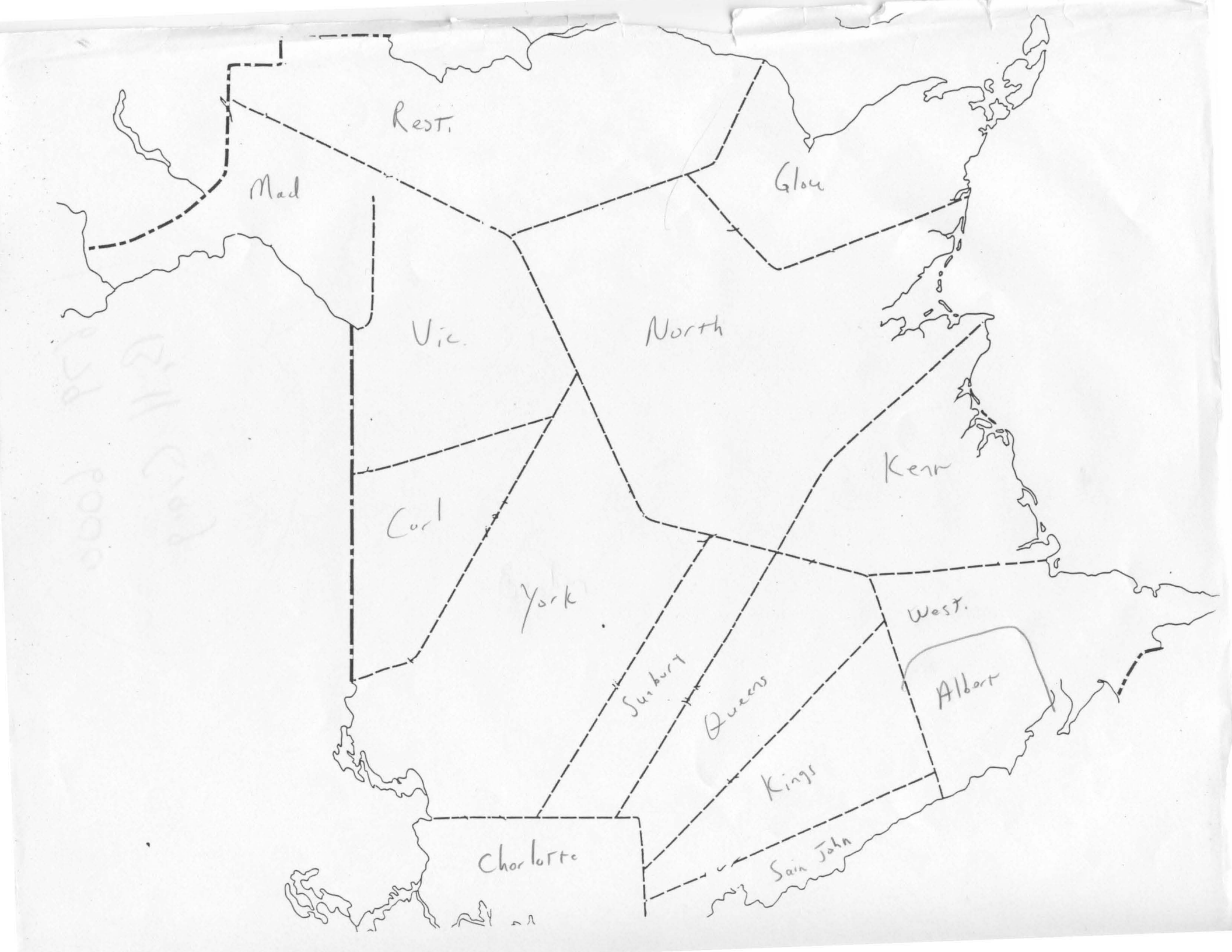
Beach surrounds the island, and except for occasional clumps of beach grass (*Ammophila breviligulata*) or dune grass (*Elymus mollis*), is devoid of vegetation. Areas of upper beach reaching inland on the E side eroded by storms are becoming re-established by sheep sorrel (*Rumex Acetosella*).

Dune grass and beach grass, the dune pioneer species, have stabilized the relatively new land of the south end. This widespread "*Ammophila* dune" then offers protection for the establishment of such common species as *Carex silecia*, wild rose, beach pea (*Lathyrus japonicus*) and bayberry (*Myrica pensylvanica*).

Succession progresses toward shrub dune with such species as white spruce, wire birch, meadowsweet, trembling aspen, chokeberry, and shadbush (*Amelanchier laevis*) becoming dominant.

After several thousand years the climax forest on dunes develops, consisting of an association of mixed pine (*Pinus resinosa, P. strobus, P. Banksiana,* reindeer lichen (*Cladonia rangiferina, C. alpestris*) and mosses (*Dicranum spp., Pleurozium spp.*) (Figure 4). Some of the common species present are pinweed (*Lechea intermedia*), bearberry (*Arctostaphylos Uva-ursi*), hudsonia, and hair-grass (*Deschampsia flexuosa*).

Figure 4: Portage Island National Wildlife Area - lichen forest with bayberry, *Cladonia spp.*, and jack pine.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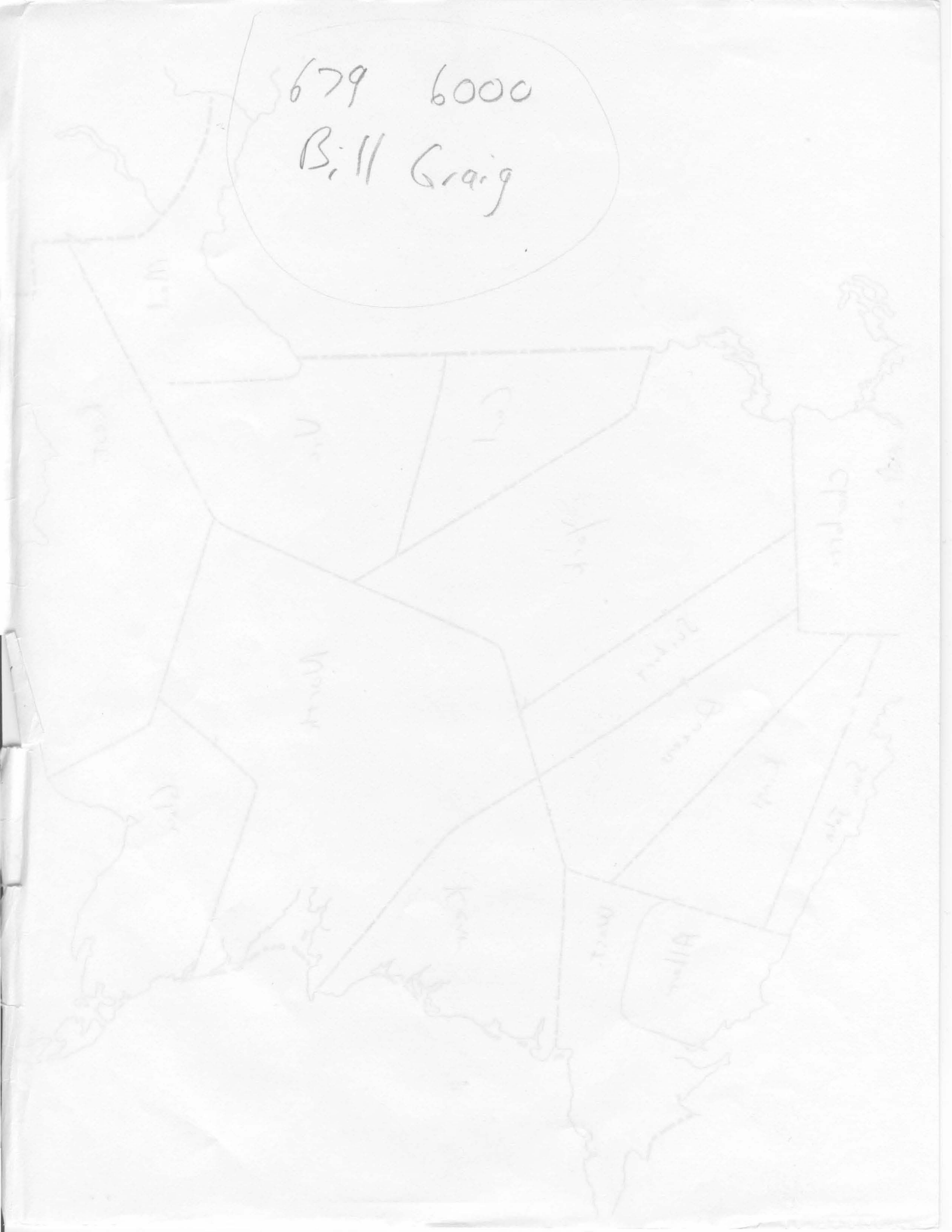

(E) CAPE JOURIMAIN National Wildlife Area

Barkhouse (1977) prepared a history of use by man and an overall description of vegetation in the Acquisition Proposal for the Area to which the reader is referred for further detail.

Recent disturbance factors account for much of the present pattern of vegetation. Most noticeable is the causeway bi-secting the Area which has drained a bog in the interior and altered its development toward black spruce swamp, while at the same inhibiting drainage in the south end and thus creating red maple swamp (Figure 5). South of the Murray Road several hectares of alder swamp are encountered.

Small pockets of fresh marsh, characterized by cattail, bulrush, and reed are found in the south end. Such marsh is slightly brackish due to its proximity to salt marsh. Vast *Spartina alterniflora* salt marsh comprises the majority of the Area. Toward the upland are found typical upper salt marsh species - *Scirpus maritimus*, *Spartina patens*, *Juncus Gerardi*, *J. balticus*, red fescue and broadleaf. Commonly occurring species throughout the salt marsh are sea-blite, orach, seaside goldenrod, milkwort, and samphire (west end).

The causeway and barrier beach in the NW are dyking off large shallow open water areas hosting sago pondweed as dominant with some widgeon grass throughout. These ponds are irregularly inundated by marine waters during storms. Shallow open water ponds scattered in the salt marsh host some widgeon grass as well, but *Cladophora* is often dominant. Eelgrass, requiring a constant flow of water, is restricted to both major and minor tidal creek channels.

Many of the abandoned fields presently are grazed by cattle and thus are retaining forbs typical of pasture such as bent grass, eye-bright (*Euphrasia sp.*), timothy, white clover (*Trifolium repens*), thistles (*Cirsium spp.*) and poverty grass. Older abandoned fields are dominated by bayberry (near the coast) meadowsweet, alder, wild rose, and brambles, as well as the above species.

A well-developed barrier beach dune in the NW has been stabilized by beach grass and is colonized by common species like beach pea, dune grass, broadleaf, bayberry, and *Carex scoparia*. Smaller dunes with similar vegetation exist on the E side.

Forests are mostly second growth softwood, with a minor component of wire birch, red maple, and trembling aspen. An exception is present in the case of a small island forest on the NW side where red oak, white birch, red maple and beech comprise the stand, while in the ground story occurs poison ivy (*Rhus radicans*), striped maple (*Acer pensylvanicum*), alder, and ground nut (*Apios americana*). It is interesting to note that the recent discovery of this last plant has led to a range extension for the species in New Brunswick. Another noteworthy forest stand exists adjacent to the rail bed in the south end where several

of eastern white cedar (*Thuja occidentalis*) are dominant in a forest-swamp association. In the south end an open stand of willow (*Salix sp.*), apple, and pin cherry has developed on a previously settled site.

Figure 5: Cape Jourimain Area. Red maple swamp with cattail, duckweed, and willow common.

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HABITAT CLASSIFICATION

WETLAND

SWAMP
SALT MARSH
BRACKISH - FRESH MARSH

DRYLAND

BEACH
AMMOPHILA DUNE
SHRUB DUNE
LICHEN FOREST

Scale 1:8,063

Lighthouse ☆
NWA boundary
Refer to report CWS-AR 301.60
Mallone 1978. to interpret map.

Miramichi Bay

Gulf of Saint Lawrence

Vegetation		Code
Spartina patens	Salt meadow cord grass	Sp
Spartina alterniflora	Salt marsh cord grass	Sa
Spartina pectinata	Broad-leaf	Bf
Juncus Gerardii	Rush	Jg
Juncus balticus	Rush	Jb
Ligusticum scothicum	Scotch Lovage	Sl
Glaux maritima	Milkwort	Mw
Limonium Nashii	Sea Lavender (Marsh Rosemary)	Mr
Solidago sempervirens	Seaside Goldenrod	sGr
Atriplex patula	Orach	At
Salicornia europaea	Samphire (Glasswort)	Gw
Scirpus maritimus	Bulrush	Sm
Ammophila brevilugulata	Beach-Grass	Bg
Elymus mollis	Dune-Grass	Dg
Festuca rubra	Red fescue	Rf
Carex silecia	Carex	Cs
Carex paleacea	Carex	Cpa
Smilacina racemosa	False Solomon's Seal	Ss
Myrica Gale	Sweet-Gale	Sg
Myrica pensylvanica	Bayberry	Bb
Spiraea latifolia	Meadowsweet	Ms
Hudsonia ericoides	Hudsonia	H
Arctostaphylos Uva-ursi	Bearberry	Uu
Vaccinium augustifoliam	Blueberry	Bl
Rosa virginiana	Wild rose	Wl
Aronia melanocarpa	Chokeberry	Cb
Amelanchier laevis	Shad bush	Sb
Cladonia	Lichen	Cl
Maianthemum canadense	Wild Lily of the Valley	Lv
Aster novi belgii	Aster	As
Rumex Acetosella	Sheep-Sorrel	Ra
Sium suave	Water-parsnip	Wp
Scinpus validus	Bulrush	Br
Typha latifolia	Broad-Leaved Cat-Tail	Tl
Calamagrostis neglecta	Calamagrostis	Cn
Populus tremuloides	Trembling Aspen	tA
Alnus rugosa	Alder	Al
Pinus Banksiana	Jack Pine	jP
Pinus resinosa	Red Pine	rP
Pinus Strobus	White Pine	wP
Picea glauca	White Spruce	wS
Betula populifolia	Wire Birch	wiB
Betula papyrifera	Paper Birch	wB
Clintonia borealis	Blue Bead Lily	Bbl
Ruppia maritima	Widgeon Grass	Rm
Lechea Intermedia	Pinweed	Pd
Zostera marina	Eelgrass	Eg
Cornus canadensis	Bunchberry (Dogwood)	Dw
Deschampsia flexwosa	Hair-grass	Ds
Aralia nudicaulis	Sarsaparilla	Sl
Dicranum	Moss	D
Pleurozium	Moss	P

Forest Reference

Height Class	(feet)	Density Class	(percent)
0 - 10	1	66 - 100%	1
11 - 20	2	33 - 66%	2
21 - 30	3 etc.	0 - 33%	3

Example $\frac{wS_{6}\ bF_{4}}{5-1}$

Species composition: White spruce - 60%
Balsam fir - 40%
Height class - 50 feet
Density class 66 - 100%

PORTAGE ISLAND