Chapter 3: Methods

3-1 Introduction

Field work was undertaken between June and August of 1998. The main goal of the fieldwork was to assess the major ecological themes of the Shelburne Barrens, and to determine the potential for mining disturbance. The size of the study area, as well as time and resource limitations, made a random ground survey impractical. In order to get a more comprehensive understanding of the area and its vegetation, a combined airphoto analysis and ground survey technique was used. This method allowed for the area to be analyzed on both a quantitative and qualitative basis, for vegetation cover, hydrology, and landscape features.

3-2 Ecosystem analysis

3-2-1 Airphoto Analysis

Analysis of aerial photographs (airphotos) began prior to beginning field work. Initially, an infrared photograph of scale 1:250,000 was used to divide the area up into regions, based on vegetation and landscape features. The boundaries of the region were delineated based on significant changes in colour and texture of the image, representing changes in vegetation cover and landscape.

Airphotos of 1:10,000 scale were then used in order to further define the boundaries of the regions. The airphotos had been taken in 1988, the most recent photos for the area. Using stereopair analysis, each of the five regions was then assessed for vegetation and landscape features. Vegetation was identified with the help of Art Lynds, a Department of Natural Resources Employee with the Parks Division, and using Hershey and Befort's *Aerial Photo Guide to New England Forest Cover Types* (1993).

At the completion of this portion of the study, 10 areas were chosen for ground truthing of the airphoto analysis. These areas were selected from the airphotos on the basis of representivity and accessibility, as shown in figure 3-1.

3-2-2 Surveying of Selected Sites

The selected sites were studied in detail July 12th, 1998 and August 15th, 1998. Each of the 10 selected sites was studied for its vegetation, hydrology, and landscape features, using linear transects and 10m by 10m detailed plots. Sections of transect were 50m in length, with one 10mx10m plot on each. The plot was positioned non-randomly on the transect as judged to give a representative description of the transect. The number of transect sections done at a site was determined by the variability of the site, and the ability to capture all of this variability within a given section of transect. If multiple sections were required in order to capture the variability of a site, sections were placed end-to-end. One or more slide or print photographs were taken along each transect section. Photographs of representative landscape, transects and ground cover are located in Appendix IV.

Transects were used to collect the following information about a given site:

1) Description of the landscape
2) Moisture level in the soil or substrate
3) Abundance of surface boulders
4) Slope and aspect of the transect
5) Plant communities and their distribution along the transect

Figure 3-1: Aerial photograph at the edge of the Flintstone Barren system, showing an accessible transect site.

1) Major tree species

Plots were used to gather more detailed information on the plant communities. A plot size of 10mx10m was chosen for two reasons:

1) Large enough to capture presence or absence of trees, and to give some indication of tree density.

2) Small enough to gather reliable data on the abundance of shrub and herbaceous plant species.

Within each of these plots, information on the plant community was obtained using a estimates of abundance on a four point scale. The purpose of this technique was to obtain a qualitative description of the site, which could be used in describing the regions and compared against the airphotos for verification of interpretation. Plants were identified *in situ* where possible, and where this was not possible, specimens were collected for later identification. A slide or print photograph was taken of the groundcover in each plot. Each species present was rated for abundance on a scale of 1-4.

4—Abundant:
3—Common:
2—Scattered:
1—Uncommon:

At each site, any unique or unusual features were also recorded.

A 3 hour helicopter ride was taken over the study area on September 25th, 1998, in order to gain a better understanding of the ecosystem regions and the landscape and vegetation present in each. Forty-eight photographs were taken during this trip. All of the photographs taken over the course of the summer were used for later reference.

3-2-3 Soil Moisture

The moisture level in the substrate was determined by gathering a handful of the soil and squeezing it. The moisture regime was then determined to be one of four levels:

1—Dry; none or very little moisture felt.

2—Moist; moisture was apparent, but none was released upon squeezing.

3—Wet; excess

S—Seepage; moisture was present on the surface of the soil, before gathering.

If a sample of soil was intermediate between two moisture levels, it was given a value between the two levels, for example 2/3.

3-2-4 Plant Communities

Characteristic barren land plant communities were determined for moisture regimes of 1-3. Moisture levels of S were extremely infrequent, and so this moisture regime was not included in this part of the study. Plots were grouped according to moisture level. Within each moisture regime, total abundance values were summed for each plant species using the previously determined abundances (see 3-2-2). To normalize the abundance values to the number of plots in each moisture regime, the summed values were then divided by the maximum possible abundance value, calculated as the maximum abundance value of 4 multiplied by the number of plots in the moisture regime.

Typical plant communities consisting of "characteristic" and "associated" species were then calculated for each barren land moisture regime. "Characteristic" species within each plant community were chosen as those which had abundances greater or equal to 0.500. "Associated" species in each of these communities were chosen as those with abundance values of 0.200-0.499. Species with abundances of <0.200 were not included as typical members of the plant community, as they were considered too rare to be significant indicators.

Because it was not feasible to use a random plot design, the results are descriptive as opposed to statistically significant. For this reason, statistical tests of the data are inappropriate.

Information obtained in the field was used later to verify plant communities initially determined in the original airphoto analysis, using the assumption that a given plant community corresponds to a certain colour, texture and relief on the 1:10,000 airphotos, as determined by stereopair analysis.

3-2-5 Flora and Fauna

Species lists are useful in determining the biodiversity in the study area, as well as the degree to which the study area is representative of Nova Scotian ecosystems. By comparing the descriptions of mainland Nova Scotia ecosystems found in the *Natural History of Nova Scotia* (Davis and Brown, 1996), with the airphoto and surveying information I collected. a list of the ecosystems within the Shelburne Barrens was made. Creation of complete species lists for these ecosystems was not possible, due to time and resource constraints. The floral list was compiled on an ongoing basis throughout the summer, and it is not proposed that it is exhaustive. Species were added to the list as they were observed during surveying.

A one-day bird survey was conducted on June 18th, 1998, with the help of Leslie Fraser, an ornithology student at Dalhousie University. The survey was conducted to gather some general information birds present in the area, and is not exhaustive. In order to obtain a representative species list, the surveying was done in several habitats in the study area. The habitats were chosen on the basis of representivity and accessibility: a softwood forest of early succession, a mixed-wood forest of medium succession, an old hemlock forest, a rocky lakeshore, a heath barren, a beach, and a bog. The survey method involved finding a suitable concealed location, and waiting quietly for 10 minutes. The species of birds heard during this period were recorded on paper, as well as on tape for later referral. This process was undertaken in each of the seven habitat types. Other animal species were added to the species list throughout the summer as they were observed, either directly or through tracks or scat.

For field identification, the following guides were used:

Animal Signatures, by Claridge and Milligan, 1992

The Audubon Society Field Guide to North American Wildflowers, by Neiring, 1979

Amphibians and Reptiles of Nova Scotia, by Gilhen, 1984

A Field Guide to Trees and Shrubs, by Petrides, 1972

Roland's Flora of Nova Scotia, vol. 1-2, by Roland, and Zinke, 1998

Shrubs of Newfoundland, by Ryan, 1974

3-2-6 Water Samples

Water samples were obtained from each of the eight lakes in IFPPR and Beaver Creek Lake, between July 12th and July 18th, 1998 for the purpose of collecting background information on the general water chemistry of these lakes.

The water samples were collected in 200mL Nalgene sampling bottles, washed in phosphorous-free laboratory detergent and rinsed three times in distilled water. The samples were collected from the centre of the lakes. The bottles and caps were each rinsed three times in the lake prior to filling. These samples were kept at room temperature until they could be examined on July 21st. Each sample was examined in the laboratory for pH, conductivity (microseimens/cm), and colour (Hazen units).

3-2-7 Unique Features and Outstanding Values

During the surveying of the study area, outstanding ecological and biological values were recorded. These areas were characterized by the presence of endangered species, rare habitats, or other unique features.

3-2-8 Representative Transects

To select representative transects, the airphotos were divided among the five systems, and one representative airphoto was chosen for each of these areas. Transect sites were chosen for representivity of the landscape, hydrology, and vegetation of the region based on airphoto analysis and preliminary field surveying. On each selected airphoto, one line equivalent to 500m was drawn in a representative region. Stereopair analysis was then used to draw cross-sections of these 500m transects (fig. 3-1) These transects were then surveyed in detail.

3-2-9 Current and Potential Effects of Development

Current effects of development were observed both in the field and by the airphoto analysis. Affected areas were identified as those in which ecological conversion could be attributed to anthropogenic causes. The main markers for this conversion were removal of vegetation in the production of pits, trails, and highway, and the introduction of exotic or invasive species.

Identification of potential effects of development focused on mining disturbance, as this appeared to pose the greatest new threat the area at the time of the study. The sites of potential impact for mining in the Flintstone Rock region were determined from the overlay of watersheds, the mineral claim area, and the relevant geological strata.

3-2-10 Map Production through GIS

Five maps were created using ArcView Geographic Information System (GIS). A 1:50,000 topographic map was used as the base layer. Other layers were added from digital information available from the Nova Scotia Department of Natural Resources (NSDNR) and through digitizing paper maps.

Paper maps used: Watershed data - 1:50,000 map sheets: 21-A-4-A, 21-A-3-D, 20-P-13-C, 20-P-14-B. NSDNR (1996).

Mineral claim map - 1:31,680 topographic map sheet 21-A-4-A. NS Department.of Mines, Halifax (1998).

Geology data - 1:50,000 map sheet 21-A-4 and 20-P-13. Ham and MacDonald (1994). NSDNR.