

Chapter 4: Results

4-1 Survey of Ecosystem Representation

Inland Nova Scotia has been classified into 26 habitat types by Davis and Brown (1996). Thirteen of these are represented in the Shelburne Barrens (table 4-1) (Davis and Brown, 1996).

Table 4-1: Habitat types present in the Shelburne Barrens

Freshwater:

- Open-water lotic
- Open-water lentic
- Bottom lotic
- Bottom lentic
- Waters edge lotic
- Waters edge lentic

Freshwater wetlands:

- bog
- fen
- freshwater marsh

Terrestrial unforested:

- barren

Forest:

- Hardwood
- Softwood
- Mixedwood

4-2 System Descriptions

The Shelburne Barrens consists of five landscape systems, each with characteristic vegetation, hydrology, geology and landscape features (fig. 4-1). The following landscape system descriptions capture their general nature. Field transect and plot data can be found in Appendix II and III respectively. Photographs of representative landscapes, and vegetation can be found in Appendix IV.

Figure 4-1: Landscape systems of the Shelburne Barrens

4-2-1 Flintstone Barren System (fig. 4-2)

Location

The Flintstone Barren is a large system in the northernmost region of the study area (fig. 4-1). It is bounded to the south by the Semi-Barren system. Highway 203 cuts through the southwestern corner of this system.

Landscape

The Flintstone Barren is characterised by low hummocks intermixed with patches of hardwood and softwood trees. The slopes of the hummocks and the poorly drained areas are thick with heath vegetation, which makes travel difficult. The tops of hummocks and knolls are have lower vegetation and scattered trees.

Hydrology

Sabeans Lake is the only lake found entirely within the study area in the Flintstone Barren system. This lake is shallow, bouldery and dystrophic. There are five south flowing rivers which feed into the chain of lakes at the southern end of the Shelburne Barrens. The Clyde River and East Barclay Brook occur on the western boundary of the system, and Beaver Creek along the eastern boundary. Two smaller rivers are found within the system; one drains Sabeans Lake, and one feeds into Beaver Creek Lake near the eastern boundary. A large portion of this area is poorly drained, with bogs and swamps common throughout the region. The average moisture regime is 2 to 2/3.

Geology

The Flintstone Barren system is underlain by granites of the South Mountain Batholith. The substrate is granite till with an average depth of 3m (Stea, R.R. *et al.*,

Figure 4-2: Flintstone Barren system transect

1982). Moraines are common, with an east-west trend (Stea, R.R. *et al.*, 1982). Granite boulders are common, reaching up to 6m in height above the surface.

Vegetation

The Flintstone Barren system is predominantly barren, with patches of semi-barren and scattered forest patches. The tops of hummocks and knolls are dominated by a dry barren community of *Cladina* sp. and *Cornus conradii*, with scattered tree cover. The slopes are covered with thick heath vegetation, dominated by *Gaylussacia baccata* and *Rhododendron canadense*. There is little undergrowth in the areas of thick heath cover. The more poorly drained areas are predominantly a *Chamaedaphne calyculata* plant community with a *Sphagnum* sp. undergrowth .

The trees on the barren are predominantly white pine, red maple and black spruce. Larch, trembling aspen, red oak and grey birch are also found. Many of these trees are stunted or have short internodes. Some of the more poorly drained sites are dominated by red maple stands, intermixed with grey birch and some black spruce. These trees show better growth than the trees on the barrens. Patches of shade-intolerant softwood stands are scattered throughout the Flintstone Barren, in the wetter areas. These are dominated by black spruce, with larch common. Remnants of failed red pine plantations are found, but most of these trees are in poor condition.

4-2-2 Semi-Barren System (fig. 4-3)

Location

The Semi-Barren system makes up the largest portion of the study area (fig. 4-1). It is bordered to the north by the Flintstone Barrens, to the southwest by the Sand Lake Barrens, directly south by the Forested Region, and by the Indian Fields Barren to the

Figure 4-3: Semi-Barren system transect

southeast. Highway 203 cuts through the centre of this system, from the northwest to the southeast.

Landscape

The Semi-Barren system is characterised by a hummocky terrain, with some ridges and moraines which have an east-west trend. The region contains a high proportion of trees compared to the Flintstone Barren and Sand Lake Barren systems.

Hydrology

The Semi-Barren system is drained to the south by East Barclay Brook to the west, Clyde River near the centre, and Beaver Creek in the east. Beaver Creek Lake, located in the northeast corner of the region, is drained by subsurface flow, as it has no stream outlet. Two of the eight lakes in the southern portion of the study area also fall within the Semi-Barren system. Black Lake Brook collects waters from the subsurface in the southern part of the system and drains them into Black Lake. Water from Black Lake then flow into Russia Lake to the west (this lake is within the Forested Region system). Horseshoe Lake is located on the border between the Semi-Barren system and the Indian Fields system. It is fed by spring water, and as such is the clearest of the lakes within the study area. A natural sand beach lies on the northern shore, with a few small rocky beaches around the perimeter. This lake drains to the southeast into the Roseway River.

The Semi-Barren system is mostly moderately drained, with scattered bogs. Dry barrens are infrequent. The average moisture regime is 2.

Geology

The northern tip of this system lies along the Tobeatic Shear Zone (TSZ). To the north of this lie the granites of the South Mountain Batholith, and to the south lie the

Meguma Group. The majority of the Semi-Barren system is underlain by the Goldenville Formation, with the most southern region underlain by the Halifax Formation. The bedrock is covered with quartzite till facies, with moraines trending generally east-west (Stea, R.R. *et al.*, 1982). The till depth ranges from 1-10m, with an average depth of 3m (Stea, R.R. *et al.*, 1982). Boulder cover is variable, but tends to increase towards the north, where the region connects with the Flintstone Barren.

Vegetation

The majority of the Semi-Barren system contains some tree cover. In the relatively barren regions, the vegetation is typical, with *Cladina* sp. and *Cornus conradii* dominating the dry areas on the tops of ridges. Thicker heath vegetation is present on the slopes, with *Gaylussacia baccata* and *Rhododendron canadense* dominating, and a thick *Chamaedaphne calyculata* heath community in the poorly drained sites between the ridges. Stunted black spruce, red maple and some white pine are common in the barrens. Grey birch and trembling aspen occur in clumps in the better drained sites.

These barren areas are intermixed with more heavily forested areas, and the trees in these forested patches are growing well, being less stunted than those on the barrens in this and other systems. At least one stand of old eastern hemlock forest is found in this system, on the western shore of Horseshoe Lake. The majority of the forests are mixed-wood, with red maple and black spruce dominating the poorly drained sites, as well as some larch. Red maple stands are common along waterways. White pine stands are common, and red oak is also found.

The shorelines of Black Lake and Horseshoe Lake are good habitat for coastal plain flora. Blue flag iris are common along the shores of Horseshoe Lake.

4-2-3 Sand Lake Barren System (fig. 4-4)

Location

The Sand Lake Barren is located in the southwest corner of the study area (fig. 4-1). It is bordered to the north by the Semi-Barren system and to the south by the Forested Region. The majority of this region lies within IFPPR. There are no major roads or trails through this region.

Landscape

The Sand Lake Barren is the most highly ridged system in the study area. These barren ridges have a general north-south trend, and are interfingered with red maple swales. This area contains very little tree cover.

Hydrology

There are no lakes within this system, although it is bordered by three. The Clyde River and East Barclay Brook cut through the system. The area is fairly well drained, with moisture regimes of 1-2 common.

Geology

The Sand Lake Barren system lies across the Meguma Group boundary. The more northern portion is underlain by the Goldenville Formation; the southern portion by the Halifax Formation. The bedrock is covered by a thin layer of quartzite till (Stea, R.R. *et al.*, 1982). North-south trending eskers are present near the western border of the study area (Stea, R.R. *et al.*, 1982). There is little boulder cover.

Vegetation

This system is extensively barren. There is a range of moisture levels, due to the hummock and ridge landscape. The better drained areas are dominated by a *Cladina* sp.

Figure 4-4: Sand Lake Barren system transect

and *Cornus conradii* plant community, with a *Gaylussacia baccata* and *Rhododendron canadense* community on the slopes. The areas with a moisture regime of 3 are dominated by *Sphagnum* sp. and *Chamaedaphne calyculata*. In general, the vegetation in these barren areas does not reach the height or thickness of that in the Flintstone Barrens.

Only scattered trees are present in the barren areas. Some white pine, red maple and black spruce are found; many of which are stressed or dwarfed. Interfingering of red maple swales between the barren ridges is characteristic to the Sand Lake Barren system. Small patches of softwood are also found, some of which are growing well. The trees are still relatively young in this area.

4-2-4 Indian Fields System (fig. 4-5)

Location

Indian Fields Barren is located in the southeastern corner of the Shelburne Barrens (fig. 4-1). The study area only contains a small portion of this ecological system, the majority lying to the east and southeast of the Shelburne Barrens. Most of the system is contained within the IFPPR. It is bordered to the north and west by the Semi-Barren system, and to the south by the Forested Region. Highway 203 cuts through the western edge of this system.

Landscape

The Indian Fields system is located on a glacial outwash plain, and as such there is little change in elevation. The flat plains are broken up infrequently by some low, discontinuous ridges. Within the boundary of the study area the system contains some fairly well developed forests in the better drained areas.

Figure 4-5: Indian Fields system transect

Hydrology

The Indian Fields system is poorly drained, likely due in part to a subsurface Ornstein iron pan. Clamshell Lake, the most eastern of the chain of lakes at the southern end of the Shelburne Barrens, is the only lake within this system. This lake is shallow and stream fed. The region drains south through the large Roseway River, which is fed by numerous smaller rivers both in and out of this system.

Geology

The Indian Fields system is located entirely within the Halifax Formation of the Meguma Group. Above the bedrock is the glacial outwash material, consisting of waterlaid sand and gravel (Stea, R.R., 1982). There is little boulder cover in this system.

Vegetation

The moisture regime of the Indian Fields system is 3 to S. The riverine areas are mainly grass-dominated fens, with *Sphagnum* sp. as the undergrowth. This vegetation grades into a *Chamaedaphne calyculata* dominated bog, with *Vaccinium angustifolium* common. In the areas of moisture regime 2-3 there are scattered softwoods, primarily larch, with a few black spruce. Some small patches of larch and black spruce occur with moisture levels of 2 or 1. Some red maple and white pine are also found in these areas. The more forested areas are predominantly red oak, trembling aspen and some red maple. Attempts have been made to establish red pine plantations, with varying degrees of success.

4-2-5 Forested Region System (fig. 4-6)

Location

The Forested Region is the most southerly of the landscapes in the Shelburne Barrens (fig. 4-1). It is bordered to the northwest by the Sand Lake Barren, directly to the north by the Semi-Barren system, and to the northeast by the Indian Fields Barren. Highway 203 cuts through this system, to the southeast of the study area.

Landscape

This region is characterised by rolling hills, interspersed with shallow, dystrophic lakes. Forested floodplains are found here as well. Sand Lake and Auger Lake both have sandy beaches. Rocky shorelines are common on the other lakes. Russia Lake, which lies on the southern border of the study area, is extremely shallow, with a large part of the lake becoming a bog ecosystem in dry periods.

Hydrology

Water flows into this system from the north, through East Barclay Brook and the Clyde River. From here the water is dispersed between the 5 lakes and flows out through streams in the south. There are a few large bogs, but most of the area between the lakes is relatively well drained, with a moisture regime of 2.

Geology

The Forested Region overlies the Halifax Formation of the Meguma Group. The bedrock is covered with slate till facies, with an average depth of 3m (Stea, R.R. *et al.*, 1982). The hills between the lakes are drumlins, with a till depth of 2-20m (Stea, R.R. *et al.*, 1982). There is scattered boulder cover throughout the region.

Figure 4-6: Forested Region system transect

Vegetation

This system contains many important types of vegetation. The beaches and rocky shorelines are habitat for coastal plain flora. Sundews and fringed orchids are also found here. Mature deciduous forests are common on the upland areas, dominated by sugar maple, beech and yellow birch, with little undergrowth. Stands of eastern hemlock are found on the hill slopes. The stands are mature to old forest, with well developed canopies and widely spaced trunks. Some of the hill slopes, as well as the shorelines, are dominated by white pine, red maple and black spruce. The shorelines are a mix of the three species. Almost pure white-pine stands are found on narrow strips of land between lakes.

4-3 Analysis of Flora and Fauna

4-3-1 Barren Land Plant Communities

Three main barren land plant communities can be characterised by their dominant species (table 4-2). Dominant species are those with abundance levels of at least 0.5, and associated species have abundance levels of 0.25-0.49 (see section 3-2-3).

This data was determined from field plots, which can be found in Appendix C. Dry barrens, with a soil moisture of 1, are found on the tops of mounds and knolls; heath barrens correspond to a moisture level of 2, and are found on the slopes of ridges and hummocks; bog, or wetland barren is found where there is a soil moisture of 3, in swales or small depressions between hummocks.

Table 4-2: Barren Land Plant Communities

<p>Community: Dry Barren <u>Representative Species</u> <i>Cladina</i> sp. <i>Cornus conradii</i> <i>Pteridium aquilinum</i> <i>Arctostaphylos uva-ursi</i></p> <p><u>Associated Species</u> <i>Kalmia angustifolia</i> <i>Gaultheria procumbens</i> <i>Alnus rugosa</i> <i>Fragaria virginiana</i> <i>Vaccinium angustifolium</i> grass <i>Pyrus abatifolia</i> <i>Comptonia perigrina</i> <i>Lycopodium</i> sp. <i>Rhododendron canadense</i></p>	<p>Community: Heath Barren <u>Representative Species</u> <i>Rhododendron canadense</i> <i>Gaylussacia baccata</i> <i>Gaultheria procumbens</i> <i>Kalmia angustifolia</i></p> <p><u>Associated Species</u> <i>Sphagnum</i> sp. <i>Cornus canadensis</i> <i>Vaccinium angustifolium</i> <i>Osmunda cinnamomea</i> <i>Ledum groenlandicum</i> <i>Aralia nudicaulis</i> <i>Cladina</i> sp. <i>Cornus conradii</i> <i>Fragaria virginiana</i> <i>Alnus rugosa</i> <i>Chamaedaphne calyculata</i></p>	<p>Community: Bog <u>Representative Species</u> <i>Sphagnum</i> sp. <i>Chamaedaphne calyculata</i> <i>Rhododendron canadense</i> grass <i>Kalmia angustifolia</i></p> <p><u>Associated Species</u> <i>Sarracenia purpurea</i> <i>Vaccinium oxycoccos</i> <i>Spiraea latifolia</i> <i>Fragaria virginiana</i> <i>Carex</i> sp.</p>
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4-3-2 Species present in the Shelburne Barrens

A partial species list for the flora can be found in table 4-3. Partial species lists for mammals, birds, reptiles and amphibians can be found in table 4-4.

Table 4-3: Partial Floral Species ListTrees

Abies balsamea (Balsam Fir)
Acer rubrum (Red Maple)
Alnus crispa (Mountain Alder)
Betula populifolia (Grey Birch)
Betula papyrifera (American White Birch)
Hamamelis virginiana (Witch Hazel)
Larix laricina (Tamarack)
Populus grandidentata (Bigtoothed Aspen)
Populus tremuloides (Trembling Aspen)
Prunus pensylvanica (Pin Cherry)
Picea glauca (White Spruce)

Picea mariana (Black Spruce)
Picea rubens (Red Spruce)
Pinus banksiana (Jack Pine)
Pinus resinosa (Red Pine)
Pinus strobus (White Pine)
Quercus rubra (Red Oak)
Tsuga canadensis (Eastern Hemlock)
Salix sp. (Willow)

Shrubs

Amelanchier bartramiana (Bartram Juneberry)
Amelanchier sp. (Shadbush)
Aronia sp. (Chokeberry)
Gaylussacia baccata (Black Huckleberry)
Ilex sp. (Holly)
Juniperus sp. (Juniper sp.)
Kalmia angustifolia (Sheep Laurel)
Ledum groenlandicum (Labrador Tea)
Myrica gale (Sweetgale)
Myrica pensylvanica (Bayberry)
Nemopanthus mucronata (False Holly)
Pyrus arbutifolia (Red Chokeberry)
Rhodendron canadense (Rhodora)
Spiraea latifolia (Meadowsweet)
Vaccinium angustifolium (Late Low Blueberry)
Vaccinium corymbosum (Common Highbush Blueberry)
Viburnum cassinoides (Northern Wild Raisin)

Herbaceous Plants

Aralia nudicaulis (Wild Sarsparilla)
Aster undulatas (Wavy leaved aster)*
Carex spp. (Sedges)
Chamaedaphne calyculata (Leatherleaf)
Comptonia perigrina (Sweet Fern)
Coptis groenlandica (Goldthread)
Corema conradii (Broom-crowberry)
Cornus canadensis (Bunchberry)
Cytisus scoparius (Scotch Broom)
Decodon verticullatus var. *laevicatus* (Water-willow)**
Empetrum sp. (Black Crowberry)
Epigaea repens (Trailing Arbutus)
Euthamia galetorum (a rare goldenrod-no common name)*
Fragaria virginiana (Strawberry)
Gaultheria procumbens (Wintergreen)
Lycopodium annotinum (Bristly Club-moss)

Myriophyllum farwellii (Water-milfoil)*
Osmunda cinnamomea (Cinnamon Fern)
Panicum longifolium (Panic grass)**
Pteridium aquilinum (Bracken)
Rhexia virginica (Meadow beauty)**
Rhus radicans (Poison Ivy)
Selaginella rupestris (Clubmoss)
Spiranthes casei (Case's ladies'-tresses)*
Spiranthes ochroleuca (Yellow ladies'-tresses)*
Sheperdia canadensis (Sheperdia)
Utricularia gibba (Bladderwort)**
Utricularia subulata (Bladderwort)**

Mosses

Sphagnum sp. (Sphagnum moss)

*Rare coastal plain flora possibly occurring in the Shelburne Barrens (Pronych and Wilson, 1993)

**Rare coastal plain flora occurring in the Shelburne Barrens (MacKinnon, 1999)

Table 4-4: Partial Faunal Species List

Terrestrial Mammals Occurring in Shelburne Barrens

Alces alces (moose)
Castor canadensis (American beaver)
Erethizon dorsatum (American porcupine)
Odocoileus virginianus (white-tailed deer)
Lepus americanus (snowshoe hare)
Tamias striatus (Eastern chipmunk)
Tamiasciurus hudsonicus (American red squirrel)
Ursus americanus (American black bear)
Lasiurus sp. (bat)
 (common shrew)*
Blarina brevicauda (short-tailed shrew)*
Canis latrans (coyote)*
 (red-backed vole)*
Peromyscus leucopus (white-footed mouse)*
Lutra canadensis (river otter)*
 (muskrat)*

*mammals likely to be found in the Shelburne Barrens (Davis and Brown, 1996)

Birds Occurring in Shelburne Barrens

Actitis macularia (Spotted sandpiper)
Anas rubripes (American black duck)
Ardea herodias (Great blue heron)
Aythya collaris (Red-necked duck)
Buteo jamaicensis (Red-tailed hawk)
Catharus fuscescens (Veery)
Catharus guttatus (Hermit thrush)
Catharus ustulatus (Swainson's thrush)
Chordeiles minor (Common nighthawk)
Circus cyaneus (Northern harrier)
Contopus virens (Eastern peewee)
Corvus corax (Northern raven)
Dendragapus canadensis (Spruce grouse)
Dendroica caerulescens (Black-throated blue warbler)
Dendroica coronata (Yellow-rumped warbler)
Dendroica magnolia (Magnolia warbler)
Dendroica striata (Blackpoll warbler)
Dumetella carolinensis (Grey catbird)
Empidonax alnorum (Alder flycatcher)
Empidonax minimus (Least flycatcher)
Gavia immer (Common Loon)
Geothypis trichas (Common yellowthroat)
Iridoprocne bicolor (Tree swallow)
Junco hyemalis (Dark-eyed junco)
Melospiza melodia (Song sparrow)
Mergus merganser (Common merganser)
Mniotilta varia (Black-and-white warbler)
Pandion haliaetus (Osprey)
Parus atricapillus (Black-capped chickadee)
Passerculus sandwichensis (Savannah sparrow)
Picoides pubescens (Downy woodpecker)
Regulus calendula (Ruby-crowned kinglet)
Regulus satrapa (Golden-crowned kinglet)
Seiurus aurocapillus (Ovenbird)
Setophaga ruticilla (American redstart)
Sitta canadensis (Red-breasted nuthatch)
Spizella passerina (Chipping sparrow)
Strix varia (Barred owl)
Turdus migratorius (American robin)
Vermivora ruficapilla (Nashville warbler)
Vireo olivaceus (Red-eyed vireo)
Vireo solitarius (Solitary vireo)
Zonotrichia albicollis (White-throated sparrow)

Reptiles and Amphibians Occurring in Shelburne Barrens

Bufo a. americanus (Eastern American toad)
Hyla c. crucifer (Northern spring peeper)
Rana catesbeiana (Bullfrog)
Rana clamitans melanota (Green frog)
Rana sylvatica (Wood frog)
Rana palustris (Pickerel frog)
Rana pipiens (Northern leopard frog)
Chelydra s. serpentina (Common snapping turtle)
Chrysemys p. picta (Eastern painted turtle)
Thamnophis sirtalis pallidula (Maritime garter snake)

4-4 Water Quality

Water from 9 lakes in the study area was tested for three reasons: to gather information on the physical characteristics of the site; to give an indication of the biota that would be present in the lakes; and to gather background data. In the future, these waters can be monitored for changes in water quality, which may be indicative of novel or ongoing disturbances to the watersheds.

Table 4-5 lists the pH, colour, and conductivity of each of the lakes tested in the study area. With the exception of Horseshoe and Clamshell Lakes, the pH and conductivity values are low, and the lakes are dark.

Table 4-5: Water Quality

	pH	Colour (Hazen units)	Conductivity (uS/cm)
Horseshoe Lake	5.71	15	17.7
Clamshell Lake	5.08	40	27.7
Black Lake	4.69	140	25.1
Russia Lake	4.60	208	25.1
Sand Lake	4.34	244	30.0
Auger Lake	4.69	100	23.8
Long Lake	4.57	120	24.9
Barclay Lake	4.63	108	24.3
Beaver Creek Lake	4.28	260	31.2

4-5 Effects of Current Anthropogenic Influences

The majority of the disturbances to the Shelburne Barrens study area are located in the vicinity of Highway 203, which runs from Indian Fields to the north-west. There are many concerns with the disturbances which have been caused in the past and are occurring today.

Forest plantations: Red spruce plantations during the 1960's were attempted in a bid to turn the barrens into productive land. Many of these areas did not take, and the trees are severely stressed. Some of the plantations did take, most of which are located in the Flintstone Barren land system (fig. 4-7).

Recreation: Camping, fishing, and boating are all common in IFPPR area. The majority of the recreation is localised to the Clamshell Lake and Horseshoe Lake area.

Disturbances to the natural flora and fauna have been observed due to the increased traffic, noise, and garbage created by this recreation. Building of an outhouse by the local authorities has aided in reducing the waste which is infiltrating Horseshoe Lake, the clearest lake in the entire study area, but has not stopped it entirely.

Motorized boats: Fishing and boating on Horseshoe and Clamshell Lakes is quite common, as observed during the summer study season and from speaking with the local users of the area. Both powered and non-powered boats are used for these activities.

Grading of the roads: The dirt roads used to access Horseshoe and Clamshell Lake are graded by the local authorities (observed August 1998).

ATV use: All-terrain vehicles (ATV's) are used throughout the area for recreation. There are extensive trail systems throughout the area, most of which are concentrated in the

Figure 4-7: Red Pine Plantation in Flintstone Barrens

Indian Fields System (Muisse, 1998). This has implications for the flora and fauna. One direct observation of this type of disturbance was noted in early July of 1998. A fresh ATV trail had been driven through an area where a spotted sandpiper had been seen nesting the previous week. After the disturbance, which possibly destroyed the nest, the spotted sandpiper was not seen again. Extensive damage has also been done to the Roseway River floodplain (fig. 4-8). Trail systems that begin in this area go through the TWA and into Kejimikujik National Park (Muisse, 1998).

Air strip: During the 1960's there were extensive forest fires throughout the region, and an air strip was built to aid in the fighting of these fires. This area contains no vegetation, as it is used by ATV's and other off-roading vehicles for recreation. This site is also used for access into the vulnerable Roseway River floodplain.

Highway 203: The construction of Highway 203 required the removal of native vegetation and excavation of large pits for fill. Dirt roads were also created in this process which run parallel to the highway. The highway now splits the Shelburne Barrens almost in half, with tens of meters of asphalt.

Mineral exploration: Mineral claims were originally staked by CAG in the Flintstone Rock area in May of 1996. Exploration activity was first noted in the Flintstone Rock area on July 27th, 1999. The scars of 9 mineral trenches were seen, each approximately 5m² in size (fig. 4-9). The vegetation had been removed, and the trenches consisted of gravel and fine rock flour. As of September 27th, 1999, no revegetation of the trenches had been attempted.

To the north of the highway the trenches were localised along an old path cut parallel to the highway. Most of the degradation to this area resulted from the

Figure 4-8: Photograph of all-terrain vehicle damage to the Roseway River wetlands.

Figure 4-9: Photograph of CAG Ent. exploration pit. Most pits were 5m², and none had been revegetated.

digging of the pits, as no new paths needed to be cut to access the exploration area. To the south of the highway, the existing trail was not used for movement of equipment. The machinery was driven parallel to this existing trail, crushing and killing barren vegetation. A return to the site on September 27th, 1999, showed no improvements in the state of the vegetation in this area.

4-7 Potential Effects of Mine Development

4-7-1 Potentially Affected Watersheds

The mineral claims held by CAG Enterprises Ltd. are located along the TSZ in the Flintstone Rock area in southwestern Nova Scotia (fig. 1-4). The claim area extends in a southwest-northeast direction, cutting across four watersheds, contained within one larger watershed area (fig. 4-10). Three of these watersheds feed into the chain of lakes at the southern end of the study area. If a mine was to be developed in this area it could directly affect three south flowing rivers which are within the mineral claim area. Barclay Brook and East Barclay Brook feed to Barclay Lake, which is the most western of the lakes within the study region. The Clyde River flows through the centre of the study area into Sand Lake. Sand Lake is connected through short waterways to Auger Lake and Long Lake, and through this into Barclay Lake. Any influx of water and materials through even one of the three rivers would then have an affect on all four of these lakes. To the east, Auger Lake is connected to Russia Lake and through this to Black Lake. These lakes all lie within the same watershed, so there is potential for water and material exchange with these lakes as well.

4-7-2 Potentially Affected Ecosystems

The mineral claim area is contained within the Flintstone Barren and Semi-Barren systems. Any direct surface disturbance would be contained within these ecosystems.

The watersheds potentially affected by mine development (see above) support portions of three systems within the study area. These systems are the Flintstone Barren, the Semi-Barren and the Forested Region. The Sand Lake Barren system is entirely contained within the potentially affected watersheds. Indian Fields Barren is not supported by the watersheds potentially affected by mine development in the claim area.

Figure 4-10: Map of CAG Ent. mineral claims in relation to the watersheds of the Shelburne Barrens