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# MANAGEMENT PLAN

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## HAWKE HILL

## ECOLOGICAL RESERVE



**Parks and Natural Areas Division  
Department of Environment and Conservation  
Government of Newfoundland and Labrador**

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## 1.0 HAWKE HILL ECOLOGICAL RESERVE

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### **1.1 Introduction**

Ecological Reserves are established under **The Wilderness and Ecological Reserves Act (1980)** for the preservation of areas in the province which contain unique or representative species, ecosystems or natural phenomena.

Hawke Hill (47° 20'N, 53° 05'W) was designated as an Ecological Reserve in 1992 under the Wilderness and Ecological Reserves Act, (1980). This 2.1 km<sup>2</sup> site is located approximately 3 kilometres east of the Salmonier Line/Trans Canada Highway junction (See Figure 1). It contains the best representative area of alpine barrens east of the Long Range Mountains. In fact, it is the most easterly alpine barrens site in North America and is an excellent representative of Meades (1973) Alpine Heath Eco-region.

### **1.2 Geology**

The Hawke Hills form part of the central upland of the eastern Avalon Peninsula. The Avalon Peninsula is a relatively subdued eastern extension of the Appalachian Mountain system. As a member of this structural unit, the area was subjected to the late Precambrian and early Paleozoic Appalachian Orogeny which has been linked to the generation and destruction of the ancient Iapetus Ocean. The Hawke Hills are composed predominantly of moderately resistant late Precambrian volcanic and sedimentary rocks of the Harbour Main Group. Bedrock is mantled by an uneven veneer of locally derived glacial till. Bedrock outcrops are numerous, as are glacial erratics. Evidence suggests that during the Late Wisconsin glaciation, the Avalon Peninsula's ice cover remained for a significantly longer period than the rest of the Island.

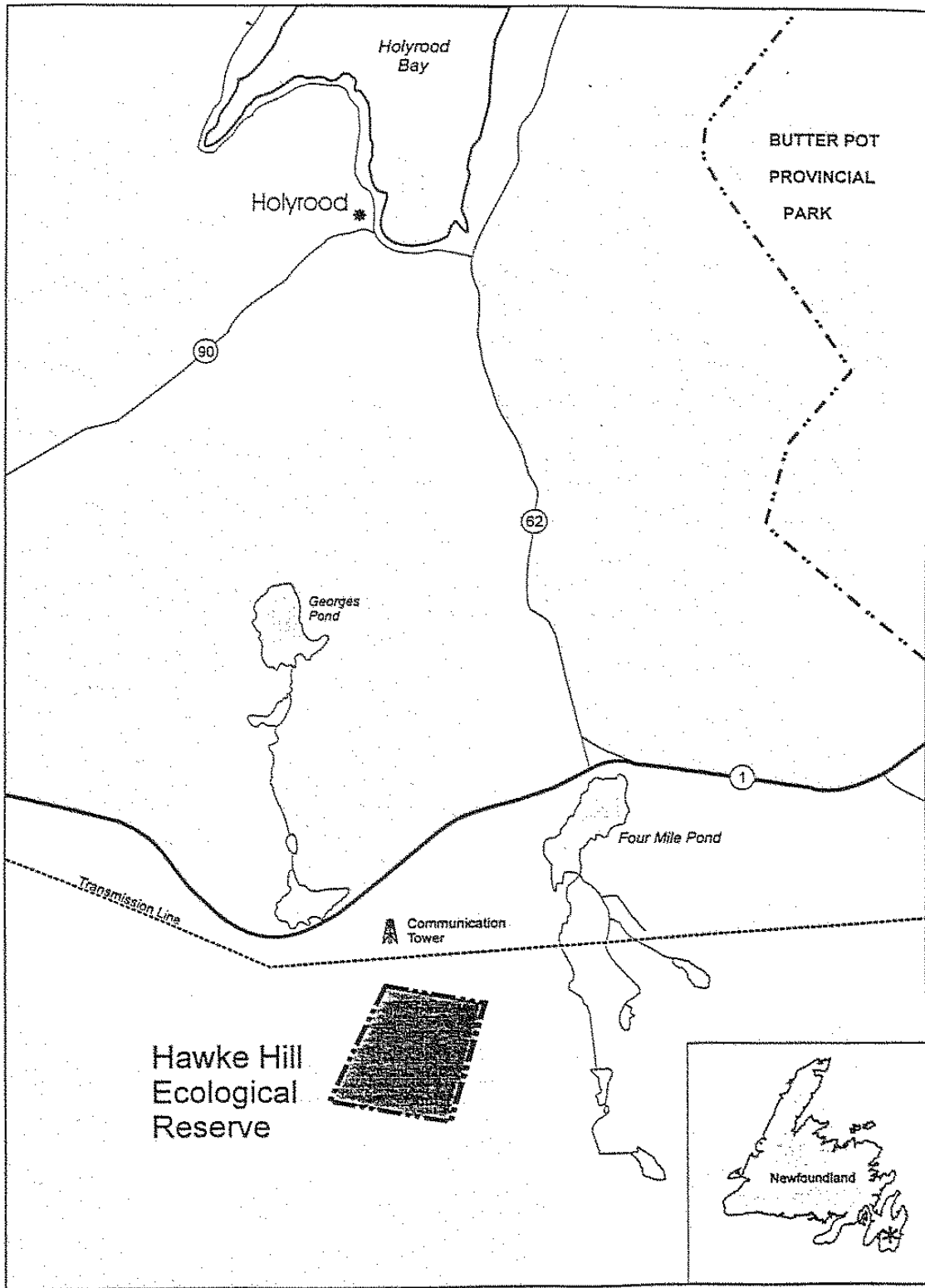


Figure 1. Location of Hawke Hill Ecological Reserve.

Deglaciation occurred first where ice cover was thinnest. Hence, the Hawke Hill area is thought to have been deglaciated before the surrounding lowland areas (J. MacPherson, P. Comm, 1987).

Pollen studies suggest that the climate of the Avalon experienced a general warming and a decrease in precipitation following the late Wisconsin glaciation. This trend continued for 9,700 years B.P. until 3,200 years B.P. At that time a reversal occurred. Temperatures began to decrease and precipitation increased, resulting in a lowering of the tree limit in the interior upland (J. MacPherson, 1982).

Patterned ground, a minor geomorphological feature often associated with periglacial environments, is common throughout the Hawke Hills. Intense freeze-thaw activity coupled with a discontinuous cover of vegetation, and the absence of both an insulating snow cover, or a thick humus layer as a result of wind erosion, provide ideal conditions for the formation of patterned ground. Along the windswept summits of the Hawke Hills small-scale sorted to poorly sorted rock polygons predominate (Refer to Figure 2).

These polygons develop as a result of the vertical displacement of sediment as a result of the heaving and settling associated with the freeze thaw cycle. This is followed by the process of sorting as the sediment settles at the surface where the forces of wind, water and gravity act upon it. The formation of patterned ground results in intense soil disturbance. In an alpine setting, such as the Hawke Hill site, this disturbance precludes the invasion of all plants, except the hardiest species that are well suited to a severe climate.

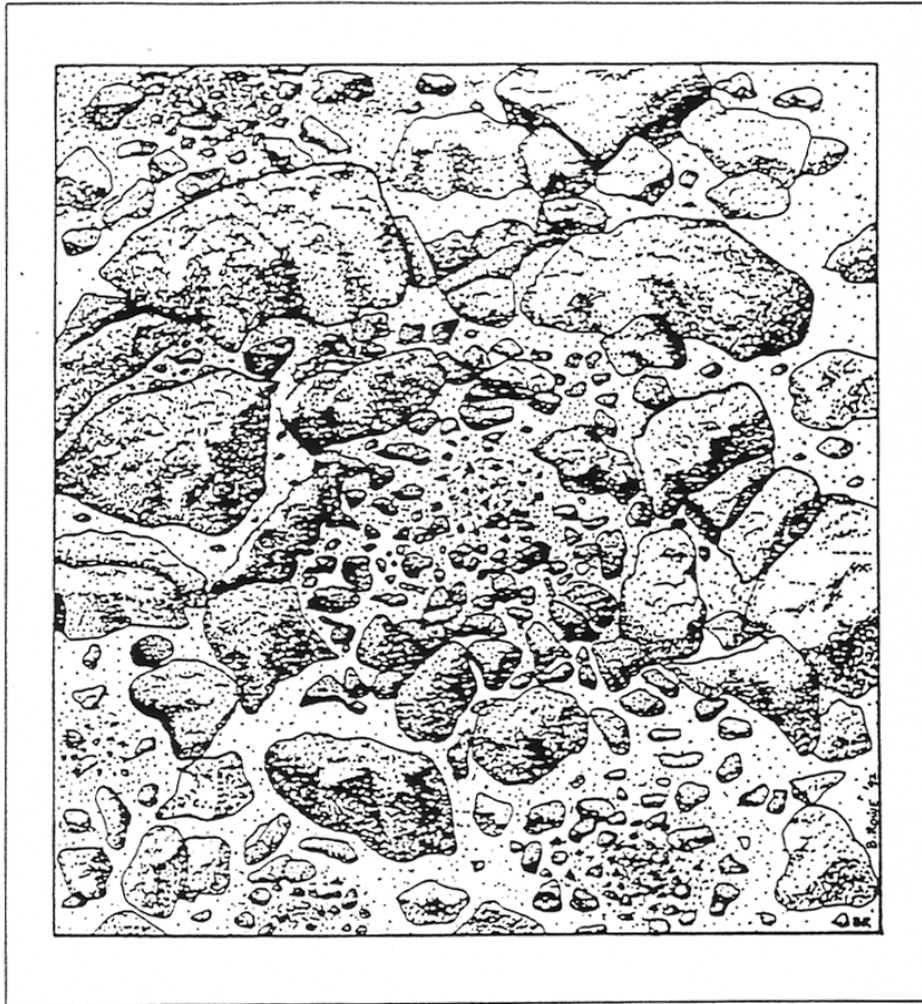


Figure 2. An example of patterned ground at the Hawke Hill site. Note that the surface sediment is sorted from coarser sediment at the perimeter to finer sediment at the center.

### **1.3 Climate**

The unique nature of the climate of the Hawke Hills is attributed to the interplay of a number of environmental factors, which tend to be mutually reinforcing and contribute to an overall cool and humid microclimate. On a regional scale, the Hawke Hills experience the modified maritime climate typical of the Avalon Peninsula. Although many of the associated low pressure systems originate over continental Canada and the United States, they travel east in winter and southeast in summer, crossing a fairly extensive tract of ocean before reaching the Avalon. In addition, the warm Gulf Stream and cold Labrador Current, which meet off the east coast of the island, exert a strong maritime influence. On a local scale, the microclimatic factors create a situation amenable to the development of arctic/alpine vegetation, as well as patterned ground, a feature common to periglacial environments. These microclimatic factors include: an increased number of freeze-thaw cycles, reduced temperatures, high winds which tend to be constant both in duration and direction, reduced snow cover coupled with an incomplete cover of vegetation along exposed summits, plentiful precipitation, frequent spring and summertime fog and relatively high incidence of cloud cover. The mean annual temperature for the Hawke Hill site has been calculated to be approximately 4° C. Annual precipitation exceeds 1975 mm. Snow is present from December to April and often in early May.

### **1.4 Fauna**

Due to the small size of the Hawke Hill Reserve, the mammalian presence cannot be considered residential. However, several species may be found in the area. Moose (*Alces alces*), red fox (*Vulpes vulpes*), lynx (*Lynx canadensis*), shorttail weasel (*Mustela erminea*), mink (*M. vison*) and red squirrel (*Tamiasciurus hudsonicus*) may be encountered, depending on the time of the year.

The absence of significant tree cover limits avifaunal nesting habitat. Ground or krumholtz nesters may nest in the Reserve. The Reserve probably contains willow ptarmigan (*Lagopus lagopus*) as the Avalon Region has a significant density (annual mean density = 3.0 birds/km) and the *Empetrum* association provides suitable habitat.

## **1.5 Flora**

The Avalon Peninsula can be divided into four distinct eco-regions (refer to Figure 3) based on the distribution of plant associations and other floristic, ecological and morphological characteristics (Meades, 1973). The Hawke Hill site is representative of the Alpine Heath eco-region. This eco-region includes the interior plateau of the Avalon Peninsula extending from the Hawke Hill Range southward to the headwaters of Chance Cove and Biscay Bay Rivers. The highest summits throughout the isthmus of the Avalon are also included in this eco-region. The altitude of the eco-region is atypical for alpine vegetation varying from 150-300m, and is beyond the limit of productive forests on the Avalon.



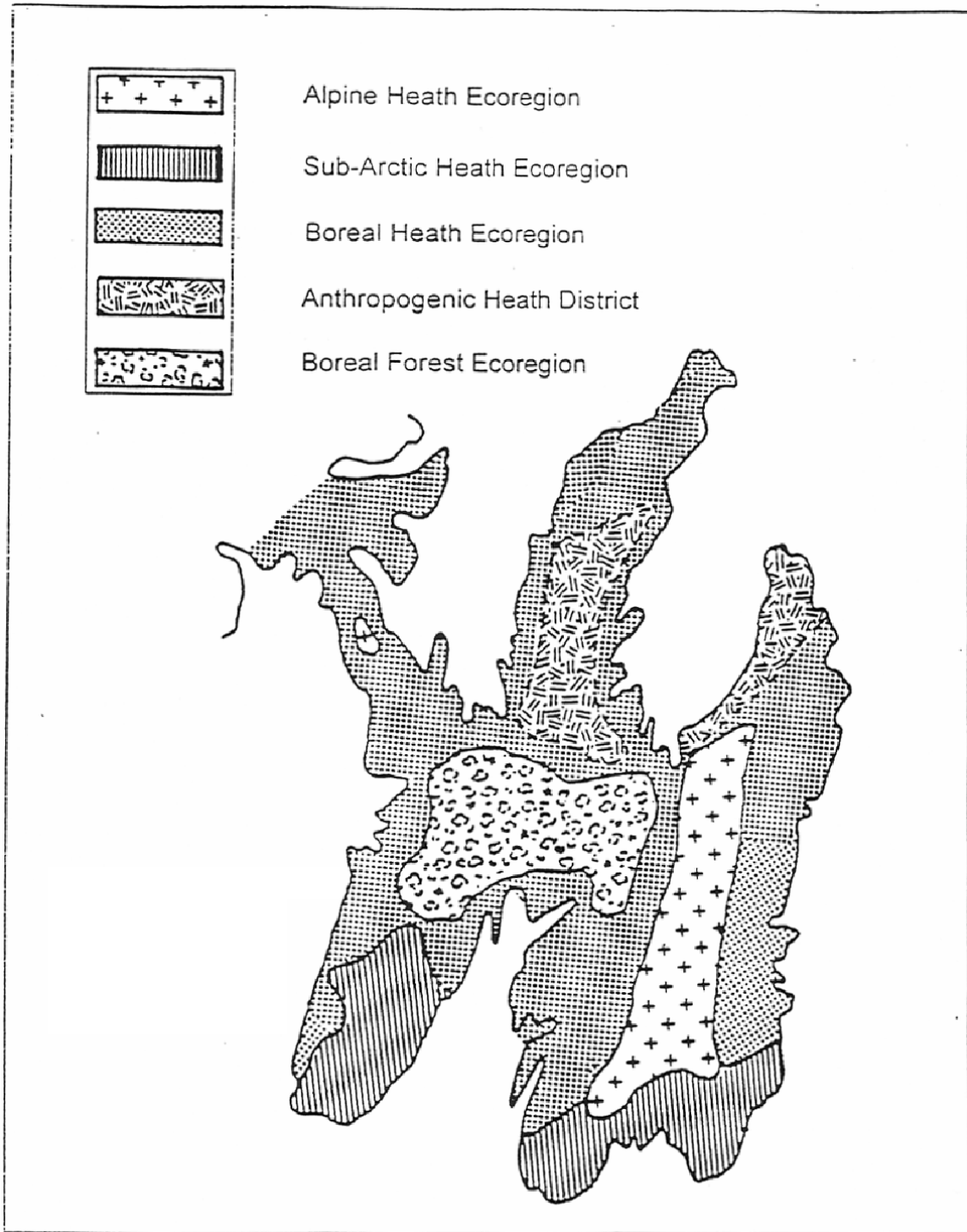


Figure 3. Eco-regions of the Avalon Peninsula (Meades, 1973).

Where coniferous trees occur they are in a depressed growth form, (krumholtz or tuckamoor). Fir, *Abies balsamea*, only occurs in the form *hudsonia* and spruce, *Picea mariana*, in the form *empetroides*. The fir is restricted to tuckamoor, whereas, spruce grows in cushions rarely exceeding 10 cm in height. Larch, *Larix Laricina*, and *Alnus crispa* are also common in this ecoregion. The species are considered indicative of the tree line in Newfoundland. The Alpine Heath Ecoregion is dominated by the *Diapensia - Arctostaphyletum alpinae* association, however, other associations are prominent in the landscape.

Arctic-alpine species, which are for the most part circumboreal and arctic-alpine in distribution, characterize the Alpine Heath Ecoregion. These species are considered rare in eastern Newfoundland but are common at the Hawke Hill site. These species include: *Loiseleuria procumbens*, *Diapensia lapponica*, *Juncus trifidus*, *Lycopodium selago*, *Arctostaphylos alpina*, *Empetrum easmesii*, *Cetraria nivalis* and *Cetraria cucullata*.

The adaption of the Hawke Hill plant community to severe climatic conditions is illustrated by the cushion forming discontinuous vegetation mats occurring there. On sites experiencing high wind velocity, a broken carpet of *Diapensia lapponica*, *Loiseleuria procumbens* and *Arctostaphylos alpina* is surrounded by mineral soil, its humus layer has been removed through wind and water erosion and soil-frost disturbance. In this moranic debris the tussock forming species, primarily *Calamagrostis pickeringii*, *Deschampsia flexuosa* and *Juncus trifidus*, are recolonizing the bare soil. Other species, not unique to this association but which play an important role in development of the cushion-like vegetation mats are: *Empetrum nigrum*, *Vaccinium vitis-idaea* and *Rhacomitrium lanuginosum*. The only species occurring above the carpet are grasses, which can complete the above ground portion of their life cycle during the summer. Ericaceous

shrubs have a reduced vitality. Wind-hardy lichens such as *Cetraria nivalis*, *Platismatia glauca*, *Cetraria cucullata*, *Cladonia boryi* and *Sphaeophorus globosus* are part of this association. The presence of *Larix laricina var depressa*, *Picea mariana f. empetroides* bear testimony to constant intensive winds that often reach 160 km/h on Hawke Hill.

## **1.6 Need For Protection**

Although the land surface of eastern Newfoundland is covered by about 30% barren vegetation, only a very small proportion of these barrens are climatic, undergoing primary succession. Such barrens are more common in the mountainous areas of western and northern Newfoundland. Most barren sites on the Avalon Peninsula originally supported forests but were subsequently devastated by fires that accompanied the early European settlers and the railway. Today, the need to protect this alpine barren site is illustrated by the destruction of a similar site, just north of the Reserve. This other site was identified in the early 1970's, under the International Biological Program and was subsequently destroyed by the construction of a microwave network and associated maintenance roads.

The accessibility of the Hawke Hill site facilitates research and education, however, easy access also increases the vulnerability of the site. Over a period of hundreds of years, under harsh climatic conditions, these arctic alpine species have gained a foothold. Unfortunately, all-terrain vehicle traffic is heavy in the area and could, in a very short time, destroy the integrity of the site. The expansion of existing microwave facilities could also pose a significant threat.

## 2.0 MANAGEMENT POLICIES

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### 2.1 *Introduction*

Ecological reserves are established under the **Wilderness and Ecological Reserves Act (1980)** for the preservation of areas in the province which contain unique or representative ecosystems or natural phenomena. The Hawke Hill Reserve contains one of the best representative areas of Alpine Barrens in the province. In addition to being a significant alpine flora site, the Reserve is an excellent example of the Alpine Heath Ecoregion.

### 2.2 *Management Goals*

The Hawke Hill Ecological Reserve is established to:

- (a) preserve the habitat and existing specimens of alpine heath flora as examples of the most easterly alpine barrens in North America;
- (b) protect a representative portion of the Alpine Heath ecoregion;
- (c) protect a landscape that was affected by the Late Wisconsin glaciation;
- (d) provide educational opportunities for the general public to share in an interesting feature of the natural history of the province;
- (e) provide opportunities for scientific research and monitoring;

### 2.3 *Management Policies*

Resource management at the Hawke Hill Ecological Reserve will emphasize the preservation of the flora and geological resources, while at the same time provide opportunities for public education and scientific research.

The following management policies apply:

- (a) use of the site for educational purposes will be permitted. Students from local and other institutions will be permitted to visit the Reserve for supervised educational purposes;
- (b) scientific research will be permitted when it does not conflict with the prime objective of site protection. The collection of plant and other specimens will be controlled by a permit system. Results of such research will be forwarded to the managing agency;
- (c) the introduction of exotic species or the extermination of native species is strictly prohibited;
- (d) since this habitat is very susceptible to fire, strict measures for the prevention and control of fire may be required.

## **2.4 *Implementation Guidelines***

In addition to the requirements of the **Wilderness and Ecological Reserves Act (1980)**, which applies to all ecological reserves, the following statements are intended to serve as a guide to users and managers of the Hawke Hill Ecological Reserve:

- (a) **Reserve Management**
  - (i) The managing agency of the Reserve is Parks and Natural Areas Division, Department of Environment and Conservation;
  - (ii) The boundaries of the reserve will be clearly identified by signs placed along the perimeter;
  - (iii) Routine patrols will be conducted by the managing agency and/or other designated government officials;

- (iv) Priority will be given to undertaking a botanical inventory of the reserve aimed at providing a systematic checklist of the flora for scientific monitoring purposes.
- (v) For the purposes of monitoring long-term environmental quality of the reserve it may be necessary to establish permanent sample plots within the reserve. Permanent plots should be measured at the time the reserve is established and every five years thereafter.

**(b) Scientific Research**

Providing areas for long-term scientific research is one of the main reasons for creating and managing the province's ecological reserves. It is important, therefore, that research be carried out in such a way that the scientific value of the reserves is not destroyed or diminished for future investigators; accordingly, persons requesting to conduct research within the Hawke Hill Ecological Reserve will require a permit from the Parks and Natural Areas Division, Department of Environment and Conservation.

Application for permits should provide a detailed description, including the objectives of the research proposed, methodologies and the time frame involved.

The following conditions will apply to each permit issued:

- (i) All published material related to research done at the site will acknowledge the existence of the reserve, permission given by Parks and Natural Areas Division, and the requirements made of the researcher;
- (ii) A report of the results of each research project will be filed with Parks and

Natural Areas Division, Department of Environment and Conservation. A copy of all scientific papers published and unpublished, will be forwarded to Parks and Natural Areas Division upon completion.

**(c) Educational Use**

The site may be used for educational purposes providing that such use does not damage the scientific value of the reserve. Permits will be required for institutions, individuals and groups wishing to utilize the area for educational use. Such permits can be obtained from the Parks and Natural Areas Division, Department of Environment and Conservation.

***APPENDIX I - Selected References***

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SELECTED REFERENCES

MacPherson, J.B. 1982. Postglacial Vegetational History of the Eastern Avalon Peninsula, Newfoundland; and Holocene Climatic Change Along the Eastern Canadian Seaboard. *Geographic Physique et Quatemaire*, Vol. 36, p.175-196.

Meades, W.J. 1973. A Phytosociological Classification of the Avalon Peninsula Heath, Newfoundland. M.Sc Thesis, Memorial University of Newfoundland, St. John's, NF. 249 p.



## **APPENDIX II- Reserve Order and Regulations**

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### RESERVE ORDER

*Hawke Hill Ecological Reserve Order*  
under the  
*Wilderness and Ecological Reserves Act:*  
(O.C. 96-199)

Under the authority of subsection 18(1) of the *Wilderness and Ecological Reserves Act* and the *Subordinate Legislation Revision and Consolidation Act*., the Lieutenant-Governor in Council makes the following Order.

### **ORDER**

#### *Analysis*

Section:

- I. Short title
2. Area included
3. Outline

Section:

4. Repeal
- Schedule A
- Schedule B

Short title	1. This Order may be cited as the <i>Hawke Hill Ecological Reserve Order</i> .	202/92 s1
Area included	2. The area included in the Hawke Hill Ecological Reserve is as set out in Schedule A.	202/92 s2
Outline	3. An outline of the Hawke Hill Ecological Reserve Management Plan is as set out in Schedule B.	202/92 s3
Repeal	4. The Notice re: Establishment of an Ecological Reserve. Hawke Hill. Avalon Peninsula. Newfoundland Regulation 162/90. the Hawke Hill. Avalon Peninsula Provisional Ecological Reserve Order. Newfoundland Regulation 163/90. and the Hawke Hill Ecological Reserve Order. 1992. Newfoundland Regulation 202/92, are repealed.	

## Schedule A

All that piece or parcel of land situate and being south of the Trans Canada Highway in the vicinity of Holyrood in the province. abutted and bounded as follows, that is to say:

Beginning at a point, that point having co-ordinates of north 5.242.964 metres and east 332.856 metres:

Then from the point of beginning and running in a straight line in a general southwesterly direction for a distance of 1.234 metres. more or less, to a point having co-ordinates of north 5.241.815 metres and east 338,405 metres:

Then turning and running in a straight line in a general southeasterly direction for a distance of 1.170 metres. more or less, to a point having co-ordinates of north 5.241.608 metres and east 339.557 metres:

Then turning and running in a straight line in a general northerly direction for a distance of 1.219 metres. more or less, to a point having co-ordinates of north 5.242.796 metres and east 339.831 metres:

Then turning and running in a straight line in a general westerly direction for a distance of 989 metres. more or less, to the point of beginning;

Containing in all an area of 131 hectares. more or less.

All bearings and co-ordinates are referred to Zone 22 of the Universal Transverse Mercator Projection.

202/92 Sch A

## Schedule B

### **Outline of Hawke Hill Ecological Reserve Management Plan**

The area known as Hawke Hill Ecological Reserve on the Avalon Peninsula is established as an ecological reserve to preserve the best example of arctic/alpine vegetation east of the Long Range Mountains and a representative portion of the Alpine Heath Ecoregion for scientific study and educational purposes. To accomplish this there will be no removal of plants or other material from the site except under specific permit. and there will be no development within the reserve. Scientific research at the size will be encouraged. and educational use of the reserve will be permitted where it does not conflict with the general objectives of preservation and scientific research.

RESERVE REGULATIONS

*Botanical Ecological Reserve Regulations*  
under the  
*Wilderness and Ecological Reserves Act*  
(O.C. 97-247)

*(Filed May 21, 1997)*

Under the authority of sections 25 and 29 of the *Wilderness and Ecological Reserves Act*, the Lieutenant-Governor in Council makes the following regulations.

Dated at St. John’s, May 13, 1997.

John Cummings  
Deputy Clerk of the Executive Council

REGULATIONS

*Analysis*

Section:

Section:

- |                        |                               |
|------------------------|-------------------------------|
| 1. Short title         | 6. Exception for research     |
| 2. Definitions         | 7. Hunting and fishing        |
| 3. Restrictions        | 8. Permit required            |
| 4. Exception           | 9. Application of regulations |
| 5. Research in reserve | Schedule                      |

Short title      **1.** These regulations may be cited as the *Botanical Ecological Reserve Regulations*.

Definitions      **2.** In these regulations

- (a) “Act” means the *Wilderness and Ecological Reserves Act*;
- (b) “managing agency” means the Parks and Natural Areas Division of the Department of Tourism, Culture and Recreation;
- (c) “management plan” means the management plan for a declared botanical ecological reserve on file with the managing agency;

- (d) “permit” means a permit issued and valid under these regulations;
- (e) “personal water craft” includes jet-skis, sea-doods, wave-runners and the like but excludes ordinary motorized boats, kayaks and canoes;
- (f) “reserve” means a botanical ecological reserve set aside under the Act and listed in the Schedule;
- (g) ‘structure’ means a man-made object intended to be permanent or semi-permanent in nature and includes, but is not limited to, buildings, houses, cottages, cabins, wharves, docks, boathouses, slipways, trailers, mobile homes, tents, tent platforms, and recreational vehicles used for any purpose but does not include semi-permanent blinds and signs erected under the authority of the management plan; and
- (h) “wildlife” means an animal or plant.

Resections

3. Within a reserve, a person shall not

- (a) remove or dislocate a botanical specimen except for scientific study and this only when the researcher is the holder of a valid permit;
- (b) pollute or obstruct a stream or other body of water or dispose of any garbage;
- (c) build or erect or cause to have built or erected any structure;
- (d) destroy, damage, remove, disturb, or handle the home, den, or nest of wildlife;
- (e) destroy, damage, remove, disturb, or handle-an egg of any wild bird;
- (f) destroy, damage and remove any wildlife, fossil or other natural object;
- (g) destroy, damage, or remove a sign or other government property;
- (h) remove sand, stone, or gravel;
- (i) prospect, claim stake, mine or quarry;
- (j) use, operate or be in possession of a motor car, motor truck, four-wheel drive vehicle, all-terrain vehicle, snowmobile, personal water craft or other motorized conveyance;

- (k) land an aircraft;
- (l) operate a commercial establishment or commercial enterprise within the reserve, except guiding, touring and outfitting;
- (m) display, post or broadcast an advertisement;
- (n) herd or graze animals within a reserve;
- (o) light a fire; and
- (p) camp.

Exception	<b>4.</b> A person engaged in the administration or management of a reserve in the normal course of his or her duties is exempt from paragraphs 3(a), (d), (e), (g), (k) and (m).
Research in reserve	<b>5.</b> Scientific research within a reserve shall require a permit and those permits may be obtained from the managing agency on submission of a written request outlining the research project. and subject to the terms and conditions that the managing agency may determine.
Exception for research	<b>6.</b> A person engaged in scientific study which is approved by the managing agency and for which a permit has been issued under section 5 may be exempted from paragraphs 3(a),(c), (d), (e) and (g).
Hunting and fishing	<b>7.</b> All hunting and fishing within the West Brook and Watts Point Reserves is allowed in accordance with permits or licenses issued under the <i>Wildlife Act</i> , the <i>Migratory Birds Convention Act (Canada)</i> or the <i>Fisheries Act (Canada)</i> .
Permit required	<b>8.</b> (1) A person engaged in a touring, guiding or outfitting enterprise shall obtain a permit for the enterprise from the managing agency.  (2) Applications for a permit shall provide a full description of the enterprise planned.
Application of	<b>9.</b> These regulations shall apply to the botanical ecological reserves regulations listed in the Schedule, except to the extent that they have been modified by the Order declaring a given botanical ecological reserve in effect.

### Schedule

1. Hawke Hill Ecological Reserve.