

HALIFAX FIELD NATURALISTS NEWSLETTER

c/o Nova Scotia Museum
1747 Summer Street
Halifax, Nova Scotia
B3H 3A6

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JUNE - DECEMBER 1980

NUMBER 24

Meetings are held on the first Thursday of every month at 8.00 P.M. in the Auditorium on the ground level of the Nova Scotia Museum, 1747 Summer Street, Halifax.

Field Excursions are held at least once a month.

Membership is open to anyone interested in the natural history of Nova Scotia. Membership is available at any meeting or by writing to - Membership, Halifax Field Naturalists, c/o The Nova Scotia Museum. Individual membership is five dollars yearly; family membership is seven dollars. Members receive the newsletter and notice of all excursions and special programs.

Directors for 1980-81:

President	Anne Greene
Vice-President	Bill Freedman
Past President	Joe Harvey
Membership Secretary	Marjorie Willison
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	Doris Butters
	Roger Cousens

Newsletter: Anne Greene
Mike Burke
Doris Butters

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hfn news



MEETING WITH REPRESENTATIVES OF THE FEDERAL DEPT. OF ENVIRONMENT

On October 27, 1980, the Halifax Field Naturalists, along with other provincial environmental interest groups, were invited to a meeting with Mr. Bill Mountain, the Assistant Deputy Minister of the newly-formed Environmental Conservation Service. The ECS is part of the Federal Department of the Environment and is responsible for three other existing department branches; Inland Waters, Land Directorate and the Canadian Wildlife Service. The purpose of the meeting was to acquaint Mr. Mountain with the various environmental interest groups in the province and to in turn, provide these groups with information on ECS and how to use it.

Five groups were represented at the meeting; HFN, Ecology Action Centre, Nova Scotia Resources Council and the Dartmouth and Shubenacadie Lake Advisory Boards. Each described their major focus of interest and posed questions to the dozen federal civil servants present. HFN's submission stressed our interest in the protection of Ecological Sites (as outlined by the International Biological Program) and Regional Parks in the province. The federal representatives were interested and responsive, although ours is a provincial rather than federal concern.

In general the meeting (one of a series across the country) was useful. It was a very positive step, on the part of the Department of Environment, towards increasing public participation in its affairs, a policy the Department has recently adopted.

In addition, the meeting afforded a rare opportunity for the representatives of the various interest groups attending, to meet and discuss areas of common concern.

AREA STUDIES

Many people helped with our Area Studies Programme this summer. Three areas were described in detail, Peggy's Cove Barrens, the South End Railway Cutting and Conrads Beach, thanks to the members of the groups involved. In addition, the Public Gardens, not on our original list of areas (see newsletter no. 23), has been well described by Joe Harvey and Collin Stewart. Information on these areas will appear in the newsletters, starting with Peggy's Cove, featured in the current issue. Thanks to all - keep up the good work.



field trips

MUSHROOM FORAY -

The mushroom foray led by Brenda McAfee on Saturday, October 11, 1980, was our most successful outing of the year, both in terms of the bright, sunny weather as we drove to Moses Mountain near Windsor, and in terms of the turnout of 30 people.

Although there was an apparent shortage of fungi visible in the woods, a diligent search for a couple of hours provided several basketfuls which Brenda commented on and identified for us on the spot and again over lunch when they were laid out on display. Edibility was the concern of many people and several groups went away intending to eat the better ones.

The best book for identifying mushrooms is probably O.K. Miller, Mushrooms of North America published by Dutton. Its keys, although complicated because of the large number of species we have, are quite good and the photographs are excellent.

Among the decidedly inedible ones was the well-named Destroying Angel and its relative the Fly Agaric. The latter gets its name from its use in the Middle Ages to kill flies. The cup was crumbled up in a saucer with a little milk and left on the window ledge. Flies sucking on the mixture were killed. It is high time someone repeated this to see if it works - how about it one of you fungophiles?

After lunch the group dispersed, the writer to buy fruit and vegetables in the Valley and to visit Prescott House with its display of apple varieties. The day ended pleasantly with a meal of chicken breast casserole in a tomato sauce with Honey Fungus.

Following is a list drawn up by Brenda, of species collected at Moses Mountain.

M.J. Harvey.

<i>Agaricus arvensis</i>	Field or Horse mushroom	G
<i>Aleuria aurantia</i>	Orange-peel fungus	NP
<i>Amanita citrina</i>	Lemon amanita	P
<i>A. muscaria</i>	Fly agaric	P
<i>A. virosa</i>	Destroying angel	DP
<i>Armillaria mellea</i>	Honey mushroom	G
<i>Bolbitius vitellinus</i>	Cow dung fungus	NP
<i>Clitocybe aurantiaca</i>	False chanterelle	P
<i>C. dealbata</i>	-	DP
<i>Collybia acervata</i>	-	EV
<i>C. maculata</i>	Spotted collybria	NP
<i>C. dryophila</i>	Oak-loving collybria	P
<i>Cortinarius armillatus</i>	Bracelet cortinarius	E
<i>C. semisanguineus</i>	-	EV
<i>Cystoderma amianthinum</i>	-	NP
<i>Eutoloma lividum</i>	Leaden entoloma	P
<i>Fomes sp.</i>	-	NE
<i>Ganoderma tsugae</i>	-	NE
<i>Gomphidius subroseous</i>	-	E
<i>Hebeloma sp.</i>	-	P
<i>Inocybe sp.</i>	-	P
<i>Laccaria laccata</i>	-	E
<i>Lactarius cinereus</i>	-	EV
<i>L. subdulcis</i>	-	E
<i>Lycogola epidendron</i>	Slime mold	NE
<i>Marasmius oreades</i>	Fairy-ring mushroom	E
<i>Mycena pura</i>	-	E
<i>Naematoloma fasciculare</i>	Sulphur Tuft	P
<i>Pluteus cervinus</i>	Fawn-coloured pluteus	E
<i>Polyporus versicolor</i>	Many-zoned polypore	NE
<i>Ramariopsis crocea</i>	-	EV
<i>Russula fragilis</i>	Pepper russula	P
<i>Suillus granulatus</i>	Granulated bolete	G
<i>S. luteus</i>	-	E
<i>Tricholoma flavovirens</i>	Equestrian tricholoma	E
<i>Tricholomopsis decora</i>	-	E

G = Good
 NP = Not poisonous
 P = Poisonous
 DP = Deadly poisonous
 EV = Edibility unknown
 NE = Not edible
 E = Edible



Fomes fomentarius

EDITOR'S NOTE

As a result of a lot of hard work on the part of many people, we are pleased to devote most of this rather late issue of the HFN newsletter to the first results of our Area Studies Programme. As you will remember, after studying an area, we planned to publish our findings, in all their detail, in our newsletter. Then we would proceed to concentrate our information in booklet form for distribution to the public via the N.S. Museum. This last step is in progress for the Peggy's Cove Area.

WEST DOVER - PEGGY'S COVE

BARRENS

REPORT NO. 1 OF THE AREA STUDIES GROUPS

The area is reached from Halifax by taking Route 103 to the outskirts and branching off on Route 333 to Peggy's Cove. The distance from Halifax is about 40 km. (Figure 1).

Unfortunately there is no good parking place on the barrens. The only (minute) pull-off site is the start of the track to Polly's Cove in the centre of the barrens. This is marked by a row of old telephone poles. Peggy's Cove itself has good parking but is on a peninsula cut off from the barrens by an inlet. One of many possible hikes is to go from West Dover along the coast towards Peggy's; this gives many spectacular views. Visitors should expect rough walking with occasional steep slopes, wet boggy patches and low but dense clumps of bushes. Clothing and footwear should be chosen to suit these conditions.

GEOLOGY

These coastal barrens are one of the best examples in eastern Canada of the shaping of the land by past glacial action, the absence of trees gives the area a more dramatic feel. The evidence of glaciation is most obvious from the perched boulders left sitting on the hillsides since the ice melted from beneath them 12,000 years ago. Also from the *roches moutonnées* (sheep-back rocks) which form the majority of the landscape. In addition the glaciers gouged out deeper hollows which are now occupied by lakes or their successional vegetation, bogs.

The rock itself is a white mica granite, technically a granodiorite. It consists of block platelets of mica, exceptionally large crystals of white, opaque feldspar and smaller, transparent crystals of silica. In many places, especially along the coast where

PEGGY'S COVE BARRENS

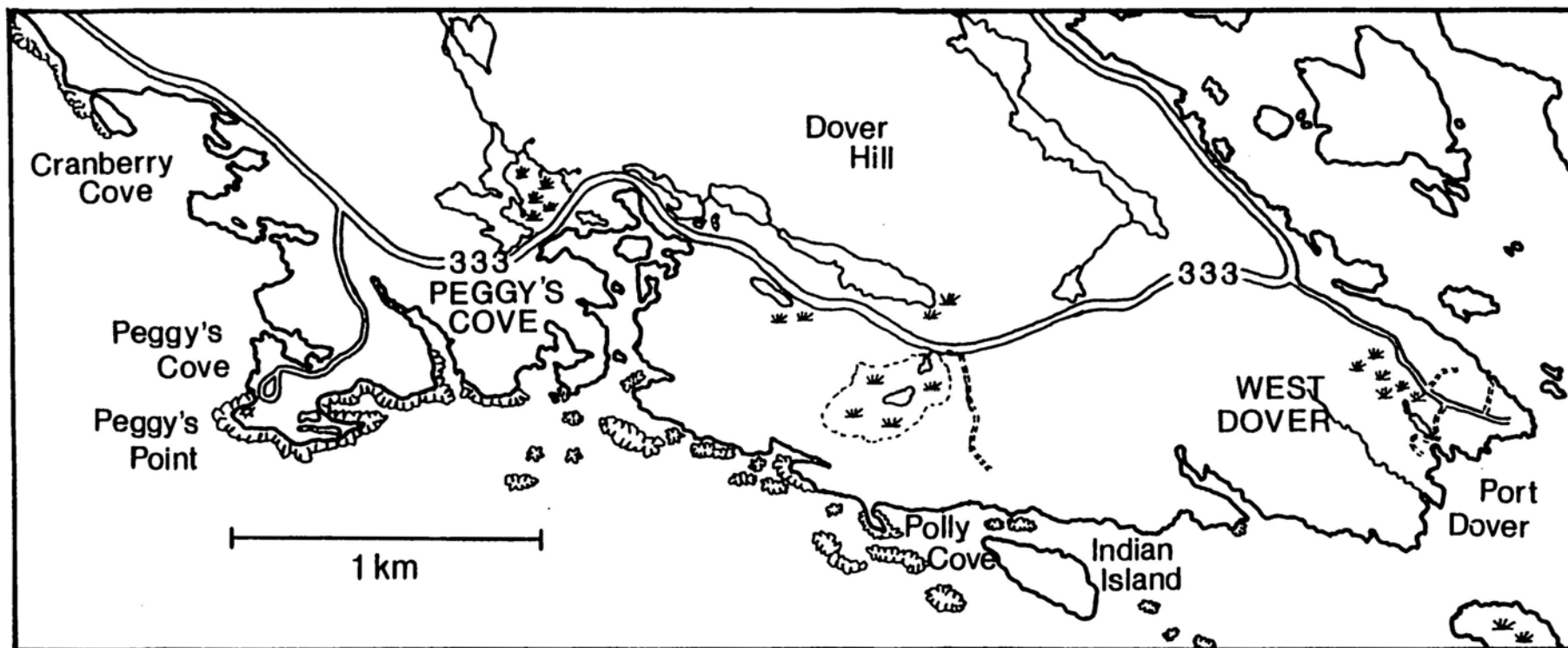


Figure 1. The West Dover - Peggy's Cove barrens. The specific area we studied is surrounded by a dashed line (----).

lichens do not obscure the surface, darker blocks of rocks can be seen incorporated. These 'heathens' are older rocks which were mixed into the magma when it was intruded into the crustal rocks. The granite is of Carboniferous Age (about 350 million years ago). Cutting through the granite are a few veins of silica and some small dykes of slightly more recent intrusive granites.

SOILS

Mineral soil is absent over much of the area. No doubt most of the clay, silt and sand left by the glaciers was removed by wind and rain during the first thousand or so years following deglaciation. There is evidence for this in cores which have been drilled through some of the peat deposits formed in the lake basins. Below the peat is a fine, white silt and clay layer. Where a mineral soil is present it is a podzol in a mainly coarse sandy base. Podzols are the soils formed in areas with high rainfall and low temperatures, and while this applies to the whole of Nova Scotia, the area around Peggy's Cove has a particularly cool micro-climate since it is exposed to the Atlantic gales and fogs.

Elsewhere there is either no soil at all and the rock is covered with lichens or there is a deposit of peat formed directly on the rock surface. Some of these humus deposits are on fairly steep slopes and it seems fair enough to regard these as blanket peat. Blanket bog is a rare phenomenon and forms only in cool, damp regions with no summer hot periods. In North America extensive blanket bog is found only on the Burin Peninsula of southern Newfoundland. Doubtless the summer fogs which form on the Atlantic coast have had an effect.

HISTORY -

There are two stories told as to how Peggy's Cove came by its name. One is the romantic tale of the sole female survivor of a shipwreck, marrying one of her rescuers who was a resident of the Cove. Her name was Margaret, shortened to Peggy, by those who came to call. The other, the more likely story, is that the name is derived from the Bay on which the cove is located - St. Margaret's Bay.

Regardless of how the area came by its name, what is known is that six families, resident at the cove, were granted 800 acres of land lying between Indian Harbour and Pollock Cove, in 1811.

At one time the community numbered about four hundred people and fishing was the principle means of livelihood. Fences were erected around the area to protect the gardens of the residents from the cattle which were put out to pasture nearby and a gate in the fence was located where the lower parking lot now stands. Today the fences are no longer needed, the population is around 100 people, but some fishing is still carried out as witness the boats tied at the wharf and the markers telling where nets and lobster pots are located.

In 1962 an Act of the Nova Scotia Legislature was proclaimed to preserve the unique scenic beauty, character and atmosphere of the area from Indian Harbour to West Dover, and in 1969 the highway and adjoining area were declared parkland, thus preserving the whole area.



HABITATS

There are five major habitats within the study area near Peggy's Cove: coastal barrens, patches of scrub spruce, bogs, ponds, and the intertidal zone. All of these habitats are readily accessible to any investigator by walking in along the access road to Polly Cove and exploring on either side of it. The intertidal zone is covered in a following report by Mike Burke.

COASTAL BARRENS -

The coastal barrens can be divided into two sub-habitats on the basis of physical conditions and dominant vegetation. The first of these consists of the granitic coastal cliffs and exposed hill-tops, which resemble to some degree the alpine zone of the montane landscape. On such sites, soil is absent or found only in localised cracks or hollows. What little soil is present is nutrient-poor, due to leaching by rain. The rocky surfaces retain little moisture and suffer great temperature extremes. As well, these exposed sites experience the greatest effects of the wind and ocean spray.

Due to the harsh conditions prevailing in this rocky sub-habitat, the only plants present are stress tolerators with adaptations to survive in the dry, nutrient-poor environment. Lichens (symbiosis of fungi and algae) are abundant and diverse in this sub-habitat. They have the ability to become dormant when moisture is not available, and to react quickly (to photosynthesise, metabolise, etc.) when it is available. They are slow-growing (as one can infer from their interrupted metabolism) and long-lived, and are the most successful stress-tolerators encountered in the study area. Vascular plants grow only where soil has accumulated in cracks or hollows. These plants are also adapted to withstand dry conditions (they are xerophytes, 'dry plants'). Often they have leaves with a thick, waxy cuticle (eg. bearberry, wintergreen); leaves that are thickened and leathery (eg. wintergreen, cinquefoil); or leaves that are reduced to needles (e.g. common juniper, broom crowberry). All such plants grow close to the rock surface to minimise dehydration due to the wind. Due to the low availability of nutrients and short

growing season, most plants are evergreen and long-lived, and have relatively slow growth rates and metabolism.

The following is a list of lichens, mosses and vascular plants commonly found in the rocky sub-habitat:

Lichens:

Cladonia boryi
Cladonia cristatella (British soldier)
Cladonia rangiferina (reindeer moss)
Cladonia terra-novae

Ochrolechia frigida
Parmelia centrifuga (grows in rings on rocks)
Parmelia saxatilis
Rhizocarpon geographicum (map lichen)
Umbilicaria muhlenbergii (smooth rock tripe)
Umbilicaria papulosa (rough rock tripe)
Xanthoria parietina (bright orange in colour)

Mosses:

Andreaea sp. (black tufts on rocks)
Dicranum sp.

Vascular plants:

Arctostaphylos uva-ursi (bearberry)
Corema conradii (broom crowberry)
Empetrum eamsii (pink crowberry)
Gaultheria procumbens (wintergreen)
Hudsonia ericoides (hudsonia)
Juniperus communis (common juniper)
Potentilla tridentata (three-toothed cinquefoil)
Vaccinium vitis-idaea (foxberry)

The second sub-habitat of the coastal barrens habitat is the barrens per se. In general, this sub-habitat encompasses the hill-sides, but it must be noted that it is, in fact, a mosaic of wet, dry, sheltered, and exposed micro-habitats, depending on local topography. Both soil and moisture accumulate as one moves from the bare tops of the hills to their bases, and some shelter from the wind can be found in the lees of the hills. The vegetation cover ameliorates temperatures and the extremes common on the hilltops are not pronounced on the hillsides.

The barrens, in general, present a less extreme environment for plant growth than the "alpine" zone. Plants other than

stress-tolerators can survive there, although many arctic "alpine" plants are still present, especially towards the hilltops. Broad-leaved shrubs and herbs are common, but for some species it is a sub-optimal habitat (eg. bunchberry, wild lily-of-the-valley, gall-of-the-earth grow better in the forest understory). Stunted trees, mostly conifers, grow in sheltered hollows, and eventually create their own microhabitat. Although the majority of the plants in the barrens are mesophytes (middle plants, with respect to moisture), some show xerophytic adaptations, especially evergreen species that must minimise water loss in winter when moisture is often frozen and thus, unavailable. For example, Labrador Tea

has thick, leathery leaves with a hairy covering over the stomata; lambkill has a waxy cuticle.

Although soil is more plentiful in the barrens than on the rocky hilltops, it remains nutrient-poor due to leaching by rain. As well as evergreen-ness, other nutrient conservation mechanisms are shown by barrens plants. Alder and sweet gale have symbiotic associations of nitrogen-fixing bacteria in their root nodules. Most higher plants have fungal mycorrhizae (which enhance absorption of nutrients) associated with their roots.

Because the barrens sub-habitat is a mosaic of microhabitats of differing environmental conditions (each microhabitat favouring a different collection of plant species), there is a much greater diversity of plant species within the barrens than within either the hilltop "arctic-alpine" sub-habitat or the bog habitat at the base of the hills.

Plant species commonly found within the barrens include the following:"

Lichen:

Hypogymnia physodes (on twigs)

Moss:

Sphagnum spp.

Clubmoss:

Lycopodium obscurum (tree clubmoss)

Ferns:

Osmunda cinnamomea (cinnamon fern)

Polypodium virginianum (polypody fern)

Pteridium aquilinum (bracken fern)

Grasses:

Agrostis scabra (tickle grass)

Calamagrostis pickeringii (bluestem)

Sedges:

Carex spp. (sedges)

Eriophorum spp. (cottongrasses)

Scirpus cespitosus (deer sedge)

Scirpus cyperinus (woolly-headed sedge)

Herbs:

Aster acuminatus (wood aster)

Aster nemoralis (bog aster)

Clintonia borealis (clintonia)

Coptis groenlandica (gold thread)

Cornus canadensis (bunchberry)

Maianthemum canadense (wild lily-of-the-valley)

Melampyrum lineare (cow wheat)

Prenanthes trifoliata (gall-of-the-earth; lionspaw)

Solidago uliginosa (bog goldenrod)

Smilacina trifolia (bog lily)

Trientalis borealis (star-flower)



Woody:

<i>Abies balsamea</i>	(balsam fir)
<i>Acer rubrum</i>	(red maple)
<i>Alnus rugosa</i>	(speckled alder)
<i>Aralia nudicaulis</i>	(sarsparilla)
<i>Aronia arbutifolia</i>	(red chokeberry)
<i>Gaylussacia baccata</i>	(common huckleberry)

<i>Gaylussacia dumosa</i>	(bog huckleberry)
<i>Kalmia angustifolia</i>	(lambkill)
<i>Larix laricina</i>	(tamarck, larch)
<i>Ledum groenlandicum</i>	(Labrador tea)
<i>Myrica gale</i>	(sweet gale)
<i>Myrica pennsylvanica</i>	(bayberry)
<i>Picea glauca</i>	(white spruce)
<i>Picea mariana</i>	(black spruce)
<i>Pinus strobus</i>	(white pine)
<i>Rhododendron canadense</i>	(rhodora)
<i>Rosa virginiana</i>	(wild rose)
<i>Vaccinium angustifolium</i>	(blueberry)
<i>Viburnum cassinoides</i>	(witherod)

BOGS AND PONDS -

The bogs and ponds/lakes are found within the depressions at the bases of the slopes. These depressions (as well as the rest of the landscape) were shaped by the action of past glaciers, whose relentless scraping and gouging exposed the granitic bedrock. After the ice melted, water tended to accumulate in the depressions because of poor drainage associated with the underlying granite. With a gradual input of organic matter into the system, the deep water of the ponds was colonised by vascular plants, such as pond weeds with floating leaves. The shallow water was colonised by creeping plants that formed a mat over the water surface, and eventually allowed the invasion of the surface by peat moss, and such plants as leatherleaf, bog rosemary and bog lambkill. With continuing growth and deposition of debris, the vegetation mat over the water increased in thickness and area, and the pond decreased in size! This process (which continues today) is very much dependent on the presence of the

peat moss (*Sphagnum* spp.) which dominates the bogs of the study area. Peat moss can absorb large quantities of water by capillary action, and accumulated dead peat moss can draw ground water up through it so that live moss can continue to grow on top of the dead mat. Thus, the bog habitat is always a wet one.

The bog is also a very nutrient-poor habitat, as the underlying granite contributes little in the way of minerals to groundwater. Peat moss possesses a very efficient ion-exchange mechanism whereby it exchanges hydrogen ions for mineral ions. It obtains its ions from groundwater or rainwater. This not only decreases the availability of mineral nutrients to other plants, but it also creates a very acidic environment. Because of the extreme acidity and poor circulation, resulting in anaerobic conditions, bacterial decomposition occurs only slowly. This ties up nutrients for long periods of time and renders them unavailable to other plants.

The bog, then, is not an optimal habitat for most plants,

and there are relatively few plants that flourish in the wet, nutrient-poor conditions. These plants are, out of necessity, hydrophytes (= water plants) and must possess mechanisms for nutrient conservation. Many bog plants are evergreen (eg. bog lambkill, Labrador tea, black crowberry, bog rosemary, leatherleaf) and others are carnivorous (eg. sundew, pitcher plant, bladderwort). Thus they either conserve what few nutrients are available, (by retaining their leaves), or utilise an alternate source of nitrogen and phosphorus. The pitcher plant is particularly interesting in that it has associated with it a number of organisms that take advantage of its ability to provide nutrients for itself. The pitchers may

contain algae, filter-feeding mosquito larvae, or fly maggots feeding on dead insects. Moths feed on the leaf tissues, the seeds, and the roots of the pitcher plant.

Within the bogs there are often upraised hummocks of moss, which are usually inhabited by spruces, tamaracks, and heaths. These plants take advantage of the somewhat drier conditions associated with the hummocks, and are an indication of the next stage in the bog succession to dry land. The stunted trees tend to create their own microhabitat, one which favours plants common to the barrens or to forest understory vegetation.

Plants commonly found in the Peggy's Cove bog habitat are:



Vaccinium macrocarpon
(large cranberry)

Moss:

Sphagnum spp. (bog moss)

Liverwort:

Odontoschisma sphagni (leafy, between moss plants)

Sedges:

Carex spp. (sedges)
Eriophorum spp. (cottongrasses)
Scirpus cespitosus (deer sedge)

Herbs:

Rubus chamaemorus (bake-apple, cloudberry)
Smilacina trifolia (bog lily)
Vaccinium macrocarpon (large cranberry)

Orchids:

Arethusa bulbosa (dragon's mouth)
Calopogon pulchellus (grass pink)
Pogonia ophioglossoides (rose pogonia)

Carnivorous Plants:

Drosera rotundifolia (round-leaved sundew)
Sarracenia purpurea (pitcher plant)
Utricularia cornuta (yellow bladderwort)

Woody:

Andromeda glaucophylla (andromeda, bog rosemary)
Chamaedaphne calyculata (leatherleaf)
Gaylussacia dumosa (bog huckleberry)
Kalmia polifolia (bog lambkill)
Larix laricina (tamarack, larch)
Myrica gale (sweet gale)
Nemopanthus mucronata (Canada (false) holly)
Picea mariana (black spruce)

The ponds/lakes within the
 bogs are acidic and nutrient-poor
 due to the effects of peat moss.
 They harbour only a few plant
 species; the ones which follow:

Liverwort:

Pallavicinia sp. (thalloid, rare, around edge of pool)

Herbs:

Lobelia dortmanna (water lobelia)
Nuphar variegatum (cow lily, yellow water lily)
Nymphaea odorata (white water lily)
Utricularia sp. (bladderwort)

Magi Nietfeld

VEGETAL HISTORY

Over the 10,000 or more years
 since deglaciation, the barrens
 must have undergone changes in
 appearance. The first wave of
 plants and animals colonising the
 area would be those now found in
 the arctic and subarctic. Some
 idea of the appearance at this
 stage can be obtained by visiting
 some of the coastal barrens of
 Newfoundland, e.g. the Port-au-
 Choix Peninsula on the Gr at
 Northern Peninsula.

Remaining from this initial
 colonisation are probably the
 ground-hugging bushy plants such
 as creeping juniper, foxberry,
 bearberries, blueberries and pink
 crowberry. The greenland sand-
 wort, which grows in small amounts
 (rare - do not collect) on some of
 the flat granite exposures is a
 typical arctic herb. It has
 obviously only persisted on these
 barrens since the tundra phase,
 because of the availability of

thin soils on granite where it
 does not have to compete with
 other herbs.

We know, however, that trees
 migrated into Nova Scotia quite
 soon after ice retreat. For
 instance, Dan Livingstone detected
 the presence of spruce from its
 pollen in the Wreck Cove bog on
 the Cape Breton Highlands plateau
 at about 9,000 years BP. Thus the
 treeless tundra phase was fairly
 short and for much of its vegetat-
 ional history the barrens would
 have closely resembled their present
 condition with patches of
 spruce, fir and bushes on the
 slopes with only the bogs, granite
 exposures and the coastal strip
 without trees.

The coming of white settlers
 was the next major event in the
 vegetational history of the region.
 The early fishing communities were
 self-sufficient in food, generally
 buying only flour beans, sugar,

salt and spices. All the vegetables were grown in small fenced gardens as can still be seen in northern Newfoundland. Meat, eggs and dairy produce were provided by the usual domestic animals: cows, pigs, sheep, chickens, etc., and of these the sheep and horses would have been allowed to wander fairly freely over the barrens to search out what little grass there was and hence modifying the vegetation. The growth of grass and herbs would of course be encouraged by the felling of trees for fuel and lumber.

More important than grazing and local felling is the effect of fire. Fire may be caused naturally by lightning strike or as an accidental or deliberate act of man. In the Maritimes as a whole, lightning strikes account for a large number of fires in Northwest New Brunswick with a declining number as one goes towards the Atlantic coast, reaching a low in the fog belt along the coastal peninsulas of Atlantic Nova Scotia. Hence the guess is that fire was a rare occurrence in pre-settlement times but has become important since. From written accounts of the nineteenth century it is obvious that a large number of deliberately-set fires reduced large areas of Nova Scotia to char. Doubtless the area around Peggy's Cove has been burnt several times during the past two hundred years.



Ledum groenlandicum
(Labrador Tea)

The most recent fire occurred in the mid-1960's and was very severe since it took place during a dry spell and burnt much of the humus on the hillsides. Numerous clumps of black spruce and fir went up in flames and have not regenerated since. Only the trees in wet hollows and on bogs escaped. The fire line extended across the upper half of the large bog in the centre of the barrens and the boundary can be detected still from the change in the bog vegetation that it caused. The bog will retain a record of the fire history because particles of charcoal produced by fire are preserved in datable horizons by the growth of the bog mosses.

Hence it is possible to conclude that the barren is a natural product of a soil-less, windswept granite site, but that the tree cover is probably lower today than for a long time, as a result of human-set fire.

CHECKLIST OF THE PLANTS OF THE
WEST DOVER-PEGGY'S COVE BARRENS

VASCULAR PLANTS

<i>Abies balsamea</i>	fir	<i>Gaultheria procumbens</i>	teaberry, wintergreen
<i>Acer rubrum</i>	red maple	<i>Gaylussacia baccata</i>	huckleberry
<i>Achillea lanulosa</i>	yarrow (on sea cliffs)	<i>G. dumosa</i>	bog huckleberry
<i>A. millefolium</i>	yarrow (by roadside)	<i>Glaux maritima</i>	sea milkwort
<i>Agrostis scabra</i>	tickle grass	<i>Glyceria canadensis</i>	rattlesnake grass
<i>Alnus crispa</i>	downy alder	<i>G. laxa</i>	rattlesnake grass
<i>A. rugosa</i>	speckled alder		
<i>Amelanchier bartramiana</i>	service-berry, Indian pear, shadbush.	<i>Habenaria blephariglottis</i>	white fringed orchid
<i>A. intermedia</i>		<i>Hudsonia ericoides</i>	hudsonia
<i>Ammophila breviflora</i>	marram	<i>Hypericum virginicum</i>	St. John's wort
<i>Andromeda glaucophylla</i>	bog rosemary		
<i>Aralia nudicaulis</i>	wild sarsparilla	<i>Iris hookeri</i>	iris
<i>Arenaria lateriflora</i>	sandwort	<i>Iris versicolor</i>	iris
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Isoetes</i> sp.	quillwort
<i>Arctostaphylos uva-ursi</i>	arethusa		
<i>Arctostaphylos uva-ursi</i>	chokeberry	<i>Juniperus communis</i>	juniper
<i>Aster acuminatus</i>	wood aster	<i>J. horizontalis</i>	creeping juniper
<i>A. nemoralis</i>	bog aster	<i>Juncus canadensis</i>	rush
<i>A. novi-belgii</i>	Michaelmas daisy	<i>J. pelocarpus</i>	rush
<i>A. radula</i>	bog aster		
<i>A. umbellatus</i>	white aster	<i>Kalmia angustifolia</i>	lambkill
<i>Atriplex patula</i>	orach	<i>K. polifolia</i>	bog lambkill
<i>Betula papyrifera</i>	paper birch	<i>Larix laricina</i>	larch, hackmatack, tamarak
<i>B. populifolia</i>	wire birch	<i>Lathyrus japonicus</i>	beach pea
		<i>Ledum groenlandicum</i>	labrador tea
<i>Calamagrostis canadensis</i>	canada bluestem	<i>Ligusticum scoticum</i>	lovage
<i>Calamagrostis pickeringii</i>	---	<i>Linnaea borealis</i>	twinflower
<i>Calopogon pulchellus</i>	calopogon	<i>Luzula multiflora</i>	woodrush
<i>Campanula rotundifolia</i>	bellflower	<i>Lobelia Dortmanna</i>	water lobelia
<i>Carex canescens</i>	sedge		
<i>C. exilis</i>	sedge	<i>Lycopodium clavatum</i>	club-moss
<i>C. folliculata</i>	sedge	<i>L. inundatum</i>	bog moss
<i>C. lasiocarpa</i>	sedge	<i>L. obscurum</i>	ground pine
<i>C. mackenzii</i>	sedge	<i>Lycopus uniflorus</i>	bugle weed
<i>C. nigra</i>	black sedge		
<i>C. paupercula</i>	sedge	<i>Maianthemum canadensis</i>	"may-flower", false lily-of-the-valley
<i>C. silicea</i>	sedge	<i>Malaxis unifolia</i>	adders mouth orchid
<i>C. trisperma</i>	sedge	<i>Melampyrum lineare</i>	cow wheat
<i>Cerastium vulgatum</i>	mouse-ear chickweed	<i>Millegrana radiola</i>	allseed
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Minuartia groenlandica</i>	greenland sandwort
<i>Clintonia borealis</i>	clintonia	<i>Myrica gale</i>	sweet gale
<i>Convolvulus sepium</i>	convolvulus	<i>M. pensylvanica</i>	bayberry
<i>Coptis trifolia</i>	goldenthread		
		<i>Nemopanthus mucronatus</i>	false holly
<i>Corema conradii</i>	broom-crowberry	<i>Nuphar variegatum</i>	yellow water lily
<i>Cornus canadensis</i>	bunchberry	<i>Nymphaea alba</i>	white water lily
<i>Cypripedium acaule</i>	common ladyslipper		
		<i>Osmunda cinnamomea</i>	cinnamon fern
<i>Danthonia spicata</i>	poverty grass		
<i>Deschampsia flexuosa</i>	hair grass	<i>Picea glauca</i>	white spruce
<i>Diopatra intermedia</i>	long-leaved sundew	<i>Picea mariana</i>	black spruce
<i>D. rotundifolia</i>	round-leaved sundew	<i>Pinus banksianus</i>	jack pine
<i>Dryopteris spinulosa</i>	prickly shield fern	<i>P. strobus</i>	white pine
		<i>Plantago maritima</i>	sea plantain
<i>Elymus mollis</i>	lyme grass	<i>Polypodium virginianum</i>	polypody
<i>Empetrum nigrum</i>	pink crowberry	<i>Potentilla anserina</i>	silver weed
<i>E. nigrum</i>	common crowberry	<i>P. tridentata</i>	three-toothed cinquefoil
<i>Eriocaulon septangulare</i>	pipewort	<i>Pogonia ophioglossoides</i>	rose pogonia
<i>Eriophorum angustifolium</i>	cotton grass	<i>Prenanthes trifoliata</i>	lion's paw
<i>E. virginicum</i>	cotton grass	<i>Prunus pensylvanica</i>	pin cherry
		<i>Pteridium aquilinum</i>	bracken
<i>Festuca rubra</i>	red fescue		
<i>Fragaria pensylvanica</i>	wild strawberry		

Rhododendron canadense
Rhynchospora alba
Rosa virginiana
Rubus chamaemorus
R. hispidus
R. sp.
R. strigosus
Rumex acetosa
R. acetosella

Sarracenia purpurea
Scirpus cespitosus
S. cyperinus
Scutellaria galericulata
Sedum rosea
Sisyrinchium sp.
Smilacina trifolia
Solidago bicolor
S. puberula
S. rugosa

Solidago sempervirens
S. uliginosa
Sorbus americana
Sparganium angustifolium
Spartina alterniflora
Spiraea latifolia
Spiranthes romanzoffiana

Thalictrum polygamum
Triglochin elata

Utricularia cornuta
U. minor

Vaccinium angustifolium
V. macrocarpon
V. myrtilloides
V. oxycoccus
V. vitis-idaea
Viburnum cassinoides
Viola cucullata
V. incognita
V. septentrionalis

Xyris montana

rhodora
beakrush
wild rose
cloudberry, bakeapple
trailing blackberry
blackberry
raspberry
sourdock
sheep sorrel

pitcher plant
deer sedge
woolly-headed sedge
skullcap
roseroot
blue-eyed grass
bog lily
white goldenrod
heath goldenrod
rough goldenrod

seaside goldenrod
bog goldenrod
mountain ash
narrow-leaved bur-reed
cord grass
meadowsweet
hooded ladies tresses

meadow rue
arrow grass

bladderwort
bladderwort

blueberry
large cranberry
blueberry
small cranberry
foxberry
withered
blue violet
white violet
blue violet

yellow-eyed grass

Polytrichum
Racomitrium
Rhytidiadelphus loreus
R. triquetrum
Sphagnum cuspidatum
S. flavicomans
S. fuscum
S. magellanicum
S. rubellum
S. tenellum
S. torreyanum

LIVERWORTS

Bazzania triloba
Cephaloziella
Gymnomitrium crenulatum
Lepidozia setacea
Nylia anomala
Odontoschisma sphagni
Pallavicinia
Gymnocolea inflata

Among the freshwater algae *Batrachospermum* is noteworthy as occurring in a green form on roots in the edges of the pond.

LICHENS

Cladonia alpestris
C. boryi
C. chlorophaea
C. cornuta
C. cristatella
C. novae-terrae
C. papillaria
C. rangiferina
C. verticillata
Cornicularia aculeata
Hypogymnia physodes
Parmelia centrifuga
P. conspersa
P. omphalodes
P. saxatilis
P. sulcata
Parmeliopsis
Physcia grisea
Ramalina intermedia
Rhizocarpon geographicum
Stereocaulon
Umbilicaria muhlenbergii
U. papulosa
Usnea
Xanthoria parietina
 (also, the similar orange *Caloplaca* needs looking for).

MOSSES

Andreae
Aulacomnium palustre
Climacium dendroides
Dicranum
Eurhynchium pulchellum
Grimmia
Hypnum
Hylocomium splendens
Mnium
Pleurozium schreberi

BIRDS OF THE PEGGY'S COVE AREA

The Peggy's Cove study area is not particularly rich in bird life. My list, covering spring, summer, and part of autumn, and including inland and coastal areas, currently stands at only 26 species. Nevertheless, I have passed a number of enjoyable hours compiling it. A person passing through the area for the purpose of pursuing some other interest, or for no greater reason than to take a pleasant stroll, will find enough bird life to add another dimension to his pleasure, at least, and the avid birdwatcher can take consolation for a rather short list in the peculiarly hard, dramatic beauty of the scenery.

One might well start a bird tour of the area by leaving one's car by the highway at the head of the road leading in. A walk along the road about two-thirds of its length, and then along the winding path leading off to the right over the rocks and eventually to the cliff overlooking the sea, will afford an opportunity of seeing almost all the species in the area, even though only a small part of it is covered. An hour before sunrise is a good time of day to start, and early in the season before the leaves are fully out, is a good time of year.

When the air is still you will hear a number of songs through the morning mist as soon as you step out of the car. There are Robins near the road. The song of the Hermit Thrush will come from more than one quarter. There were at least three this spring. One I was always able to find sang from parts of a few tall branches above an area of spruce scrub under the steep hill to the left. You will probably hear Song Sparrows, and the somewhat less insistent songs of the Warblers.

The Yellowthroat is the common Warbler of the area, and will be seen first in the alder bushes along the road in. Only slightly less common is the Yellow Warbler. This bird seems to favour brush including one or two trees, though by no means displacing the Yellowthroat from such areas.

Both may be seen almost anywhere where there is a little brush. Also likely to be seen anywhere - but particularly abundant in the small trees on the slopes leading down to the sea - is the Song Sparrow. Nine times out of ten, if not more, the little "cheep" you hear in the scrub and spend twenty minutes trying to trace to its source, will turn out to be one of these three. In leaving the easy paths and walking, stalking, and standing extensively about the bog, the ponds, and the various areas of scrub growth and spruce forest patches, I have failed to add to the list of common woodland birds. I saw two other Warblers-- Myrtle and Chestnut-sided one observation each.

The Savannah Sparrow can be seen frequently hopping about the rocks and open areas.

Ravens can be seen, and the Common Crow is as common as could be desired, especially in the north-west part of the area.

Without even leaving your car, many seabirds, of course, can be observed flying up and down overhead. The Great Black-backed Gull and the Herring Gull being the most common, and I think there may be some nesting on the island very close to shore off the southern coast of the area. Not having actually seen a nest or nestlings of any kind in the area, I cannot

say from my own certain knowledge that anything breeds there. I have never seen a Ring-billed Gull there. Double-crested Cormorants fly over frequently, and I have identified several Great Cormorants. Great Blue Herons fly over occasionally. Often they can be seen wading in Peggy's Soi, a half-mile or so north of the study area. I saw Black Guillemots in early May, and frequently during the next couple of months. A few weeks after that I watched Gannets out over the sea, while a group of Purple Sandpipers walked about in the rockweed in front of me. Later in the season Terns were plentiful, but generally too far out to tell the Common from the Arctic.



Black-capped Chickadee

Osprey seem to get more common as the season progresses. I saw one in spring a mile from Polly Cove, but it wasn't until late summer that I noticed one hunting the waters of the study area.

The area is not rich in resident shorebirds. I saw one Spotted Sandpiper all year. However, on several occasions in late spring and early summer I saw Willets about the north-west section of the place, where there are extensive areas of water protected from the open sea by low, rocky arms, and some grassy shallows. I know for a fact that the year before, Willets nested a mile or so north on the other side of Peggy's Cove.

On a summer day I saw one or two Mergansers in the same area.

One day I spotted two swallows flying along the coast, probably a Barn Swallow and a Tree Swallow.

There are White-throated Sparrows, Myrtle Warblers, and Black-capped Chickadees in the more heavily-treed area across the road from the study area.

The rather more grown up areas and taller spruce patches about the old stone foundation and off the end of the grassy shallow I mentioned in connection with the Willets, do not seem to harbour birds which cannot be seen in more open areas and smaller brush patches. (They do harbour red squirrels). The ponds do not seem to be of much interest to birds. I did see a pair of Black Ducks on one once, in mid-summer.

While my spring and summer visits to the study area were frequent and I tried to make my coverage fairly thorough, I have not spent as much time in the area during late summer and fall. Furthermore, to call my ability in distinguishing what Peterson calls "confusing fall warblers" limited, would be flattering. And the fall migration is far from over, so I do not offer this list as a completed task. Nevertheless, I should note that a couple of weeks ago I saw (and heard) flocks of Whimbrel on two different days. And early this afternoon, a squally, misty sort of day, constantly mizzling and threatening to rain, there were Slate-coloured Juncos, Tree Sparrows, White-throated Sparrows, and Black-capped Chickadees among the alder bushes along the road in. At sea, Gannets, including some immatures, were about, and closer inland in the large bay central to the area, a female Scoter swam and dived in the waves. There were also about half-a-dozen Common Mergansers.

My total list, including only birds of whose identity I am reasonably certain, follows:

Probable residents:

Great Black-backed Gull (*Larus marinus*)
 Herring Gull (*Larus argentatus*)
 Common Raven (*Corvus corax*)
 Common Crow (*Corvus brachyrhynchos*)
 Robin (*Turdus migratorius*)
 Hermit Thrush (*Hylocichla guttata*)
 Yellow Warbler (*Dendroica petechia*)
 Yellowthroat (*Geothlypis trichas*)
 Savannah Sparrow (*Passerculus sandwichensis*)
 Song Sparrow (*Melospiza melodia*)

Possible resident:

Willet (*Catoptrophorus semipalmatus*)

Commonly observed:

Double-crested Cormorant (*Phalacrocorax auritus*)
 Black Guillemot (*Cepphus grylle*)

Seasonal transients:

Gannet (*Morus bassanus*)
 Common Scoter (*Oidemia nigra*)
 Whimbrel (*Numenius phaeopus*)
 Purple Sandpiper (*Erolia maritima*)

Occasional or isolated observations:

Great Cormorant (*Phalacrocorax carbo*)
 Great Blue Heron (*Ardea herodias*)
 Common Merganser (*Mergus merganser*)
 Spotted Sandpiper (*Actitis macularia*)
 Myrtle Warbler (*Dendroica coronata*)
 Chestnut-sided Warbler (*Dendroica pensylvanica*)
 Osprey (*Pandion haliaetus*)

Other:

Black-capped Chickadee (*Parus atricapillus*)
 Slate-coloured Junco (*Junco hyemalis*)
 White-throated Sparrow (*Zonotrichia albicollis*)

These three birds were not seen on the area in late spring or summer. They were present at times in groups in the past few weeks. All are known to winter in the province.

This list is based on well over fifty hours of observations in spring, summer and early fall, at all times of day and in all kinds of weather. Nevertheless, the user should bear in mind that the absence of any bird from this list indicates nothing more than this observer has not seen or identified it.

Michael J. Downing.

PEGGY'S COVE INTER-TIDAL AREA

Peggy's Cove and environs are characterised by a granitic coastline, rugged and steep in some places, gradual in others. The Atlantic coastal region is subjected to twice-daily tidal changes, and organisms which live on the rocks must be able to live when covered by water, and survive when exposed to air. As such, the inter-tidal zone (zone between high and low tide) is a harsh environment and the organisms that live there are a hardy breed.

It is a bit difficult to search for and observe inter-tidal life in the vicinity of the massive rock outcroppings and lighthouse because of the danger of wave action and slippery footing, but a number of the more sheltered bays around the cove (such as Cranberry Cove) make ideal spots for discovery and observation.

Especially noticeable in the inter-tidal zone are the algae, the seaweeds. A visit to the rocky shore will reveal the predominant greens, browns and yellows of the rockweeds. These are equivalent to the land plants and perform the same function - to capture sunlight and use it as an energy source to manufacture food from the nutrients in the water. *Fucus* and *Asco-phylum* are the dominant genera of rockweed. An examination of them reveals air sacs which buoy up the algae when they are submerged. If enough of the rocks are exposed, one can see bands of colours which indicate that the different species of seaweeds are zoned according to their habitat preference.

In some areas, at the low tide line, a red seaweed, Irish Moss (*Chondrus crispus*) can be found. From this species a

chemical called carageenan can be extracted, which is used as an emulsifier (keeps everything mixed) in chocolate milk, ice-creams and such. It is also used in soap, hand lotion, paint, cosmetics and apparently is used to add bulk to low-calorie foods.

Without the algae, animal species living between the tide marks would be virtually eliminated. When the tide is out, the algae form a mat over the rocks which, even in the hottest weather, preserves moisture and provides a shelter for the animals. When the tide is in, and the seaweeds are buoyed up, they provide a food supply for many of the animals. At low tide one may be disappointed at the apparent lack of animal life, until it is realised that inter-tidal animals do not feed, or even move, when the tide is out lest they quickly dry out. A search within the mat of seaweeds, however, shows how wrong these first impressions about the lack of life are.

Most rocky shores have snails as a dominant organism and periwinkles are the most abundant of these. The Nova Scotia coast has three species of these, the largest of which is edible. All three species are vegetarians (herbivores), browsing on the algae. A file-like tongue, the radula, rasps back and forth on the algae, tearing off little bits of tissue which are ingested by the periwinkles.

The largest species, the Edible or Common Periwinkle (*Littorina littorea*) can be a centimetre or more high and mainly occupies the zone from mid-tide to below low tide. The smallest species, *Littorina saxatilis*, the Northern Rough Periwinkle, occupies a higher zone, to the high tide mark and even into the splash zone. This habitat

necessitates its being exposed for a number of hours, and the rough periwinkle can often be seen clinging to the bare rock, away from the seaweed mat. It is able to secrete a liquid which hardens in contact with air and this enables the periwinkle to stick to the rock by its aperture - of course it does not, stick fast, as it is very easy to dislodge by hand, and must be able to move when the tide comes in again.



Littorina obtusata

The third species, *Littorina obtusata*, is the hardest to find. It occupies the middle part of the shore, but one must search through the seaweed mat to find it, as it tends to be the same colour as the rockweed which it inhabits. It is called the Smooth or Dwarf Periwinkle - it is smooth to the touch and has a very low spire.

Sexes are separate in the periwinkles. *Littorina littorea* lays floating egg capsules which hatch into larvae in about a week; *L. obtusata* lays eggs in small jelly capsules on rockweed, and *L. saxatilis* has the young develop inside the female in a brood pouch, and they emerge as little miniatures of the adult.

The only bi-valve that tends to be found on rocky shores is the mussel, mainly the blue mussel *Mytilus edulis*. They attach to the rocks by little threads called byssus threads and they can rock back and forth with the wave action. In the spring one can see whole rocks completely covered with tiny mussels, but as the weeks wear on the mortality rate is extremely

high (competition for food, space, attacks by predators) so very few grow to be reproductive adults.

Other snails, not as noticeable, but important nonetheless, are the predators such as the dogwinkle (*Nucella*) and the whelk (*Buccinum*). These are white-ish snails, the latter being larger, and they feed by boring through other snails and mussels to get at the flesh. If one finds an empty shell with a virtually perfect, round hole drilled in it, one can



Littorina littorea



Littorina saxatilis

be fairly certain it was attacked by one of these predators.

Of course the rocky coast has more than just snails and seaweeds - the rocks are often coated with white, volcano-like barnacles. These are relatives of lobsters, crabs and shrimp. They reproduce ~~separately~~ ^{sexually} and the larvae land on the rocks upside-down, cement their heads to the rock, feed with their feet, and build a limestone shell around themselves. When covered by the tide their feet sweep the water for microscopic food, and when uncovered they close two "sliding doors" over themselves and wait until they are submerged again.

At Peggy's Cove, one can see evidence of both seagulls and sea urchins on the rocks. Sea urchins, marine "pincushions", are green in life, with numerous spines capable of independent movement. Sea urchins are vegetarians, browsing very slowly on algae. Seagulls are one of their main predators - they swoop down, take the urchin in the beak, fly aloft and drop it on the rocks a number of times until the urchin shell breaks open. The gulls then feed on the exposed

flesh. The rocks are sometimes covered by pieces of sea urchin shell as a result.

Tide pools are bodies of water left behind when the tide has receded. Tide pools provide special problems for marine organisms at Peggy's Cove and other places. On a warm day the water temperature in the pools steadily climbs, and, with evaporation, the salinity increases. Organisms inhabiting these pools must be able to withstand these constant changes. The rocks are often spotted with pinks and reds - these are encrusting colonies of coral-like animals. A common green seaweed, growing up tall and thin, is *Enteromorpha*. Snails inhabit these tide pools, and in addition, if one disturbs the water, shrimplike creatures called *isopods* and *amphipods* can be seen scurrying for cover. These latter are related to shrimp, - they have jointed appendages and are usually a centimetre or less in size. As a general rule, the isopods are flattish from top to bottom and the amphipods flattened from side to side. Both types act as scavengers eating dead plant and animal material. Amphipods tend to swim sideways. Actually, one can find these under seaweed mats as well, outside tide pools, simply by lifting the weeds and observing the wet rocks. One can see them making mad dashes for cover and moisture again.

Starfish can be found in the Peggy's Cove inter-tidal zone as well. They are predators, mainly of bivalves (such as rocky shore mussels). They can force their stomach outside their mouths and into the slightest opening between the shells. Secretions from the starfish can dissolve the prey's flesh, then the stomach is made to recede into the starfish after its meal.

Sea anemones are also found, in tide pools and cracks in the rocks. Sometimes they look like blobs of flesh, but when the arms emerge they give the appearance of a multi-armed cylinder. They are predators, each arm containing numerous barbs which can impale a tiny organism with "harpoons" then draw it into the central mouth.

Rock crabs, *Cancer* species, are carnivores and scavengers, as are the smaller green crabs, *Carcinides*. Green crabs are not always green (some are rusty brown) so colour alone is a difficult method of identifying crabs. Although small, the claws of a crab are powerful and pain is guaranteed if one uses a finger to test their strength. The claws tear off pieces of flesh and pass them to the mouth parts on the underside, and one can see these always in swift motion like a miniature conveyor belt.



Green Crab

A final organism of note is a tiny coiled worm found on the rockweed *Fucus*. They are white shells, spiralled, and about 1mm. across. They are the homes of tiny worms *Spirorbis* which filter the water for plankton.

A trip to the inter-tidal zone is a fascinating one, as the more one searches, the more diversity one finds. Each rocky shore somehow seems a little different from the previous ones, and something new is found at each one.

It is a continual learning experience. Peggy's Cove and environs is an excellent area with which to familiarise oneself with marine inter-tidal life.

A final word - you know how you would feel if someone suddenly moved your house. One should always replace anything which has

been disturbed - rocks should be replaced in the position in which they were found, and seaweed clumps should be laid down again so that the organisms can maintain their shelter, moisture and position. Always leave the area in the same condition in which it was found.

Mike Burke

WHAT ACCOMPLISHED?

Looking back over the past year there are obvious strengths and weaknesses. Birds are well-covered by Michael Downing and others, but no work was done on other vertebrates. The area is obviously riddled with mice, voles, hares, snakes, frogs, salamanders and larger carnivores (a mink was sighted), but these need patient observation and probably a trapping programme.

The higher plants were well-covered largely because Joe Harvey had already got a species list and there are probably only

a couple of dozen more species to be found, mainly the roadside weeds which were neglected as not being native. However, the cryptogams were under-collected, which is a pity, since the area is dominated by mosses and lichens. Fungi were not covered at all. The present lists of the lower plants could probably be expanded tenfold and the names on them should be checked since they were not all confirmed by experts. These should be the subject of additional work over the next few years.

PARTICIPANTS

Members of the Peggy's Cove-West Dover Study Group are: Mike Burke, Michael Downing, Bill Freedman, Greg Henry, Dorothy Morris, Helen Painter, John Robinson, Elizabeth Surrect and Lorne Vaasjo. They were assisted at times by Roger Cousens, Anne and Erick Greene, Joe Harvey and Wolfgang Maas. Magi Nietfeld was the Project Co-ordinator.