Permanent Sample Plot Project Report
Gwich'in Land Administration
Summer 2002

1.0 Introduction

1.1 Project

The need for immediate long-term environment monitoring is realized as development and disturbances is increasing the Northwest Territories (NWT) and particularly in the Mackenzie River Valley. The use of permanent sampling plots (PSP) allows for the determination of growth and impact in the environment. These plots will give a base-line so that we can better understand changes in the future from localized development to global changes such as climate change. The PSPs will monitor vegetation changes, forest disturbances, growth rates, changes to wildlife ranges, climate change and contamination to the soil. The health of the environment is important and the PSP project will allow for knowledgeable management. The more we understand the growth and change in the environment the better prepared we are to manage our resources and development. The Gwich'in Settlement Region (GSR) has rich resources and this project is a step towards ensuring these resources are sustainable and utilized. Gwich'in beneficiaries are involved in gathering this information. The training of Environmental Monitors through the hands on work establishing PSPs allows the Gwich'in to gain the knowledge and confidence to work in industry.

1.2 The Area

The area of the study is the Gwich'in Settlement Region (GSR) in the western arctic. This includes the lower Mackenzie River, Arctic Red River watershed and portions of the Peel River watershed. This is a large, environmentally diverse area. Most of the area is accessible only by water or air.

Plot 70-Areal view of plot location

1.3 Partnership

In order to succeed at the goals there was a partnership formed between the Gwich'in Land Administration and the Department of Resources, Wildlife, and Economic Development Forestry Branch (RWED). This partnership allowed for cost-sharing. RWED provided an experienced Forestry Technician who insured proper inventory techniques and informally trained the monitors in the field.

Both the Gwich'in Land Administration (GLA) and RWED have a commitment to the PSP project. In the NWT RWED is the government department responsible for the conduction of the inventory for the national database. The partnership between RWED and the GLA allows for a faster and more extensive establishment of the sample plot grid.

2.0 Methods

2.1 National Forestry Inventory Model

The PSP of this project follow the National Forestry Inventory Model (2000). The 20km X 20km grid of sampling points that was set by the National Forestry nventory (NFI) was used. This is a random grid. At each point a plot is set up. This plot consists of two circular plots, two line transects, four mini-plots and a soil pit. The larger circular plot, used for measuring large trees and visual assessments, has a radius of 11.28 m. The small circular plot, used for measuring smaller trees, has a radius of 3.99. The small tree plot falls within the larger plot. The line transects, with a length of 24 m, are used for measuring coarse woody debris. The four mini-plots are used for measuring small plants and seedlings and have a radius of 0.56m.The soil pit is located outside of the largest circular plot and is used to obtain soil characteristics. This model was followed in each of the Gwich'in PSPs. There was several additions in plots done by the Gwich'in. The large circular plot was also used to determine wildlife and land use. The soil pit was also used for testing soil pH and permafrost depth. Soil samples were taken from several points at the edge of the plot.

Plot 113-Soil Pit showing pH tester and thermometer

2.2 Plot Execution

Because of the remoteness of the plots all but one were accessed by helicopter. A team completed one to three plots each day (see appendix for dates). Each team consisted of three people, a RWED Forestry Technician, a Biology Student and an Environmental monitor.

Plot 115- Helicopter photographed from plot edge

3.0 Results and Discussion

3.1 General Site

The assessment plot, with a radius of 11.28 m, was used to get a general impression of site geography and cover. The majority of the plots as seen in figure 1 are treed plots.

Plot 99-Enviromental Monitor and Biology Student collecting tree cores

3.2 Stand Age

The Average, high and low of the trees aged is found in figure 2. Plot 68 had only one tree sampled so it has no age variation. The aging of trees is important for determining growth rates and regeneration.

3.3 Vegetation Classification

The plots were classified using Natural Resources Canada's Field Guide to Ecosites of Northern Alberta (Beckingham et al., 1996) and Field Guide to Ecosites of West-Central Alberta (Beckingham and Archibald, 1996). Ecosite classification is based on the tree canopy, vegetation cover, soil types and water drainage of the site. With in each ecosite there is a number of plant community variants. Table 1 shows the classification of the ecosites and plant community types of the plots inventory.

Table 1 Plot Vegetation Classification

PLOT	ECOSITE	PLANT COMMUNITY
34	Labador tea-subhygic Sb	Sb-Pj/black spruce-labador tea/feather moss
142	Labador tea-subhygic Sb	Sb-Pj/black spruce-labador tea/feather moss
108	Shrubby bog	Black Spruce-Northern labador tea/cloudberry/peat moss
109	Shrubby poor fen	Dwarf birch-willow/sedge/peat moos
100	Shrubby poor fen	Labador tea-Dwarf birch/cloudberry/sedge/peat moss
113	Shrubby poor fen	Labador tea-Dwarf birch/cloudberry/sedge/peat moss
25	Shrubby rich fen	dwarf birch/sedge/golden moss
32	Shrubby rich fen	

Willow/sedge/brown moss

27
Shrubby rich fen
Willow-dwarf birch/sedge/golden moss

137
Shrubby rich fen
Willow-dwarf birch/sedge/golden moss

115
Shrubby ruch fen
Willow-dwarf birch/sedge/golden moss

42
Treed fen
Sb/willow/sedge/golden moss

69
Treed fen
Sb/willow/sedge/golden moss

68
Treed fen
sb-Se/willow/sedge/peat moss

70
Treed fen
Sb-Se/Willow-dwarf birch/sedge/golden moss

101
Treed rich fen
Lt/Dwarg birch/ Sedge/ Golden moss

99
Treed rich fen
Sb-Lt/dwarf birch/sedge/golden moss

Once an area is classified there are interpretations that can be applied to the area. The ecosite handbooks outline these interpretations which includes potential limitations and opportunities for the ecosite. Specific interpretations of interest are windthrow hazard, compaction hazard, rutting hazard and drought limitations. For each of the ecosites surveyed these interpretation are listed in table 2.

Table 2. Ecosite Interpretation

ECOSITE	Windthrow	Compaction	Rutting	Drought	Hazard	Hazard	Hazard	Limitations
Labrador tea-subhygic Sb	M-H	H	H	L				
Shrubby bog	H	L	H	L				
Shrubby poor fen	H	L	H	L				
Shrubby rich fen	H	L-H	H	L				
Treed fen	H	L	H	L				
Treed rich fen	H	L	H					

L

3.4 Wildlife and Land Use

There was no sign of human use in any of the plots. There were many signs of wildlife use. These include birds such as cranes (Grus spp.), loons (Gavial spp.), ducks (Anatidae), grey jays (Perisoreus canadensis L), and ravens (Corvus corax L). There was also signs of caribou (Rangifer tarandus), mice (Neotoma spp.) and rabbits (Lepus americanus).

3.5 Soils

The soils sampled fit into the Cryosolic Order which is defined by the Canadian Soil Classification (National Research Council Canada, 1998) as a soil with permafrost within 1 m or 2 m in special conditions. The property of deep organic layer from the slow reaction because of low temperature is apparent (Valentine and Lavkulich, 1978).

Plot 25 Soil Pit showing depth to permafrost.

4.0 Conclusion

The foundation has been laid for an extensive monitoring network in the GSL. This will provide the knowledge for improved management in the future. The establishment of these plots is the start to better understanding the environment and allowing for responsible management. It is encouraged that the plots will continue to be established and monitor training. One goal for the future is to cover the entire GSR. There is more work that can be done with the data also that is hoped to be achieved in the future, such as applying it to use in ALCES. The ALCES computer software will define growth curves and carbon relationships allowing for comparing of changes in forest growth and volume. Once the data is obtain through establishing the plots there is a large potential for use.

5.0 Works Cited

Beckingham, J.D., and J.H. Archibald. Field Guide to Ecosites of Northern Alberta. Canada Forest Service, 1996.

Beckingham, J.D., I.G.W Corns and J.H. Archibald. Field Guide to Ecosites of West- Central Alberta. Canada Forest Service, 1996.

National Research Council Canada. The Canadian System Soil Classification 3rd ed. Ottawa:NRC Research Press, 1998.

Valentine, K.W.G and L.M. Lavkulich. Soil Landscapes of B.C. British Columbian Ministry of the Environment, 1978.

6.0 Appendix

Plot List for Summer 2002

GSA
NFI
LAT
LONG
DATE COMPLETED

27
770691
N68.29273
W133.28637
02/08/2002

25
770701
N68.32637
W132.35170
30/08/2002

32
777581
N68.15331
W132.30961
30/08/2002

34
777571
N68.11985
W133.23816
27/08/2002

42
784461
N67.98074
W132.26813
29/08/2002

68
798231
N67.66147

W131.27371
26/08/2002

69
798226
N67.64784
W131.73037
26/08/2002

70
798221
N67.63309
W132.18654
26/08/2002

99
811961
N67.21592
W133.90314
23/08/2002

100
811956
N67.19577
W134.35061
23/08/2002

101
811951
N67.17451
W134.79743
23/08/2002

108
818861
N67.11137
W132.06813
24/08/2002

109
818856
N67.09575
W132.51516
24/08/2002

113

818836
N67.02220
W134.29757
20/08/2002

115
825741
N66.93715
W132.02968
24/08/2002

137
860136
N66.04867
W132.27525
27/08/2002

142
867016
N65.87364
W132.23697
27/08/2002