Environmental Planning.

The McIntosh Run

Wildlands Working Group Study Area

Environmental
Resource
Analysis
for
the Wildlands Working Group
and the citizens of Mainland South
in Halifax County.

Henri Steeghs
E.P.1 Studio
prfs. John Zuck and Derek Davis
N.S.C.A.D. Autumn 1994

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1.0 Introduction.

The Wildlands Working Group was originally formed to study the impact of a proposed Halifax Harbour clean-up project on the Purcell's Cove-Williams Lake Wildlands/Backlands.

The WWG determined that any future development pattern should be based on watersheds and other natural features, and open spaces be determined by the need to preserve these watersheds and their ecosystems. The Group then made a request to the Environmental Planning Department at the Nova Scotia College of Art and Design to undertake a study (1) to determine and describe the existing environment of the area, (2) to examine the issues affecting future planning and development and (3) to assess what type of development would be suitable for the area.

In response to the first part of this request, during the Fall semester of 1994, the E.P.1 Studio prepared a comprehensive environmental resource analysis on the McIntosh Run drainage system and the nearby coastal zone. This report contains the findings of a physical environmental inventory, as well as recommendations on potential land uses.

1.1 Location.

Our study area is located along the Atlantic Coast of Nova Scotia, in the Mainland South area of Halifax county. It is comprised of the Long Lake-McIntosh Run, the Williams Lake, and the Purcell's Cove watersheds. The study is referred to as 'The McIntosh Run' because it is by far the largest of the 3 watersheds in the study area.

The community of Spryfield lies at the center of the main drainage basin, and is presently the most significant urban development influencing 'The Wildlands'. The small fishing village of Herring Cove is at its most southerly point, where the Run enters the ocean.

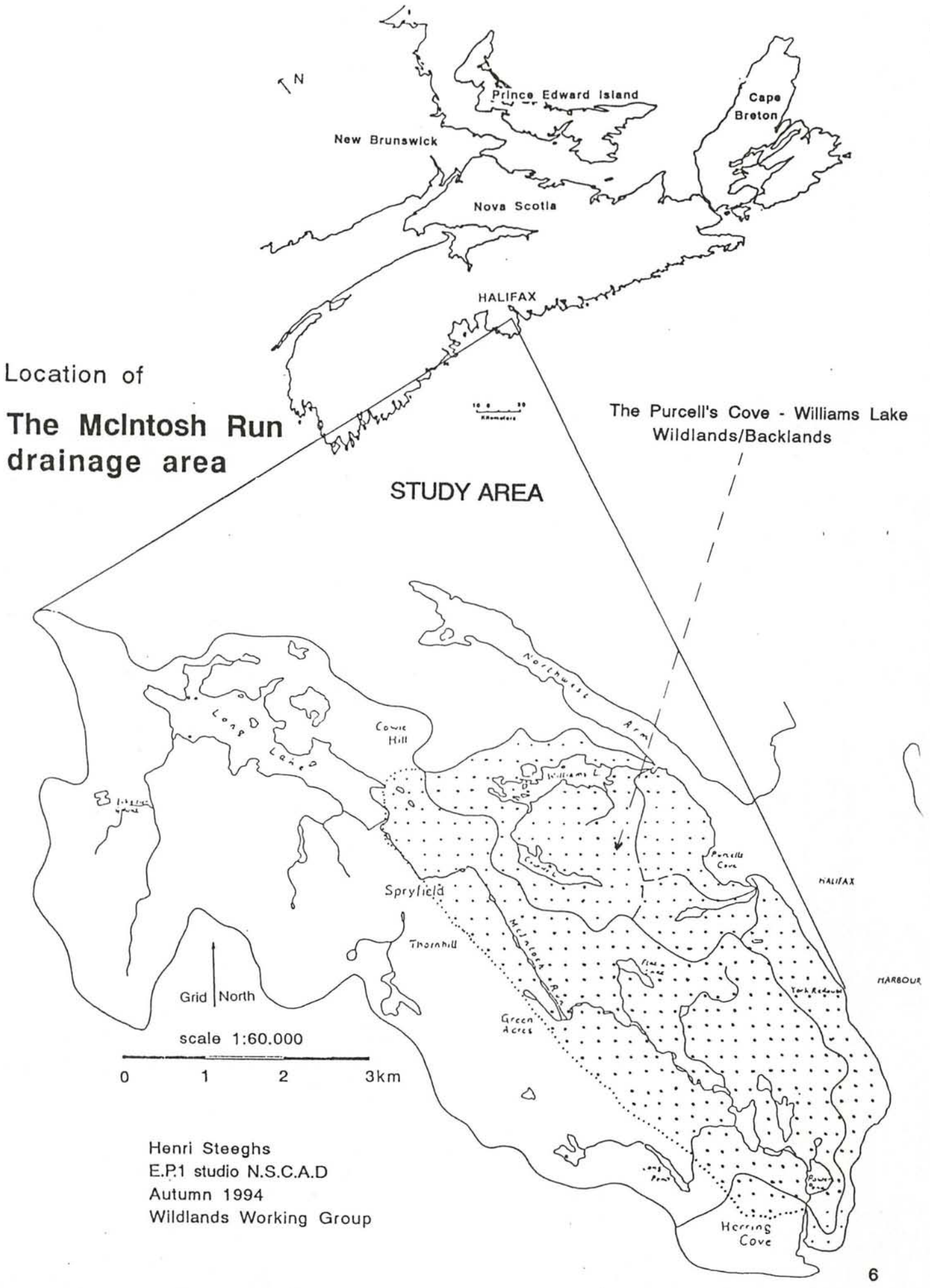
Largely within city limits, the area enjoys tracts of unspoiled wilderness, interlaced by streams, lakes and rocklands and bordered by the wild Atlantic Ocean.

North of Spryfield lies Long Lake, a large reservoir, which was built as the city's drinking water supply a century and a half ago, and continued its use until recently.

A watershed is a basic environmental planning unit. It consists of the land area that contributes flow to a particular drainage system. It is the watershed boundaries that deliniate our study area.

The area contains a variety of jurisdictions: federal, provincial, city and county all claim ownership over different parts of the land. Even though important land use policies are put in place by various jurisdictions, these are not regarded as components of this study.

This study is concerned only with understanding natural systems and identifying environmental issues that might inform land use policy decisions.


N
Prince Edward Island
Cape Breton
New Brunswick
Nova Scotia
HALIFAX
Location of
The McIntosh Run drainage area
The Purcell's Cove - Williams Lake Wildlands/Backlands
STUDY AREA
Cowie Hill
Spryfield
Thornhill
Purcell Cove
HALIFAX
HARBOUR
Herring Cove
Grid North
scale 1:60.000
0 1 2 3km
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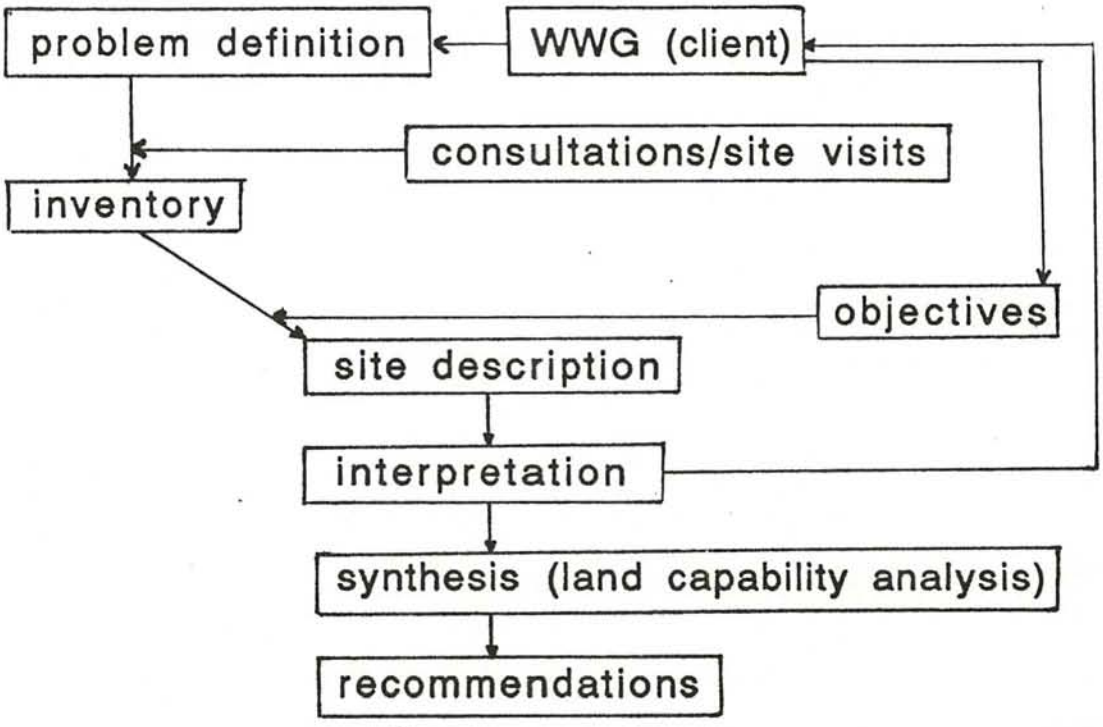
2.0 Method.

Because we are concerned with spatial data and processes in the landscape, our inventory was prepared as a series of maps. Information was assembled from interpretations of aerial photographs, topographic and meteorological data, from existing maps, and from the study of a scale model. Guest lectures, interviews and field investigations also contributed to the inventory findings.

The factor maps that were prepared include: topography, slope, surficial and bedrock geology, soil, water , habitat (land use) and climate.

The University of Pennsylvania (McHarg '69) suitability analysis procedure, overlaying single factor maps, was used to identify environmental issues and their relationship to each other.

Levels of environmental vulnerability were defined on the basis of physical land characteristics, and the capacity to support functioning ecosystems that provide maximum biodiversity and species association.



3.0. Topography.

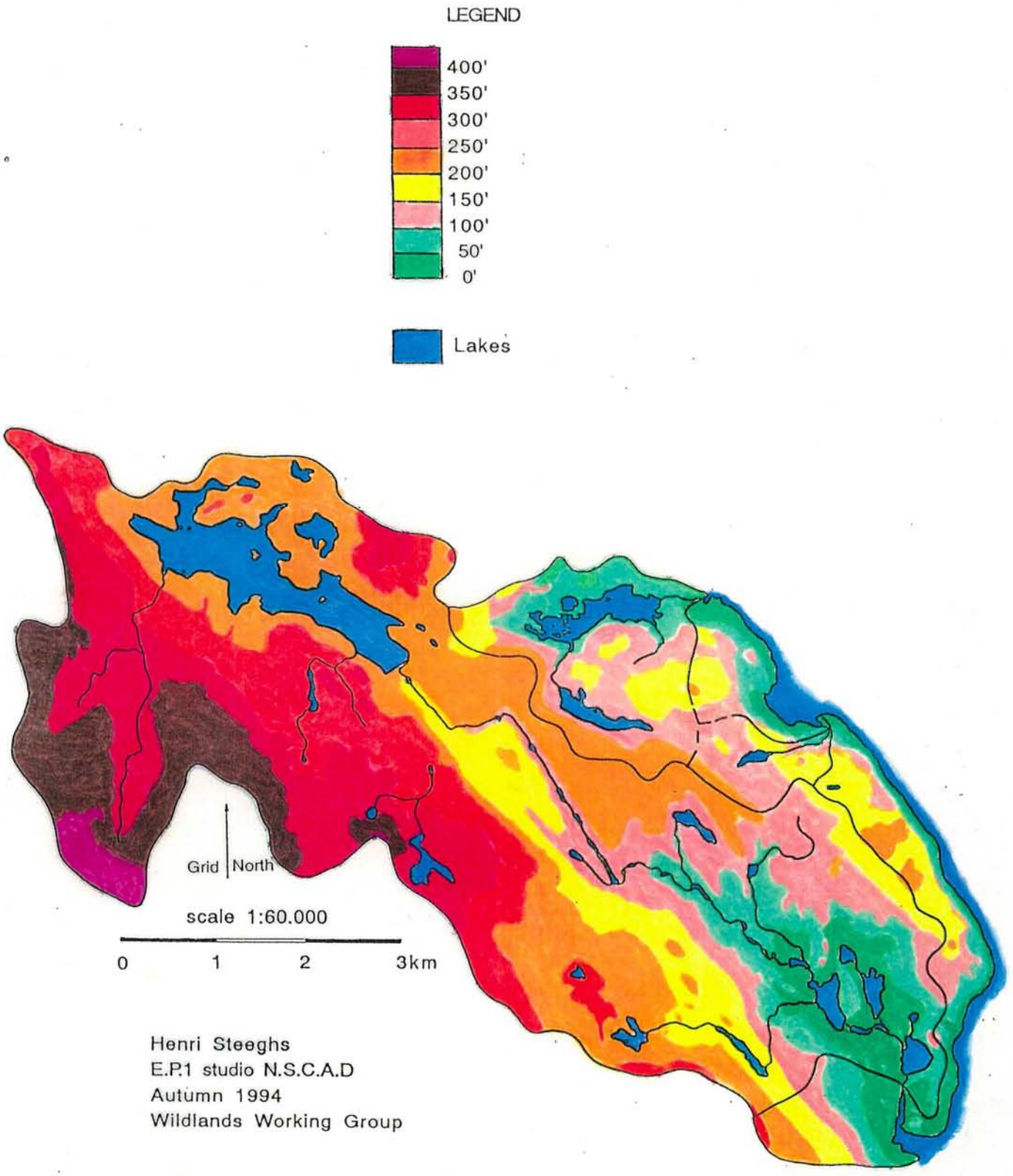
From its highest elevation of 400 feet in the southwest, the terrain drops steadily towards Long Lake and Spryfield, which is at 200 feet above sea level. Here, the high rise apartments on Cowie Hill claim the highest land, and take full advantage of the broad and scenic woodland view stretching to the distant sea.

The McIntosh Run, originating at the southern tip of Long Lake, falls nearly 200 feet as it passes through a chain of 18 lakes, before spilling into the sea. Here the steep coast dips low and lets the tide come into Herring Cove, and ocean winds breeze inland.

The coastal headlands rise over 200 feet out of the harbour inlet. This strategic rise, which housed several generations of military defense batteries, played an important role in the history of Halifax as Canada's most important seaport on the eastern seaboard.

The McIntosh Run drainage area

ELEVATIONS



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4.0 Slope.

Much of the terrain is moderately sloping. Little of it is completely flat, but along the southern edge, a few large sections with a less than 3 % slope cover the highest elevations. Some of these are wetlands or poorly drained soils.

Moderate slopes, with gradients between 3 and 15 % are common throughout. Highway 349 from Spryfield takes advantage of moderate grades on the ridge that reach from Long Lake to Herring Cove.

Inland, well defined slopes line the MacIntosh Run and border the lake waters. The steepest bluffs are found on the headlands along the Atlantic shore. Powerful erosion forces have drawn a sharp line between the water and the land.

Because sloping topography often brings interesting vistas, especially near water, much of this area has been subject to development. Steep slopes can be hazardous development areas because of their potential for erosion or slope failure.

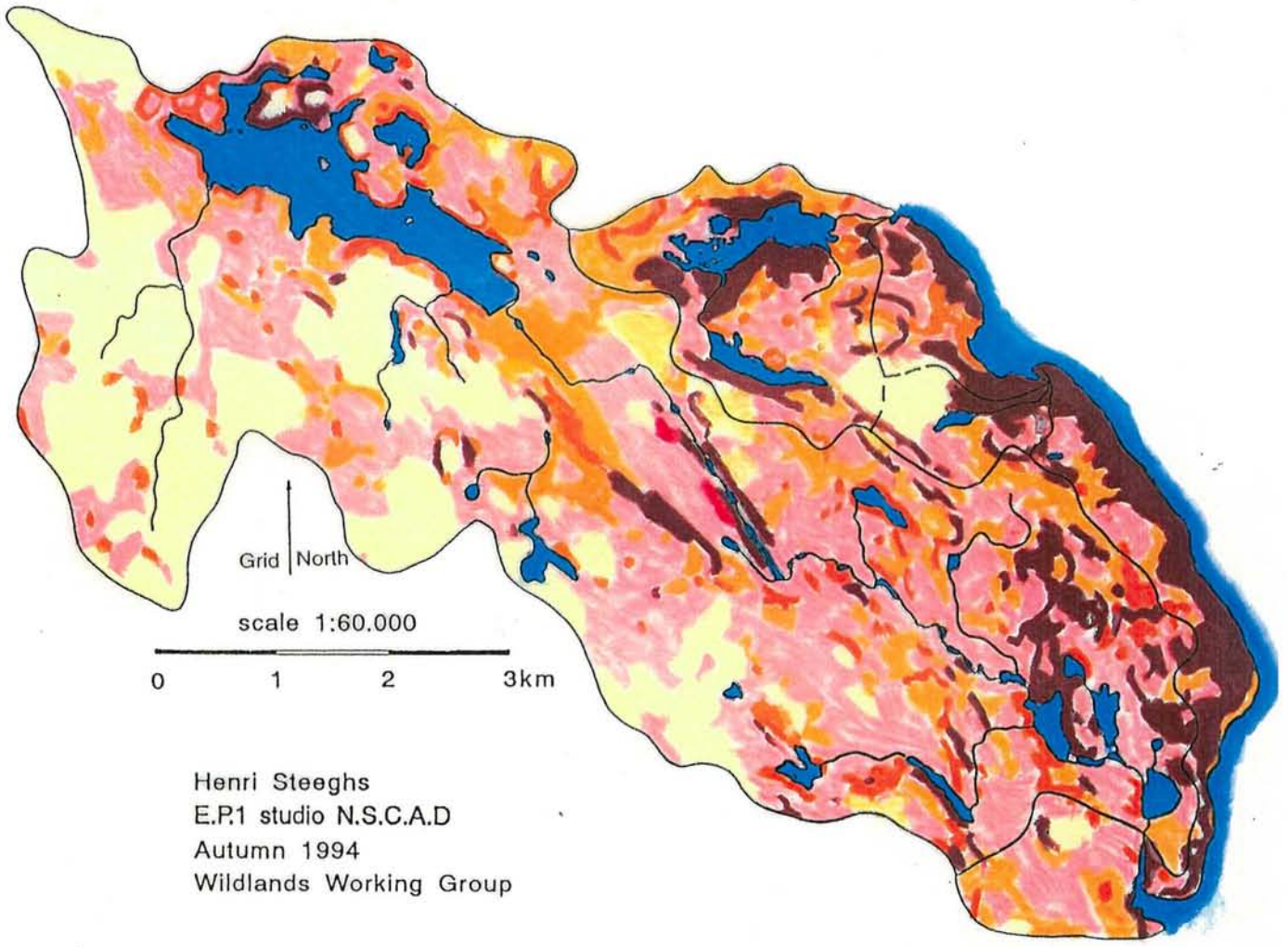
The McIntosh Run drainage area

Slope

LEGEND

- Areas with slopes of 3% or less
- Areas with slopes between 3% and 8%
- Areas with slopes between 8% and 15%
- Areas with slopes between 15 and 25%
- Areas with slopes greater then 25%

Source: N.T.S. Halifax 11D/12 1992 6th ed.



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5.0. Bedrock geology.

Most of our site is underlain by granite, which intruded the ancient meguma deposit which extends throughout the entire southern half of Nova Scotia. This metamorphic rock was intruded by a body of igneous granite in the Devonian Period. 400 million years of erosion have exposed this batholith, and most of our study area is situated on this granite.

Rock quarries in the study area, exploiting the granites and slates, were developed over a century ago to supply building stone for a growing city.

A significant fault line occurs across the granite body. The MacIntosh Run follows this geologic feature for part of its course.

In the contact zones, where the main bedrock bodies meet, the granites may hold minerals or metals, that precipitated or distilled as the intruding rock began to cool.

Although the underlying hard rock provides a good base for foundations, it is difficult and costly to install or supply underground services, such as water and sewer lines or wells and septic systems.

It is important to note that because of the occurrence of pyrite, the Halifax Slates can produce extremely acid run-off when exposed to weather. Large quantities of this run-off can have a profound effect on lakes and waterways.

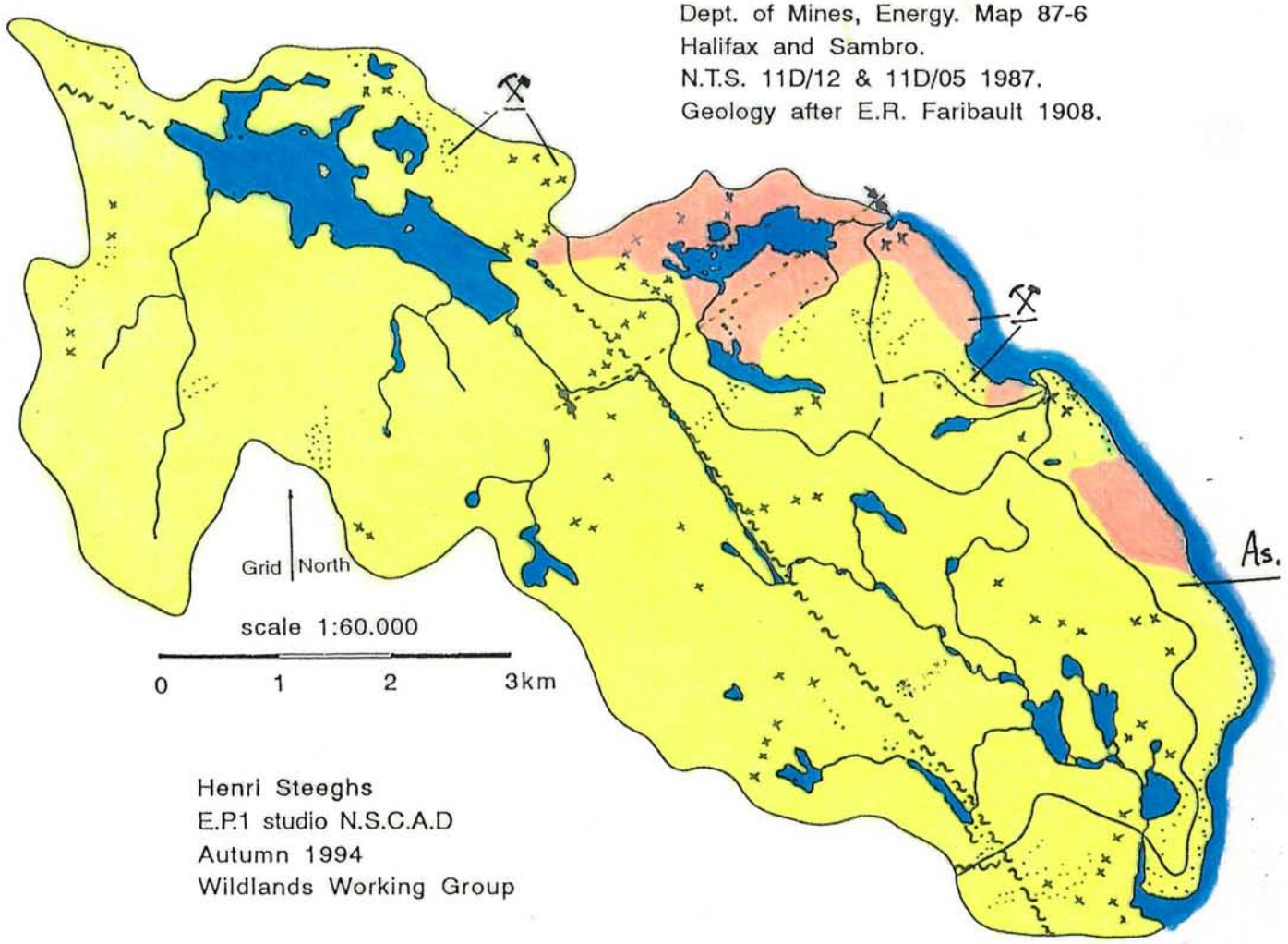
The McIntosh Run drainage area

BEDROCK GEOLOGY

LEGEND

- Slates. (Cambro-Ordivician / Halifax Formation).
- Granites. (Devono-Carboniferous)
- Fault.
- Rock outcrop.
- Quarry.
- Point Pleasant Syncline.
- As, Cu Mineral Occurrence. (Arsenic, Copper)

Sources: Geological Survey of Canada
Dept. of Mines, Energy. Map 87-6
Halifax and Sambro.
N.T.S. 11D/12 & 11D/05 1987.
Geology after E.R. Faribault 1908.



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6.0 Surface geology.

Repeated glaciation has been one of the most important elements in shaping the land as we see it today. Twelve thousand years after the last glaciers melted , the surface bears many ice-age characteristics. Striations (scratches) on many rock outcrops indicate the directions in which the glaciers moved. The granite boulders strewn across the landscape, called 'erratics', were carried across the southern mainland by the ice. They are pieces of the same bedrock structure as the granite in our study area.

Large teardrop shaped hills account for the only deep till that is found within the region. These drumlins are pockets of thick glacial till. The community of Spryfield was built on some of this deep till.

The deranged drainage pattern, with long and narrow lakes, is another typical feature of glaciated landscapes.

As with striations on the rock, and orientation of the lakes and drumlins, the entire lay of the land points the direction in which the ice fields travelled.

Our glacial till is closely related to the underlying bedrock. Because granite and slate both weather slowly, till sheets are typically rather thin.

The McIntosh Run drainage area

SURFACE GEOLOGY

(or Pleistocene Geology)

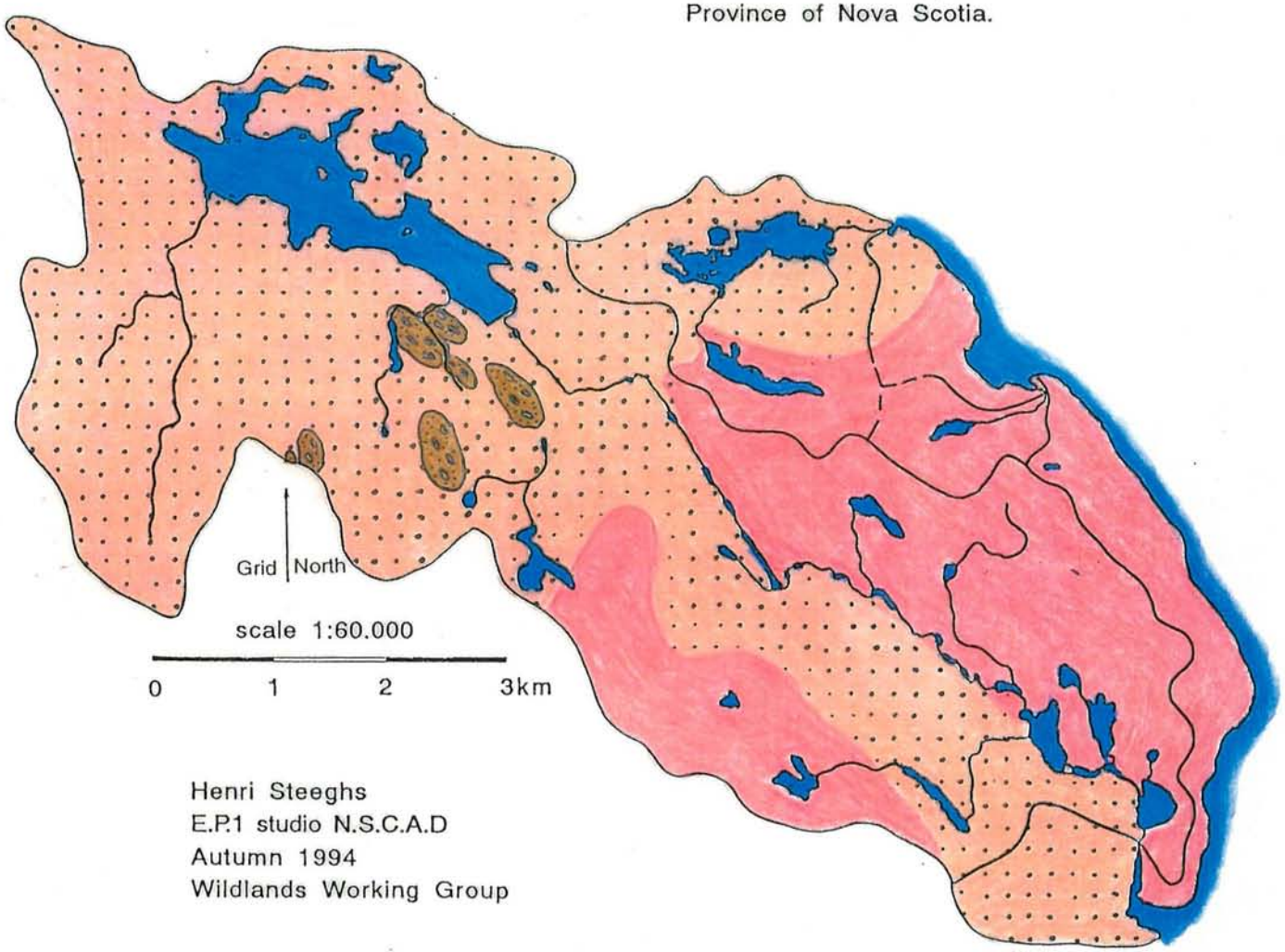
LEGEND

Granite till. (1-10m. depth)

Bedrock or thin till veneer. (40% exposed)

Drumlin.

Sources: Pleistocene Geology 1980
Central Nova Scotia sheet 4
Government of Canada /
Province of Nova Scotia.
Mineral Resource Land Use 1988
ofm 88-004 D.B. Hopper and C.A. Dobson
Province of Nova Scotia.



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7.0 Soil

Soil in the area is mostly derived from glacial till. The deepest and most finely textured soil within the watershed is the Wolfville series, which has developed on the drumlins. These soils are well drained and are considered to have potential for agricultural crop land. However, they account for just a small part of the study area, and urban developments have occupied most of these soils.

The coarser Halifax and Gibraltar soils can sustain productive forests, but provide severe restrictions for most types of agriculture because of rapid drainage and excessive stoniness.

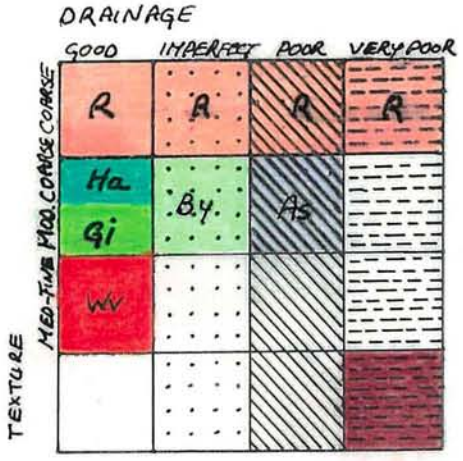
The Bayswater and Aspotogan soils, largely located south of Long Lake, are poorly drained and have seasonal groundwater levels at or near the surface. Unsuitable for either agriculture or forestry, these soils function as water storage areas and are best left to wilderness, with a potential for passive recreation.

Where 60 % or more of the landscape is exposed bedrock, the terrain is classified as 'Rockland'. Variable drainage and an extremely thin veneer of till typify these areas. Where the rock is covered, a thin layer of highly organic soil supports the vegetation. If disturbed, these soils can easily erode. Limited for forestry, these rocklands are pieces of wilderness, that support ~~adversity~~ a diversity of wildlife.

Two small peat bogs have formed and provide points of interest to the already diverse habitat of the watershed.

The McIntosh Run drainage area

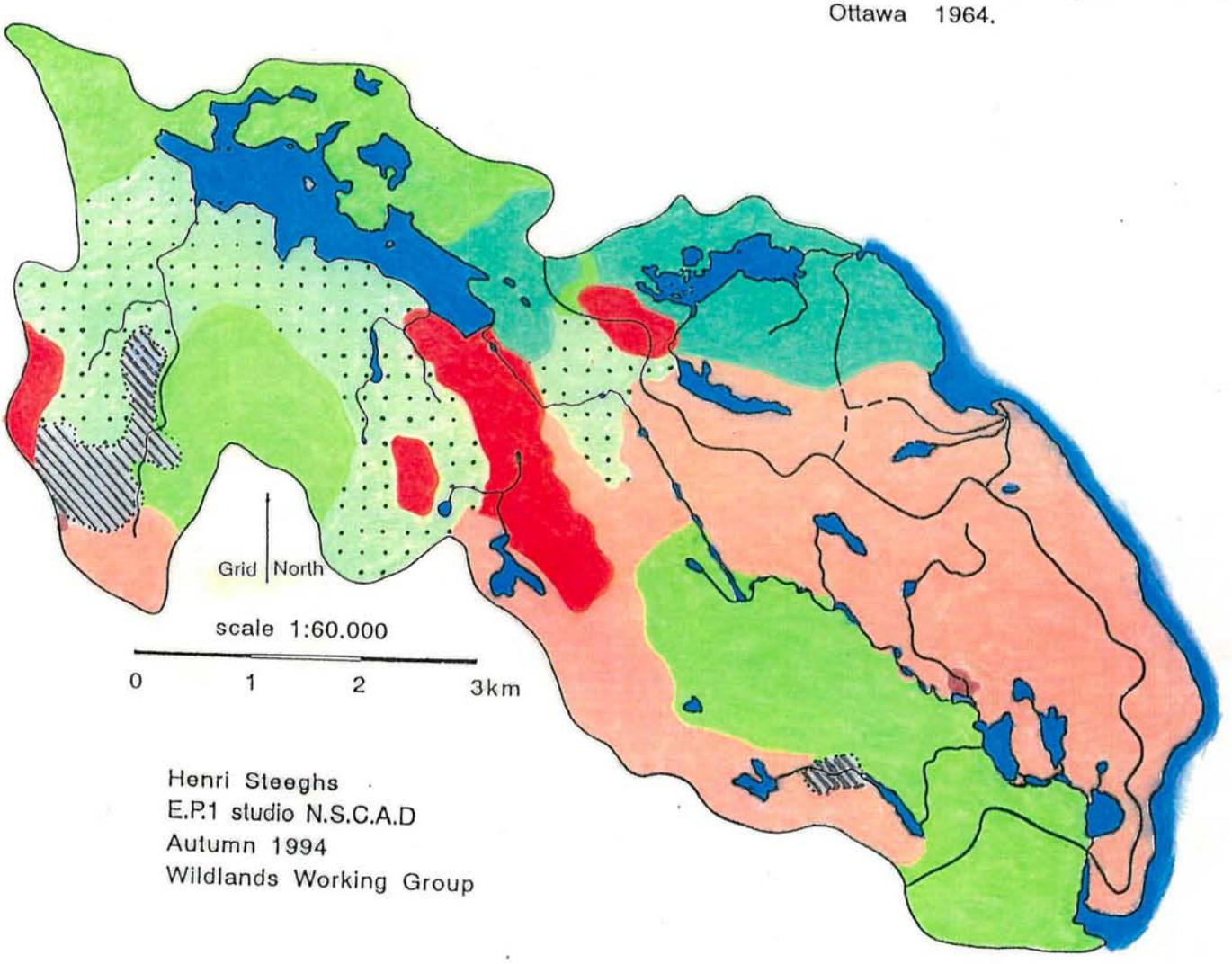
SOILS



LEGEND

- Rockland
- Halifax
- Gibraltar
- Bayswater
- Aspotogan
- Wolfville
- Peat

Sources: Soil Survey information of Halifax county. N.S. Dept. of Agriculture Research branch, Agriculture Cana Ottawa 1964.



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WOLFVILLE SERIES

L-H Black semidecomposed organic matter. (pH 3.8)

Ae Pinkish-gray sandy loam. friable, porous (pH 4.2)

Bfh1 Dark-brown sandy loam. medium granular structure friable, moderately porous sticky when wet (pH 4.5).

Bfh2 Strong brown sandy loam weakly developed fine granular structure moderately porous, compact (pH 4.9)

BC Reddish-brown loam. moderately firm (pH 5.2)

C Dark reddish brown loam firm, some stone (pH 5.2)

HALIFAX SERIES

LH · Black humified, slightly fibrous organic matter. (PH 3.4)

Ae · Light gray friable, porous silt loam. (pH 3.6)

Bfh · Very dark grayish brown friable, porous silt loam. with fine granular structure. (pH 4.9)

Bf. Yellowish brown silt loam with fine granular structure friable, porous (pH 5.1)

C Olive, gravelly silt loam derived from quartzite till, porous. (pH 5.0.)

SOIL PROFILES

Henri Steeghs 10/'94 EPI NSCAD

from: SOIL SURVEY of Halifax Co

(Hilchey, Cann, MacDougall 1963)
(N.S. dept. of Ag., Ag Can.)

– depth measured in inches –

GIBRALTAR SERIES

L-H · Black semi-decomposed, fibrous, greasy mor.

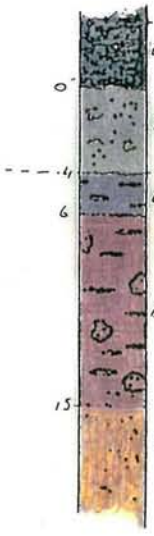
Ae · Pinkish-gray sandy loam. very friable, porous .. structureless.

Bfh · Dark gray-brown sandy loam. firm, porous. weak platy structure stony.

Bfhc · Brown sandy loam. strongly cemented stony

C · Pale-brown gravelly sandy loam porous, stony.

BAYSWATER SERIES



L-H Dark brown to black peaty organic matter over black greasy mor

Ae Gray sandy loam, structureless very friable

seasonal high groundwater

Bfhcgj1 Very dark grayish brown sandy loam weakly developed platy concretions friable, porous, mottled

Bfhcgj2 Brown sandy loam, firmly cemented stony, mottled.

C Yellowish-brown sandy loam, stony, porous

ASPOTOGAN SERIES

L-H Black peaty organic matter

Seasonal high groundwater.

Aeg Dark gray sandy loam, friable, mottled stony

Bfhg Dark brown sandy loam friable, mottled, structureless stony

Bg Olive gray sandy loam friable, mottled stony

C Olive stony sandy loam some quartzite stones.

8.0 Water.

In order to provide the citizens of Halifax with a reliable drinking water supply, a plan for damming up the outflow of the Beaver Lake was conceived 150 years ago. A granite dam was constructed, and 4 years later, in 1848, the waterworks were commissioned. The water rose by more than 20 feet, swallowed nearby Cocked Head Lake, and drowned trees and buildings in the area. The new reservoir became Long Lake. To increase the capacity of the system, a pipeline from Spruce Hill Lake was added in 1877. This pipe is said to be still operational, seasonally adding water to Long Lake and the watershed.

At the Long Lake dam, the McIntosh Run begins. Flowing through densely settled Spryfield, the stream is subject to storm sewer outfalls, carrying quantities of urban run-off at times of rain and snow-melt.

Over 20 lakes are part of the McIntosh Run system. The waters of one lake that flows into the Run (Flat Lake) are not yet affected by any type of development. Because of the abundant surface water on the granite, 9% of the drainage basin's surface is taken up by water (double the provincial average).

Throughout the study area wetlands form extensions of many lakes, occuring in places without pronounced slopes. Wetlands are important water filters that help regulate flow and provide a rich habitat for invertebrae and small fish.

The McIntosh Run drainage area

WATER

surface run-off and soil drainage

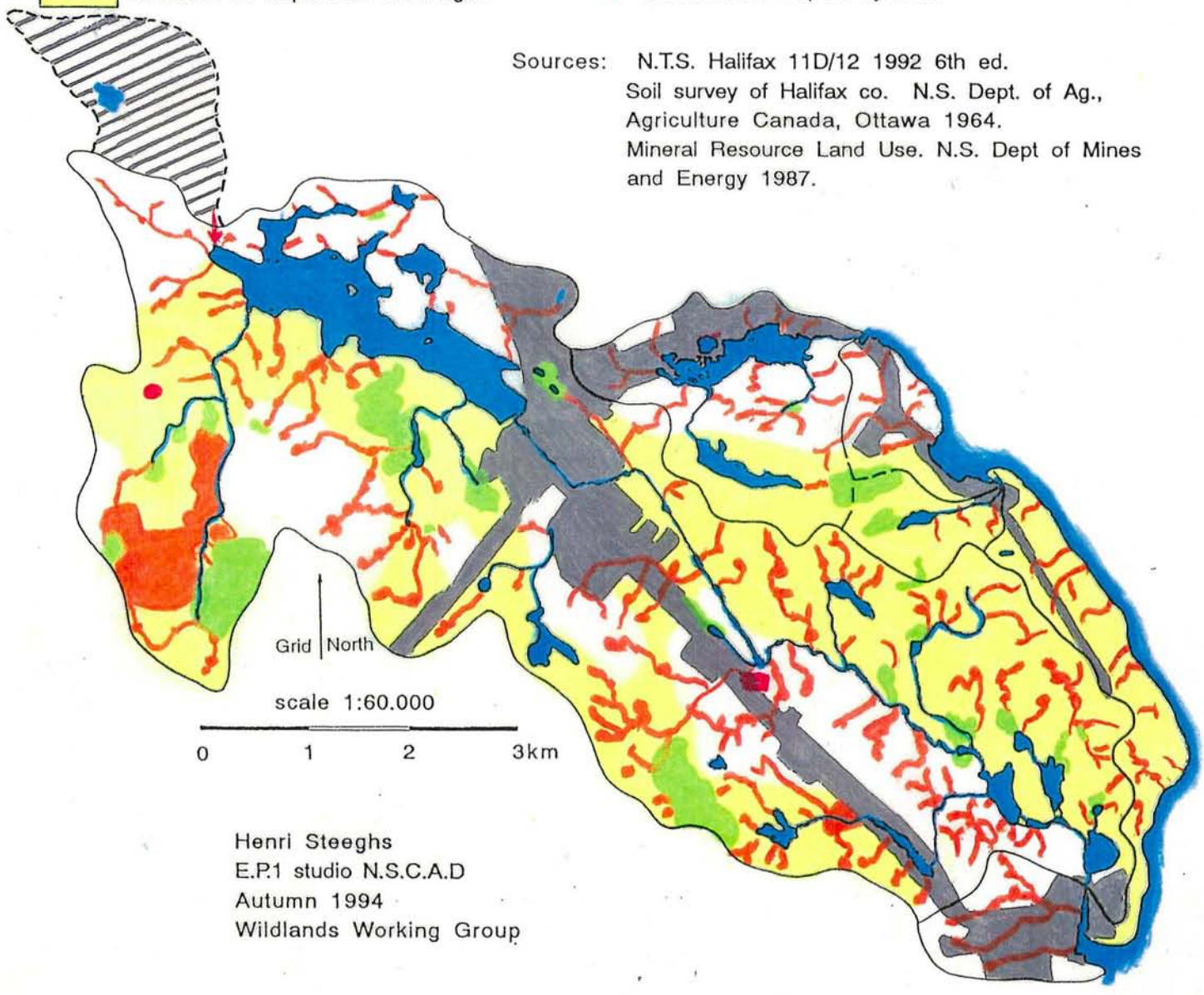
Features:

- Surface water: ocean, lakes, streams
- Swales : run-off producing areas.
- Marsh, wetlands.
- Poorly drained area.
- Variable or imperfect drainage.

Impacts:

- Natural drainage infuenced by urban development
- Bayers lake industrial development.
- Drainage diversion channel.
- Raw sewage overflow.
- Commercial septic system.

Sources: N.T.S. Halifax 11D/12 1992 6th ed.
Soil survey of Halifax co. N.S. Dept. of Ag., Agriculture Canada, Ottawa 1964.
Mineral Resource Land Use. N.S. Dept of Mines and Energy 1987.



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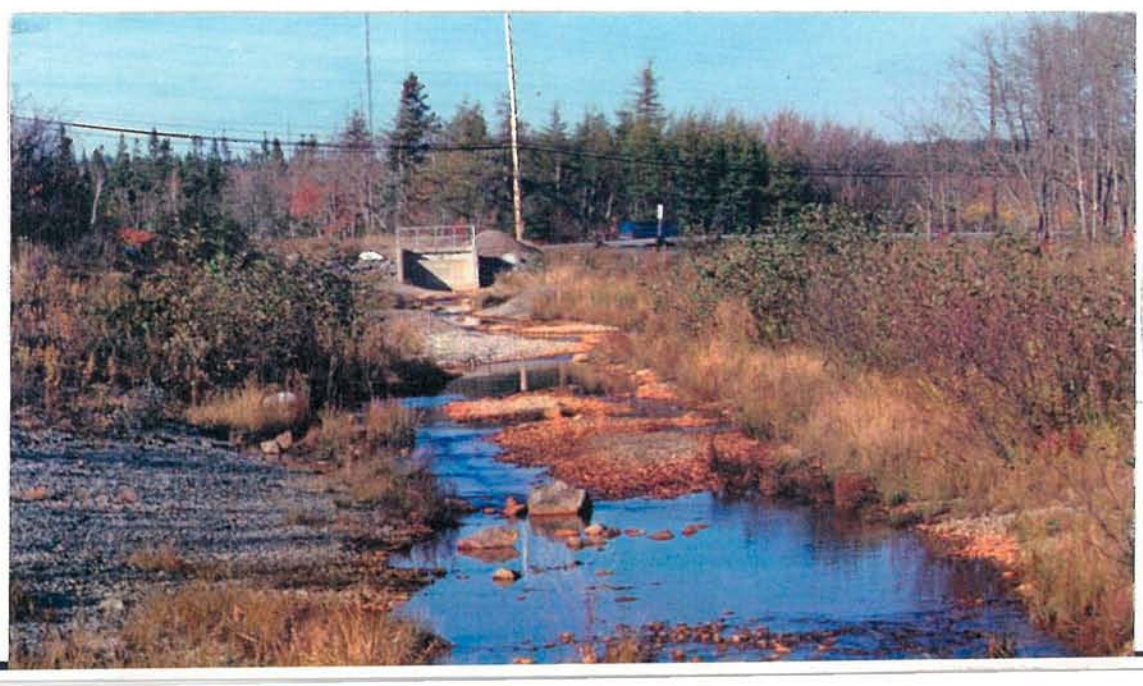
8.1 (Water) Impacts.

In a typical forested area only 10 % of the precipitation runs off. The rest soaks into the soil, nourishing plants and recharging ground water supplies, serving to maintain stream baseflow. In an urbanized environment, where almost nothing soaks in, 90 % can end up running off. This discharge affects water quality in many ways. Salt and grime from roads, as well as silt, from places where the soil or vegetation were disturbed, add contaminants to lakes and streams whenever it rains. Also, water temperatures in streams and shallow lakes will rise, negatively affecting fish habitat. Most of Spryfield's run-off goes directly into the McIntosh Run.

Several sewage pumping stations in the area are designed to overflow at times of heavy run-off. These overflows drain directly into nearby water bodies, and pose a constant threat to surface water quality when discharges occur.

When the Bayers Lake Industrial Park was built, a drainage channel was constructed to divert surface run-off water from the industrial complex into Long Lake. The channel was opened in 1986, and during the first year of operation the pH was very low and Aluminum levels three times higher than what is considered toxic. (See 5.0 Bedrock geology) It should be noted that Long Lake has a very small watershed for it's size (it takes the lake two years to flush), and therefore is particularly vulnerable to contaminants.



8.2 Water quality

Water quality is often regarded as a key diagnostic tool in determining the environmental well-being of an area.

Data were assembled on acidity and conductivity for 3 different lakes in our study area. The information used was collected over 30 years.

pH is a measure of free hydrogen ions. It is used to express the acidity (or alkalinity) of water. 7 is the neutral value, anything below that is considered acid.

Because of our geological setting, most lakes in the area are naturally acid (pH 6-6.5). Sulphate emissions, which cause acid rain and snow have further lowered the pH.

Because a change in pH value affects living organisms, a stable, and relatively neutral pH is considered a desirable state for waterbodies. Human activity will often raise or lower pH values, forcing all aquatic life to adjust or otherwise perish.

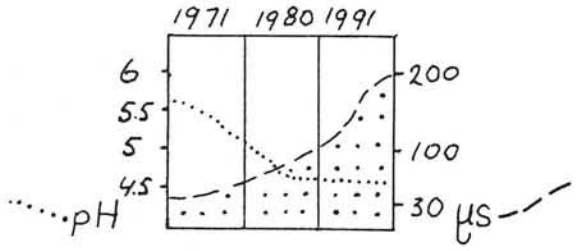
Whereas urban developments generally raise pH, acid producing slate rock can contribute to drastic lowering of the values.

Conductivity is a measure of dissolved ions in a water sample. It is expressed in μS (micro-ohm per second). Lakes with completely undisturbed watersheds have a conductivity level of 30 μS.

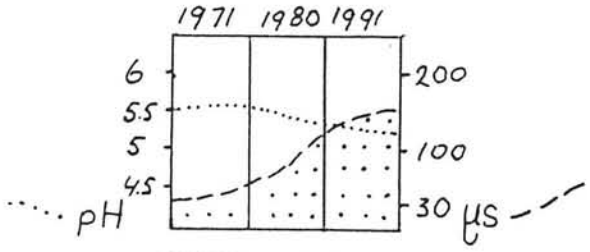
Increased conductivity is considered a measure of human activity. Salt and other run-off from urban areas and roadways, as well as sewage, are the most important contributors to conductivity levels.

Water quality (continued)

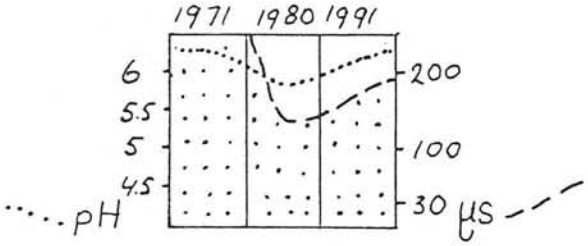
The following diagrams show the comparison in water quality over 3 decades between 3 different lakes within the study area. Long Lake is located at the top of the watershed and Powers Pond is at the bottom of the McIntosh Run. Williams Lake has an independent drainage system.



LONG LAKE
flushing time: 2 yrs.



POWERS POND
flushing time: 1 week.



WILLIAMS LAKE
flushing time: 8 months.

Rising conductivity and a gradual increase in acidity (lowering of pH) indicate an unfavourable trend in the Run's water quality. Williams Lake on the other hand, shows signs of falling conductivity and a stabilizing pH level.

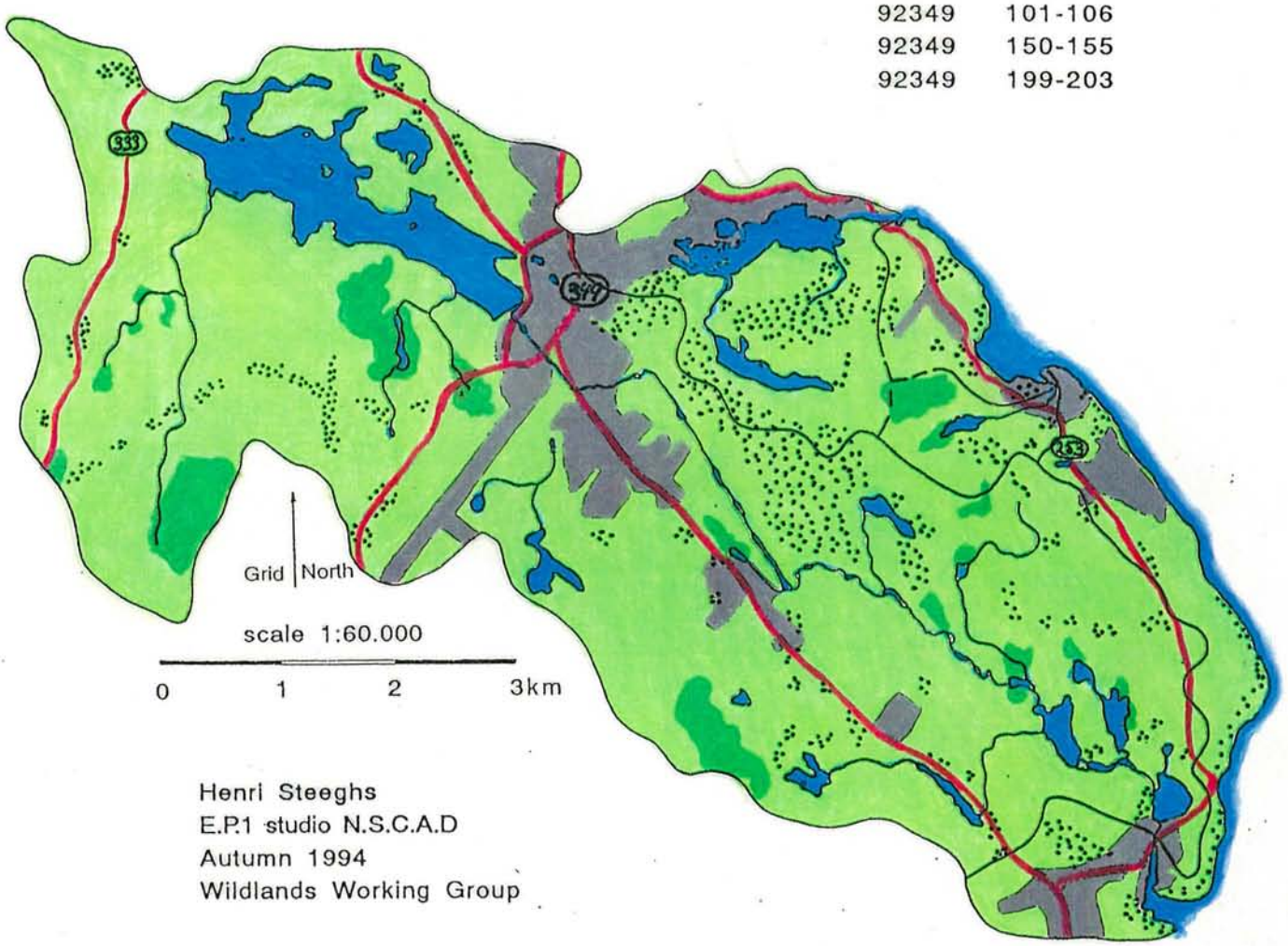
The McIntosh Run drainage area

HABITAT

LEGEND

- Water (streams, lakes, ponds)
- Wetland
- Mixed forest
- Human development
- Rock outcrop

Sources: D.Atkinson/H.Steeghs E.P.1 NSCAD '94
N.T.S. Halifax 11D/12 1992 6th. ed.
A. Hynes Hydrology E.P.1 NSCAD 1994
Aereal photos 92347 184-186
92349 101-106
92349 150-155
92349 199-203



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9.0 Habitat. Vegetation

The great Acadian Forest, which covered most of the Maritimes before European settlement, was associated both with the Temperate Forests of the South, and with the Boreal Forests of the North. Red Spruce,characteristic of the Acadian Forest, can still be found extensively throughout our study area. Logging, land clearing and burning however, have completely changed the face of the original vegetation cover. Valuable White Pine was cut for carpentry, Hemlock bark was sought by tanners, and Oak and Maple wood sold for barrel staves. A steady demand for firewood kept the second growth thinned out. Soils with agricultural potential were cleared for pastures and for gardens.

Repeated fires swept the rocklands. Some say Miq'macs set the fires to maintain their berry picking places. Jack Pine, which now populate the area, have grown as a direct result of these fires.

Land that has been cleared has regenerated in White Spruce. This spruce is one of few plants that, in combination with the moist climate, is able to withstand effects of ocean born salt spray. It, therefore, dominates the coastal forest.

The deeper drumlin soils support young hardwood stands. Red Oak mixed with Red Maple ,and Red Spruce prevail throughout the residential zones.

The forest matrix also has Black Spruce, Poplar, White Birch and Tamarack, and small amounts of Alder.

On thinner soils, where trees are sparse, a dense cover of shrub growth dominates the landscape. Many of these plants belong to the ericaceous family, which tolerates the marginal and acidic soils.

In places the exposed granite is covered with colourful lichen. These diverse populations are an indication of a relatively clean air flow in the region.

The McIntosh Run drainage area

Forest inventory of study area South of Williams Lake

bS: Black Spruce
wS: White Spruce
rS: Red Spruce
wP: White Pine
jP: Jack Pine
rO: Red Oak
rM: Red Maple
wB: White Birch
Po: Poplar
Al: Alder

Approximate height of stand given in feet
Estimated crown closure given in percentage

bS, wP, rS, rO	30-40'	30-40%
rO, bS, rM	40-50'	80%
rO, rM, wS	50-60'	80-90%
wS, Po, rO, wB	20-30'	75-85
bS, rO, wP	30-40'	30-40%
jP, rO, rM	20-30'	50%
wB, wS, Po	20-30'	75-85%
Al	5-10'	80%

Sources: N.T.S. Halifax 11D/12 1992 6th ed
Air Photos 92347 184-18(
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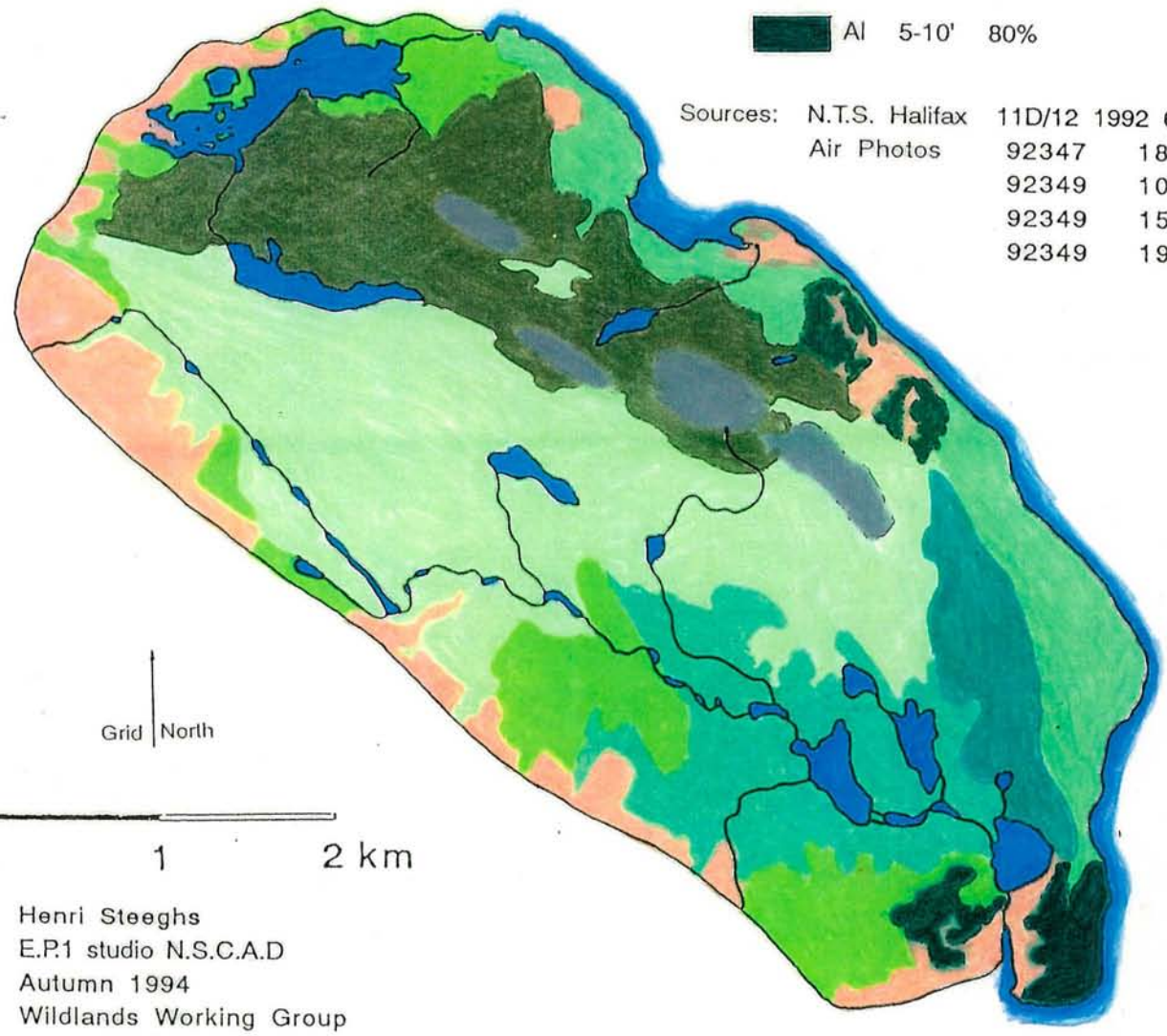
92349 150-15!
92349 199-20:



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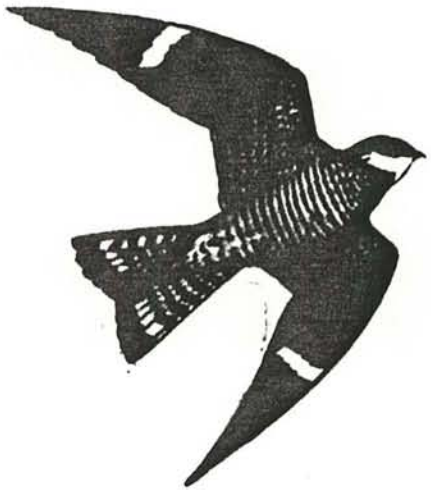

9.1 Wildlife habitat.

Mammals that are known to frequent the forest and the open shrub lands of the study area include the little voles and shrews. These creatures feed on insects, fruit and other plant-life. Their population is able to supports a stock of predatory animals like hawks and foxes, as well as mink, that live along the waterways.

Muskrats, otters and some communities of beaver are found in many of the waterways and lakes.

Squirrels and small bands of raccoons live in hardwood stands and near the human settlements. A modest number of white-tailed deer and the occasional moose are also seen throughout the range.

The upland lakes and wetlands provide nesting habitat for black and ringnecked ducks. The fish in Powers Pond and other lower lakes support a small number of osprey. Other birds of prey include the merlin and the marsh hawk (or Northern Harrier), as well as the intriguing nighthawk. These raptors love to swoop at dusk through open shrub and barren lands in search of their terrestrial prey.

Small birds include the Junco which can be seen year-round. Colourful and dainty kinglets come to nest and rear their young on the abundant spring and summer flies.

The quiet Spruce Grouse may sometimes be seen, while noisy roosts of crows are often heard around sunrise or dusk. Overhead, the passing Herring gulls toy with the wind, en route to Herring Cove.

9.2 Fish habitat.

The McIntosh Run can be considered a unique water course because it runs through a densely populated community, and still accomodates a healthy stock of fish. Brook, sea-run, and speckled trout have all been fished from its waters, and many small tributaries were found to have considerable populations of small trout. Also a yearly run of gaspereaux, as well as eel and perch have been observed, and several minnow species can be found.

Although there is no specific serious point source of pollution, development is having its effects. Siltation has been a problem, and sewage inflow is a constant threat. One of the consequences of urban run-off is increased algae growth. Algae depletes oxygen available to fish. High levels of oxygen are required on spawning grounds and are needed to support small fry.

Besides being a positive sign of a healthy surface water system, the trout and other fish provide important food for birds of prey and certain mammals (otter, mink, human).

While present fish stocks seem to be holding their own, they are threatened by overfishing, siltation, urban run-off and pollution, that could all cause the sudden demise of this valuable habitat.

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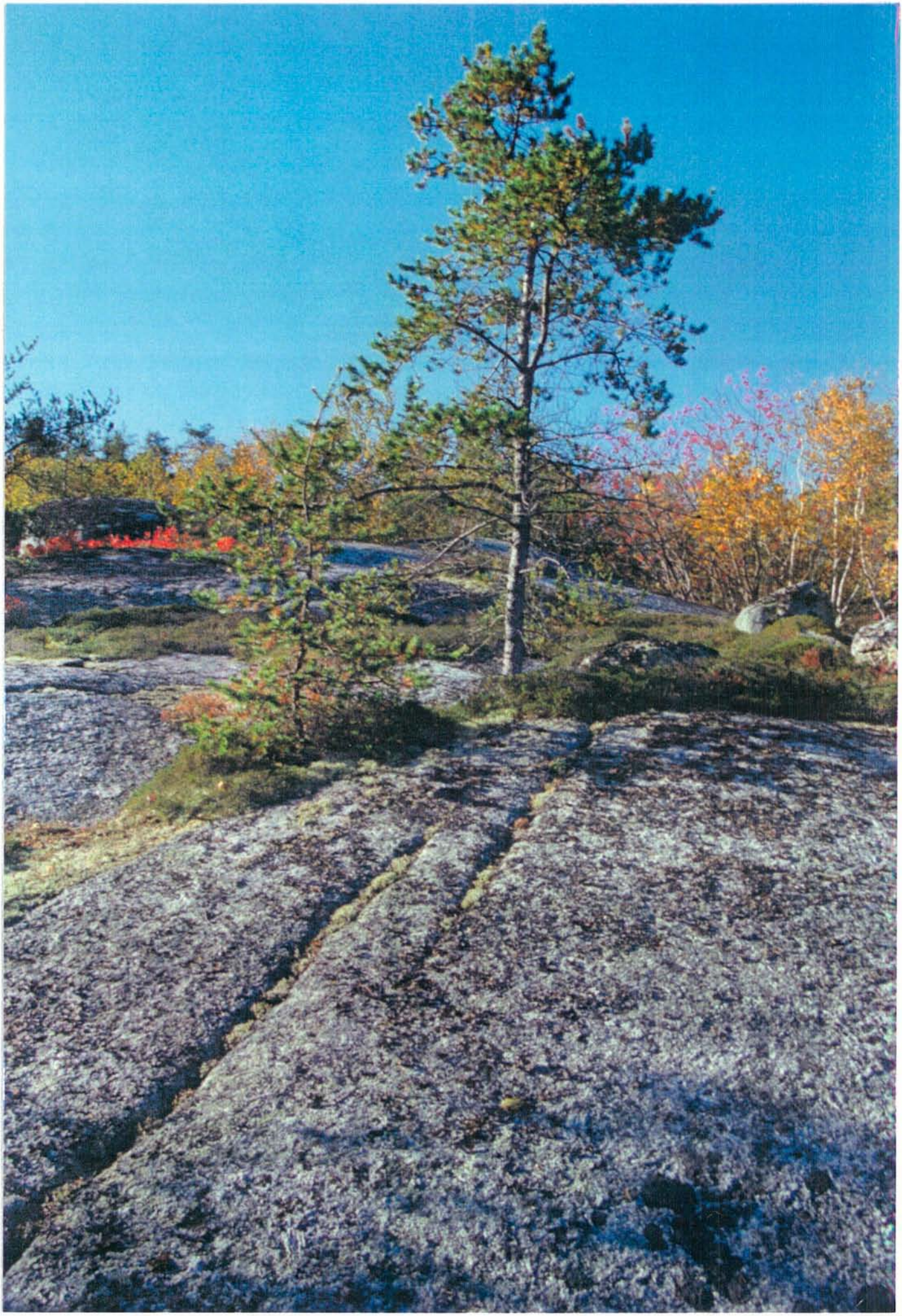
9.3 Human habitat

Abundant fresh water fishing and close proximity to a rich ocean inlet brought native people to the area long before the Europeans came. Remains of Paleo-Indian camps have been unearthed at the nearby settlement of Harrietsfield.

When colonial settlement began, the area quickly became a British stronghold, and Halifax Harbour its most vital port. The coastal headlands, including those in our study area, were chosen as a first line of defence, and played a central part in the colonialization of the continent. Soldiers and settlers soon began to purvey the abundant stores of wood and stone within the region, and small settlements sprung up around the growing city. Land cleared on the drumlins supported farms which could supply the city with food. During the nineteenth century the fields and pastures, where Spryfield is today, became a favorite day trip for city folks on summer picnics. The community itself supported sawmills, farms and quarries, factories for nails and even one for ice skates. The steady population growth reached its peak during the 1960 subdivision sprawl. Today, most industry is gone as Spryfield and surrounding centres have become residential 'bedroom' communities.



9.4 Distinctive habitat: Jack Pine, Barrens and Bogs.

The association of Jack pine with fire is well known, in that only a fire provides enough heat for cones to open and disperse its seed. The repeated fires that have swept through part of the study area allowing the pines to grow, are in part responsible for the very thin veneer of soil that covers the granite bedrock. Loss of this thin layer would result in exposure of bare rock, incapable of supporting vegetation. In spite of its disturbed past, the landscape is in delicate equilibrium, and provides a habitat for a high number of interacting plant and animal species. The thin acid soils are secured by a dense cover of ericaceous plants that provide abundant stores of fruit, and support an array of wildlife.

The character of this landscape could easily be altered if disturbed. And if any of its elements were lost, this habitat would be difficult or impossible to restore.

10.0 Climate

Cool summers and mild winters characterize the climate of the watershed. This is caused both by the latitude position on the globe and an influence of the North Atlantic. The recurrent mixing of different airmasses brings moist weather. This gives year-round precipitation totalling nearly 1500 mm.
Many summer mornings the cold water and warm air will shroud the watershed in fog.

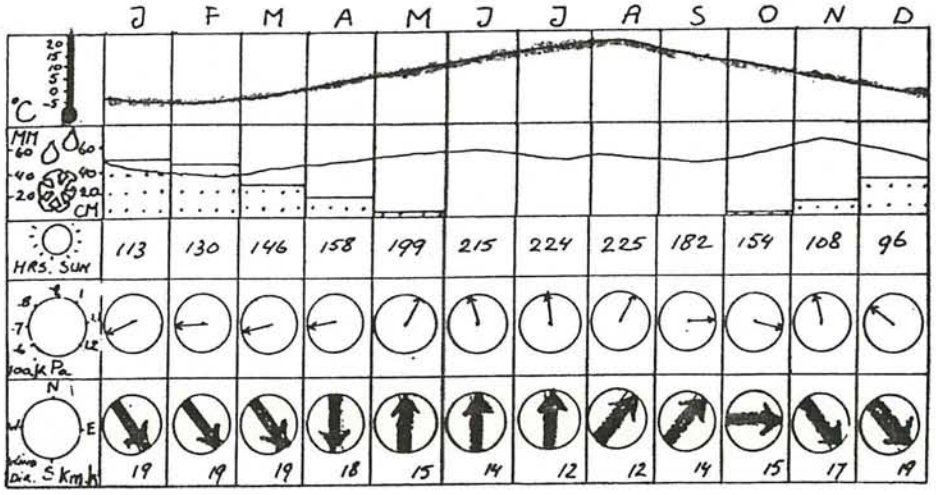
Snowfall has been recorded during 8 months of the year, and rain occurs in every month. Mild spells in the winter can cause heavy run-off if snow melts quickly during rainy weather.

Wind force is a major weather factor during the fall and winter months. Steady winds bring cold air from the North from December to the month of March. The same valley that allows the summer breeze to flow is then aligned to funnel in the cold and biting winter winds. Where the topography is higher than the surrounding landscape, persistent breezes can be counted on.

Fall storm and hurricane winds can exceed 150 km/h. High waves then pound the coast and send saltspray inland.

In September and October, barometer readings are usually high, and fair and steady weather can be expected.

Cold air drainage affects all low lying areas, and can give early fall, and late spring frosts in certain 'pockets'.



The McIntosh Run drainage area

CLIMATE

LEGEND

Locally strong winter wind exposure

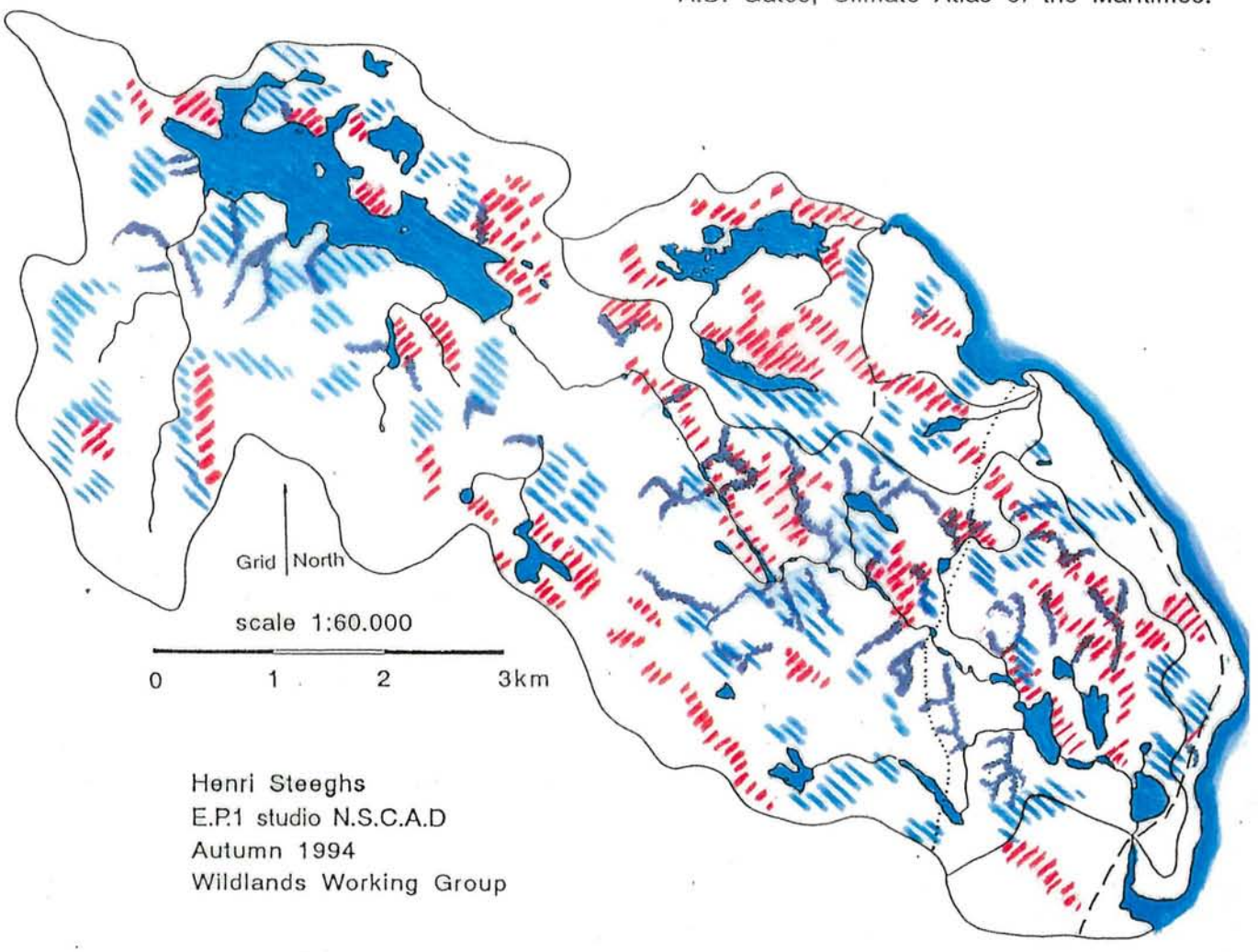
Local summer breezes

Cold air drainage

15° C

17.5° C Isotherm for July average)

Sources: N.T.S. Halifax 11D/12 1992 6th. ed.
Synoptic weather station data,
44 38' N 63 30' W 51m
A.D. Gates, Climate Atlas of the Maritimes.



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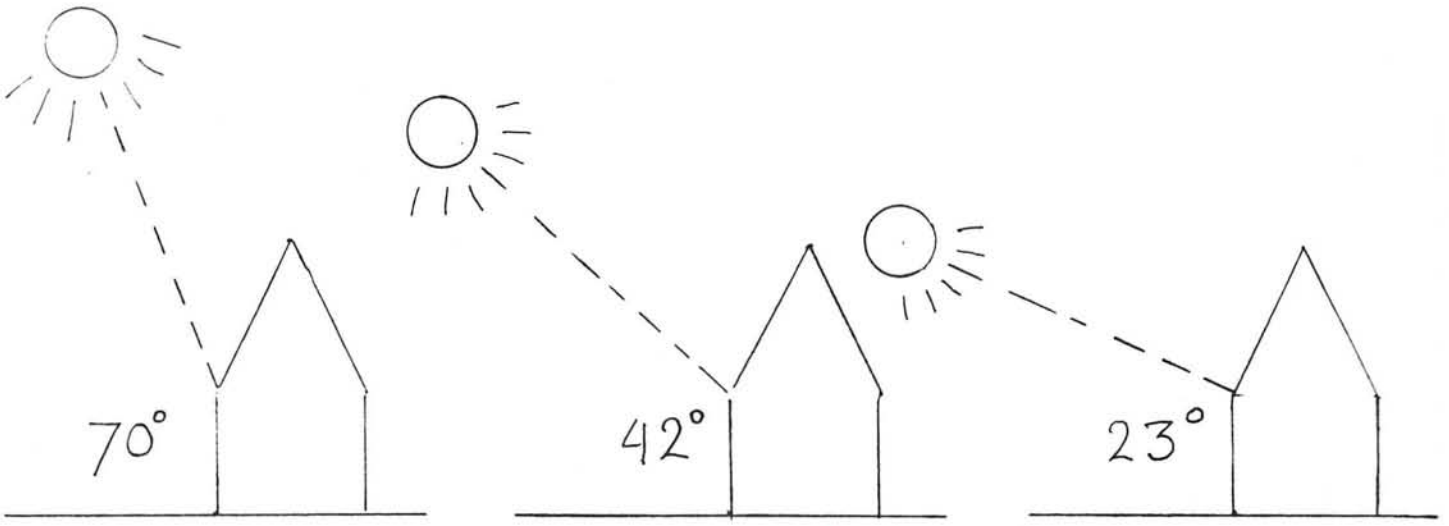
Autumn 1994
Wildlands Working Group

10.1 Slope aspect and sun angle.

With low sun angles during winter months, developments can benefit substantially from appropriate location and orientation. Because of favorable sun angles, south facing slopes maximize solar heat gain during winter months. Sites which face North, lack the benefit of solar radiation in the winter. Early morning warmth or sunlight later in the day can also differentiate between a welcome space, and one that functions poorly, suffering from heatloss, drafts and darkness.



sun angle on June 21 ...on March/September21 ...on Dec 21

Sunshine hours for study area:

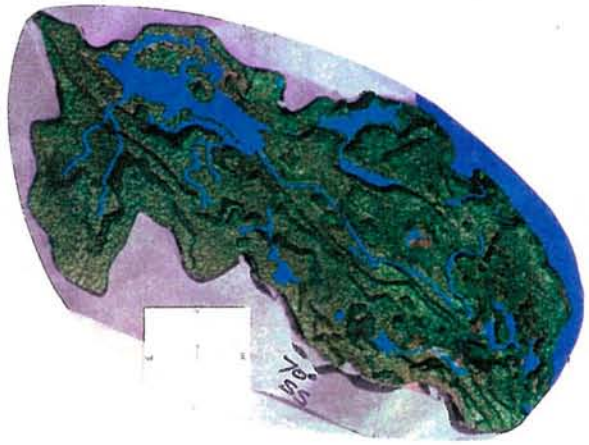
Summer approx. 220 hrs/month

Spring/Fall approx. 150 hrs/month

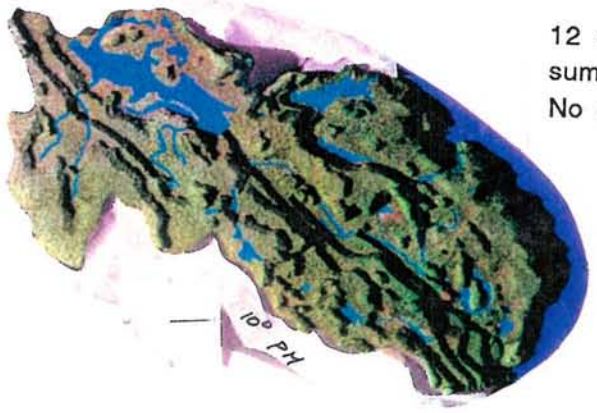
Winter approx. 110 hrs/month

Sun and shade patterns in the landscape

Photos of scale model show how slope orientation influences sunlight and shade patterns in the landscape during different seasons and at different times of the day.



12 o'clock midday
summer solstice (70° sun angle)
No shadows in the landscape



Sunset (10° sun angle)
summer 7 pm
equinox 5 pm
winter 3 pm
Pronounced shadows on
East facing slopes

Sunrise (10° sun angle)
summer 5 am
equinox 7 am
winter 9 am
Pronounced shadows on
West facing slopes

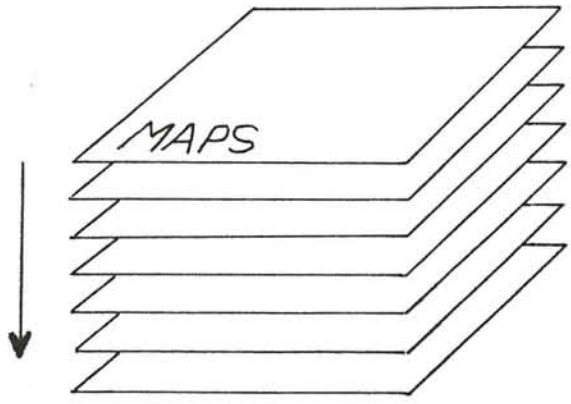
12 o'clock midday
winter solstice (23° sun angle)
Shade on North facing slopes

11.0 Synthesis.

The synthesis map considers all the factors that have been brought to light in the resource inventory. It compiles the information, which is critical in identifying environmental issues and their relationship to each other, from all the previous maps. Therefore, it is able to provide a picture of the capability of the land and its capacity for development.

The functioning of natural processes is the life support system of the physical landscape and the organisms that it sustains. Because it affects all processes, habitats and species, water is respected as the most significant element in the maintenance of all natural cycles and functions.

In composing a synthesis, levels of environmental vulnerability were defined on the basis of physical land characteristics, and the capacity to support functioning ecosystems that provide maximum biodiversity and species association.



Overlaying of factor maps
to produce a synthesis (or composite) map
which indicates land capabilities

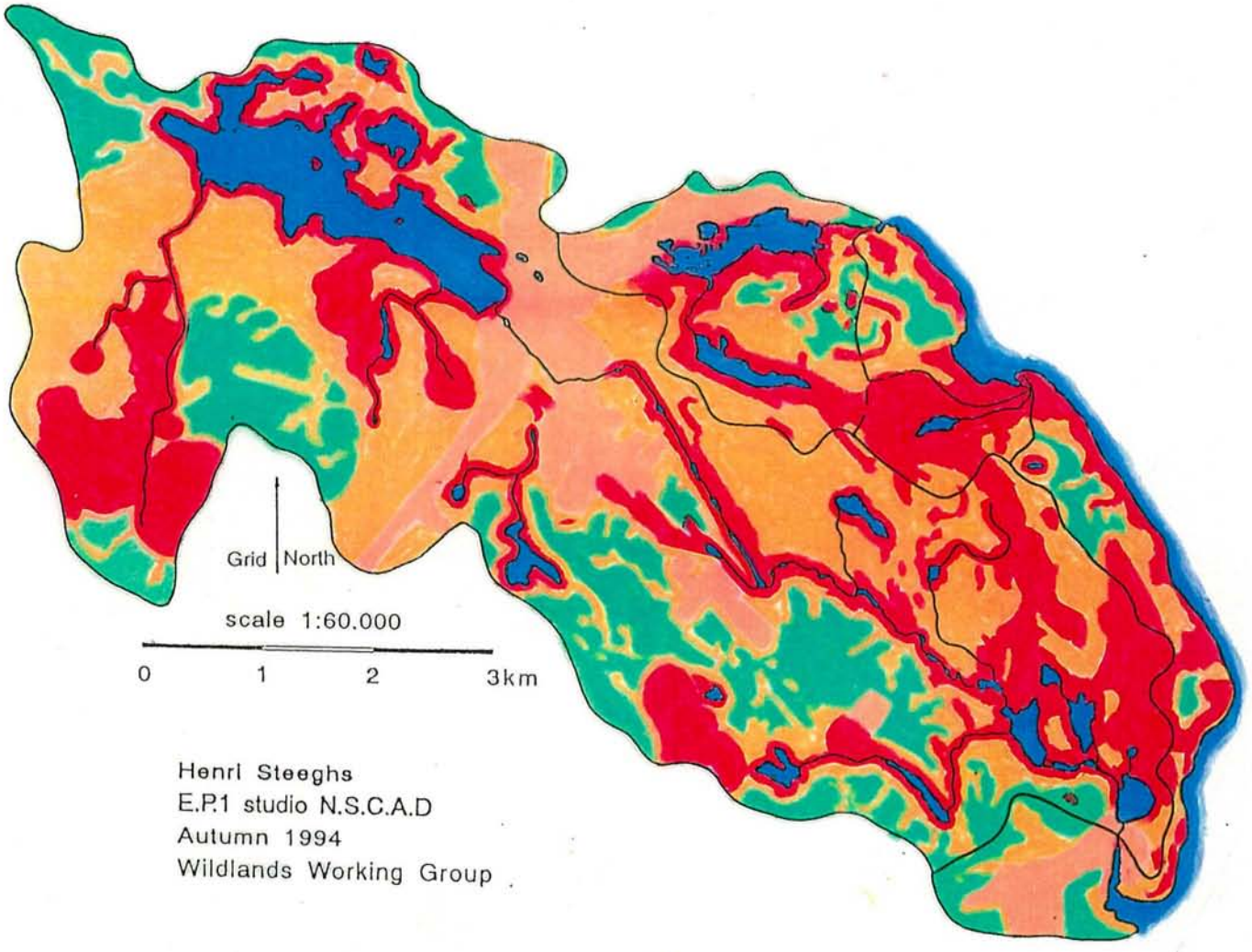
The McIntosh Run drainage area

SYNTHESIS

Areas which are highly vulnerable

Areas with moderate vulnerability

Areas with low vulnerability



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Autumn 1994
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Areas which are highly vulnerable include:
- Waterbodies, watercourses and wetlands.
- 100 meter riparian buffer zone.
- Slopes greater then 15 % commencing within the riparian buffer zone.
- Slopes greater than 25% anywhere.
- Unique or diverse habitat.
- Poorly drained soils.

Areas with moderate vulnerabilities include:
- Land sloping more than 8%.
- Land adjacent to highly vulnerable areas.(50 m buffer)
- Forested areas adjacent to developed land.(25 m buffer)
- Areas with less than 1 m of till.
- Imperfectly drained soils.

Areas of low vulnerability are relatively flat, have good internal drainage and are well away from water courses. They can generally be considered as **well suited for development purposes.**

It was established that a great diversity of communities (human-, animal- and plant-) are represented within the study area. Most significant is the **rich water resource**, which affects all of these communities. Therefore, the protection of this water resource is vital to the environmental well being of the area.

Areas which are highly vulnerable include:

- Waterbodies, watercourses and wetlands.
- 100 meter riparian buffer zone.
- Slopes greater then 15 % commencing within the riparian buffer zone.
- Slopes greater than 25% anywhere.
- Unique or diverse habitat.
- Poorly drained soils.

Lakes, watercourses and wetlands are all considered highly vulnerable. In order to protect these waterbodies, a bufferzone of 100 m is essential. Buffer zones protect the water from siltation and harmful run-off. They provide important corridors for wildlife, and allow natural vegetation to contribute to fish habitat.

When steep slopes are disturbed they become prone to soil erosion, and can suffer permanent soil and vegetation loss. Steep grades located near bodies of water can deliver choking loads of silt, destroying precious habitat for fish.

Fragile habitats, such as the Jack Pine barrens with its thin veneer of peat soil, exist in delicate balance, and can easily be disrupted.

Poorly drained areas are easily damaged. Once disturbed, they suffer injury to soil and vegetation that can take decades to repair themselves.

Areas included in the highly vulnerable zones must be regarded as off limits to development, with the exception perhaps of some forms of low-impact recreation.

Areas with moderate vulnerabilities include:

- Land sloping more than 8%.
- Land adjacent to highly vulnerable areas.(50 m buffer)
- Forested areas adjacent to developed land.(25 m buffer)
- Areas with less than 1 m of till.
- Imperfectly drained soils.

Land which falls into the category of moderate vulnerability is considered to have development restrictions. Environmental performance standards must be set and adhered to, for any type of development to take place.

For slopes over 8%, erosion is still a real danger, and enforcement of the bufferzone is important.

All lands which are located immediately next to a highly vulnerable area are placed in this category, to help protect the most vulnerable places.

Forest tracts adjacent to already populated or developed areas must be regarded as valuable stretches of land, where rain water is allowed to percolate into the soil, and wildlife and other organisms allowed to exist.

Places with less than 1 m of till on top of the bedrock are not suited for certain types of on-site services (eg. septic tanks) and have a limited capacity to deal with the effects of development. Soil and vegetation loss can be substantial if the bedrock is disturbed (eg. when underground services are installed).

Areas of low vulnerability are relatively flat, have good internal drainage and are well away from water courses. They can generally be considered as **well suited for development purposes.**

12.0 Conclusion and Recommendations.

It was found that the area has a considerable landbase which is suitable for urban or residential development. It also has the undeveloped Wildlands/Backlands area, which has a high number of interacting plant and animal species, and has good potential for various 'open space' and recreational requirements.

Buffer zones and other development limitations help protect environmentally vulnerable places for the benefit of all inhabitants.

The riparian buffer zones are recommended because water quality is such an important factor in the overall environmental well being of the area. Promotion of community stream stewardship has proven to be a useful way in dealing with water quality concerns in many other areas.

Regarding future development plans, further issues that pertain to planning will need to be addressed. These include the needs and wishes of the community (future growth limits, transportation, recreation, etc.) and the fact that several jurisdictions, each with different rules and standards, exercise their influence on the watershed lands.

Restrictions on developments in vulnerable areas will protect land values as it guards the landscape from destruction and preserves its qualities for the inhabitants.

Maps:

1. Donohoe H.V. and Grantham R.G. 1989 Geological Highway Map of Nova Scotia. Atlantic Geoscience Society, Halifax, N.S.
2. N.T.S. Halifax 11D/12 1992 6th. ed.
3. Geology after E.R. Faribault 1908.
4. Geological Survey of Canada N.S. Dept. of Mines, Energy Map 87-6 Halifax and Sambro 1987.
5. Pleistocene Geology 1980 Central Nova Scotia Sheet 4 Government of Canada / Province of Nova Scotia.
6. Mineral Resource Land Use 1988 ofm 88-044 D.B.Hopper, C.A. Dobson Province of Nova Scotia.
7. Soil Survey Information of Halifax co. N.S. Dept. of Agriculture. Research Branch, Agriculture Canada, Ottawa 1964.
8. Hydrology A. Hines EP1 NSCAD 1994.
9. Climate Atlas of the Maritimes A.D. Gates.
10. Aerial Photos

92347	184-186
92349	101-106
92349	150-155
92349	199-203

Guest lecturers:

1. Curt Speight. LRIS Consultant, authority in remote sensing. Nova Scotia Geomatic Center, Amherst, N.S.
2. Martin Willison. Professor of Biology, Dalhousie University, Halifax, N.S. Resident of Purcell's Cove.
3. Donald Cox. Habitat Management Branch, Fisheries and Oceans, Halifax, N.S.

Interviews:

1. Rick Scott. Nova Scotia Institute for Fresh Water Resources. Technical University of Nova Scotia, Halifax, N.S.

2. Paul Mandel. Water quality analyst with Fisheries and Oceans. Lecturer at Biology Department, Dalhousie University, N.S.

3. Brian Preston. Archeologist with the Natural History Museum of Nova Scotia, Halifax, N.S.

4. Bob Bancroft. Wildlife and fisheries biologist with Nova Scotia Departments of Natural Resources and Fisheries.

5. Heather Watts. Author and historian. Vice president of The Mainland South Heritage Association, Spryfield, Halifax County, N.S.

6. Iris Shae. Historian with The Mainland South Heritage Association.

7. Ernie Corbit. Draftsman with the Halifax Water Commission, at Halifax, N.S.

8. Fred Holtz, Ferguson's Cove, Halifax Co. and Kathleen Hall, Williams Lake, Halifax Co.: Directors of The Wildlands Working Group.

13.0 References:

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2. Roland A.E. 1982 Geological Background and Physiography of Nova Scotia. The N.S. Institute of Science, Halifax, N.S.

3. Keizer P.D. e.o. Synoptic Water Quality Survey of Halifax/ Dartmouth Metro Area lakes on April 16, 1991. B.I.O. Canadian Data Report of Fisheries and Aquatic Sciences 914 Fisheries and Oceans.

4. Simmons M., D. Davis, L. Griffiths and A. Muecke 1984 Natural History of Noca Scotia. N.S. Department of Education and Dept. of Lands And Forests 2 vols 807 pp 1989 ed.

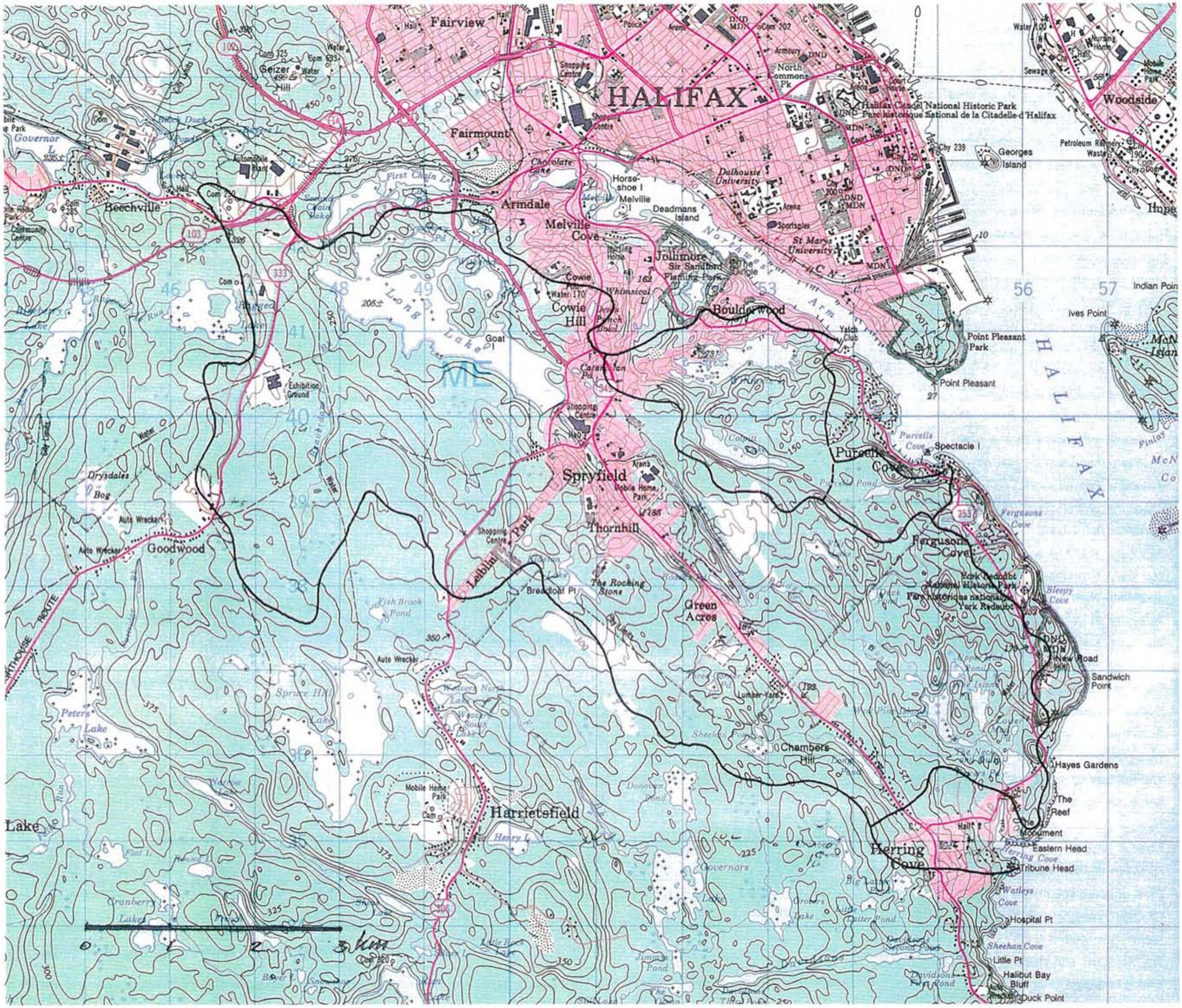
5. Hilchey J.D., J.I. MacDougall, D.B. Cann. Soil Survey of Halifax County, N.S. Canada Dept. of Agriculture, N.S. Dept. of Agriculture, Truro, N.S. 1963.

6. Nova Scotia Department of Development. Nova Scotia Resource Atlas 1986

7. P.B. Dean Wildlife Biologist C.W.S. Natural Environment Survey for Greater Halifax-Dartmouth 1971

8. Metropolitan Area Planning Committee, Halifax, N.S. 1971 Water Quality Survey for Selected Metropolitan Area Lakes.

9. Nova Scotia Department of Natural Resources 1990 Forest/Wildlife Guidelines and Standards for Nova Scotia.



Fairview
HALIFAX
Halifax Citadel National Historic Park
Parc historique national de la Citadelle-d'Halifax
Woodside
Fairmount
Chocolate Lake
Georges Island
Dalhousie University
Horse-shoe I
Melville I
Deadmans Island
Armdale
Melville Cove
Beechville
Geizer Hill
Governor L
Long Lake
Goat I
Cowie Hill
Jollimore
Sir Sandford Fleming Park
Whimsical L
Boulderwood
Yacht Club
St Marys University
Point Pleasant Park
Point Pleasant
Ives Point
Indian Point
HALIFAX
Exhibition Ground
Spryfield
Thornhill
Purcells Cove
Spectacle I
Drysdales Bog
Auto Wrecker
Goodwood
Leiblin Park
Breakheart Pt
The Rocking Stone
Green Acres
Fergusons Cove
York Redoubt National Historic Park
Parc historique national York Redoubt
New Road
Sandwich Point
Fish Brook Pond
Auto Wrecker
Spruce Hill
Peters Lake
Lumber Yard
Chambers Hill
Hayes Gardens
The Reef
Monument
Eastern Head
Tribune Head
Mobile Home Park
Harrietsfield
Lake
Cranberry Lake
Herring Cove
Hospital Pt
Sheehan Cove
Little Pt
Halibut Bay Bluff
Duck Point
0 1 2 3 km