Valued Component – Vegetation (FINAL DRAFT)

STATE OF KNOWLEDGE – WHAT IS HAPPENING?

A very brief overview of the state of knowledge with respect to vegetation in the NWT is presented below. This overview is preliminary and not intended to be exhaustive.

↪ **What are the baseline conditions with respect to vegetation?**

✻ Vegetation in the NWT is composed of taiga-boreal forest species (dominated by black and white spruce and jack pine forest), whereas the northern portion is tundra (above the treeline), with a variety of shrubs and vascular plants.

✻ There are 1107 species; 10 vascular plants in the Northwest Territories, including four species of deciduous trees and six species of coniferous trees. Nine percent (97/ 1107) of the species of vascular plants in the NWT are considered alien ("introduced" or "exotic") (WGGSNS 2006.) The number of exotic species of plants found in the NWT increases every few years. Fourteen percent (154) of NWT plants are rare and may be at risk (WGGSNS 2006.), of these 32 are considered rare in the world (Cannings 2005). There are about 400 species of mosses and 500 species of lichens in the NWT.

✻ Changes in vegetation occur at small, medium and large scales and in varying time frames. Reviews of forest related

10 WGGSSN 2006. as of December 2006. The number of species change with taxonomic revisions and as additional species are recorded with new surveys.

KEY MONITORING INDICATORS

Vegetation cover/abundance	*Habitat quality*
Phenology and growth changes	*Herbivory*
Forest fire regimes	*Distribution/migration*
Presence of contaminants	*Frequency (rare plants)*
Disease and insect outbreaks	***Natural variation***

baseline conditions and general/other baseline conditions appear below.

Forests

✻ Forest fires are the most significant factor of change on a large scale in the boreal forest. Approximately 80 percent of fires in the NWT are started by lightning. Fire regimes are monitored for most fires, thus patterns in frequency, size and intensity of fires can be determined. Over the past 30 years an annual average of about 310 fires has consumed approximately 650,000 hectares in the Northwest Territories. The number of fires and area burned are highly variable from year to year. In 1994 only 105 fires burned, while in 1997 a record of 627 fires burned (consuming over 3 million hectares).

✻ Fire impacts both the natural and social environment. Many herbivores benefit from fire due to new plant growth; however other wildlife species may be negatively affected by fire. Fires occurring close to human settlements may also have negative impacts. Much can be gained by monitoring fire regimes and forest re-growth over the long term. Given the unknown effects of climate change on fire regimes, monitoring is particularly important.

✻ Prescribed burns have been used to study fire regimes and effects in the NWT. Only a few prescribed burns have occurred therefore information gained is preliminary.

✻ Forest insect outbreaks and diseases are, like fires, natural occurrences in the boreal forest. Baseline information on frequency, size and intensity of outbreaks and diseases is available from aerial surveys in the NWT. Spruce budworm is the most serious forest insect pest. Other insects observed at outbreak levels include large extinctions. These impacts are not known and are difficult to monitor as natural variation in plant communities may be large.

aspen tortrix, larch sawfly, aspen serpentine leaf miner, birch leaf skeletonizer, forest tent caterpillar and willow leaf miner.

✻ Forest inventories have served to provide baseline information in some areas of the NWT; however these inventories are limited in size and scale. Monitoring of abundance of vegetation is now being undertaken on larger scales through the relatively recent use of satellite imagery; however this type of monitoring is only beginning.

General/other

✻ Climate change may impact large scale distribution of plant communities, including species migration and substitutions or extinctions. These impacts are not known and are difficult to monitor as natural variation in plant communities may be large.

✻ Important relationships exist between plant communities and wildlife species (particularly herbivores) which need to be monitored over the long term. Effects of herbivores on plant communities, such as selective feeding, stresses due to large population size, and population cycles, are not fully understood. (Some monitoring data does exist, and it is discussed in the respective wildlife VECs).

✻ Climate change may impact plant phenology, such as timing of plant emergence, which in turn could affect herbivore behaviour.

✻ Water regimes such as flooding can affect vegetation, particularly in wetlands or along the river banks.

✻ Knowledge of medicinal plants locations and densities is sparse. Monitoring these species would be useful for cultural reasons.

✻ Monitoring of rare plant locations and densities is important for biodiversity conservation. Current monitoring efforts are largely limited to volunteered information.

✻ Monitoring of changes of exotic plant species, their invasiness and potential for dispersion in the NWT is also important for biodiversity conservation. Current monitoring efforts rely on irregular visits to the NWT by outside botanists. A Risk analysis for invasive alien species with monitoring protocols and associated policies are being developed. Results from these efforts will be available by 2009.

✻ Monitoring of changes in vegetation due to specific small scale land uses, such as a new development or an urban settlement, can provide information on species changes and adaptation. There is very little long-term data available to the public on changes in vegetation community due to various land uses (on any scale).

↪ **Is the abundance and distribution of vegetation changing?**

✻ As a comprehensive medium-scale vegetation inventory for the NWT was performed along a proposed pipeline corridor in the 1970s. A remote sensing based vegetation classification for the forested portion of the NWT was completed in 2004. Preliminary results on how the abundance and distribution of vegetation changed between the 1970s and the late 1990s are available.

↪ **What are the levels and trends of contaminants in vegetation?**

✻ Very little monitoring of contaminants in vegetation has taken place in the NWT. Some work on contaminants in mushroom and fungi was performed in 1999.

RECENT AND CURRENT MONITORING

Ongoing monitoring programs with respect to vegetation in the NWT are found below.

Overall monitoring

✓ NWT species status rank infobase (Government of the Northwest Territories since 2000).

- This infobase monitors the general status of species in the Northwest Territories. It is a significant source of information for assessing future monitoring of vascular plants, mosses and lichens. The infobase is a searchable catalogue of information used to rank the status of species, thereby prioritizing them for further assessment and monitoring. The following biological indicators are used to rank species status: population size, number of occurrences, distribution, trend in population, trend in distribution, threats to population and threats to habitat. The general status ranks is published every 5 years; The most recent report includes a complete list of all vascular plants present in the NWT, with a their general status rank. Associated references are found in the Infobase for each species. (See WGGSNS 2006) As part of this program the location data of vascular plant specimen ever collected in the NWT were obtained from the Canadian Museum of Nature in Ottawa. In collaboration with the Protected Areas Strategy Secretariat, more databases are being repatriated from other Museums to provide baseline information on the location of rare and "may be at risk" vascular plants in the NWT.

✓ Plantwatch NWT (EMAN – Plantwatch Canada beginning in 2001)

- Plantwatch NWT is a volunteer based monitoring program which will track spring flowering of specific species.

✓ International tundra experiment (ITEX) (since 1990) and Canadian Tundra and Taiga Experiment (CANNTEX) (since 1998)

- ITEX is a Man-And-the-Biosphere - Northern Sciences Network initiative. It is one of the most active international field programs in arctic ecology. The performance of plant species and communities on a circumpolar basis is monitored in undisturbed habitats with and without environmental manipulations, to determine responses to climate change. CANNTEX is the Canadian subset of ITEX (the same protocols are

used). The ITEX/ CANTTEX network currently includes 13 research and monitoring locations, one of which is located at Daring Lake, Northwest Territories. Phenological events of eight species of vascular plants are monitored at this site.

✓ West Kitikmeot Slave Study (West Kitikmeot Slave Study Society since 1996) (scheduled to end in 2001)

- WKSS is a trans-boundary program with Nunavut funding scientific and traditional knowledge studies in the Slave Geological Province area to gather baseline information for wildlife species as well as other ecological information such as habitat/vegetation data. See Appendix A for more information on the WKSS.

✓ Habitat/ vegetation classification for the West Kitikmeot Slave Study region (Government of the Northwest Territories since 1997) (scheduled to end in 2001)

- Under the WKSS, maps of vegetation classification using satellite data are being developed (for an area of 64,000km^2). Results can be used researchers studying wildlife, and for assessment and monitoring of proposed developments. Joint habitat classification will take place in cooperation with a traditional knowledge project by the Dogrib Treaty 11 Council.

✓ The habitat of Dogrib Traditional territory: Place names as indicators of bio-geographical knowledge (Dogrib Treaty 11 Council since 1997) (scheduled to end in 2001)

- Under the WKSS, traditional knowledge about habitat in the Slave Geological Province is being collected and mapped. A joint habitat classification map will be produced in combination with satellite imagery collected by Government of the Northwest Territories.

✓ Plant biodiversity monitoring (Nahanni National Park Reserve since 1997)

- Plant diversity, abundance, and physiology are monitored at the Nahanni National Park Reserve EMAN site. Parameters measured include species richness, species height stratification, plant frequency, plant vitality, and successional change. See Appendix A for more information on EMAN.

✓ Vegetation mapping in the Gwich'in Settlement Area (Government of the Northwest Territories and Gwich'in Renewable Resource Board since 1997)

✓ Studies of environmental effects of disturbances in the subarctic (SEEDS) (University of Alberta since 1985)

- The program was established to investigate impacts of various disturbances associated with simulated transport corridors within upland subarctic ecosystems. The research site is 10 km north of Tulita, Northwest Territories. In 1995 a forest fire burned much of the site. Efforts to monitor post-fire ecosystem recovery continued until 2000. The microclimate installations have been removed.

✓ Baseline inventory and protocols for monitoring exotic plant species in the NWT (Government of the Northwest Territories and Invasive Alien Partnership Program – Environment Canada, since 2006).

- A baseline inventory of exotic plant species was performed in 2006. Other aspect of this project will provide tools for communities, industry, and government personnel to monitor exotic plants along roads and near other disturbances. Tools will include maps of known sites, identification tools, standard

definitions and protocols, and data sheets. The project will also results in a risk analysis of invasive alien species in the NWT. Results from this project are expected by 2009.

Forest specific monitoring

✓ Forest production data (Government of the Northwest Territories since 1973)

- A database and summary of the volume of timber harvested by area in the Northwest Territories. Parameters monitored are timber species harvested, product (including saw logs and fuel wood), licenses and permits issued, timber charges and total volume harvested.

✓ Tree biomass and decomposition monitoring (Nahanni National Park Reserve since 1994)

- Standing tree biomass and leaf litter decomposition are measured/monitored at the Nahanni National Park Reserve EMAN site. Monitoring will be conducted at five year intervals. See Appendix A for more information on EMAN.

✓ Forest monitoring plots near Campbell Lake, Northwest Territories (Gwich'in Renewable Resource Board since 1998)

- The Board participates in monitoring changes in timber growth at a forest health monitoring plot (Canadian Forest Service), and vegetation biodiversity at a biodiversity monitoring plot (Smithsonian Institution/Man and the Biosphere Biodiversity Program). The plot is monitored annually.

✓ Forest monitoring plots, Northwest Territories (Canadian Forest Service since 1991)

- Four forest health monitoring plots (Canadian Forest Service) are located in the Northwest Territories. One plot is the Campbell Lake plot (since 1998), mentioned in the previously described monitoring program. The other plots are located north of Fort Liard (since 1997), near Kakisa Lake, and east of Hay River. Plots have been monitored annually however future monitoring will be every 5 years.

✓ Archives of forest fire records (Government of the Northwest Territories since 1991)

- This ongoing database contains monitoring information on all forest fires in the Northwest Territories including size, type, area burned, and climate.

✓ Fire history of the Northwest Territories (Government of the Northwest Territories since 1967)

- Inventories the spatial extent of fires in the Northwest Territories through imagery and mapping (satellite imagery interpretation).

✓ Tibbitt Lake post fire study (Government of the Northwest Territories since 1999)

- This is a multi disciplinary study on the effects of fire on the taiga shield ecosystem, taking place at the Yellowknife Ecological Monitoring and Assessment Network (EMAN) site. Re-growth of vegetation is being monitored in the burnover. There is also a public education aspect to the study in the form of an outdoor field camp for high school students.

✓ Aerial monitoring surveys for insect outbreaks and diseases (Government of the Northwest Territories since 1998) (previously the Canadian Forest Service was responsible)

- Tree damage by insect pests (mainly spruce budworm) is monitored through aerial surveys. Results since 1998 will be available by the end of 2001. A historical record for the southern Northwest Territories is available from the Canadian Forest Service. Since the 1990s surveys have gradually been expanded northward to the Mackenzie Delta.

✓ Small-scale pheromone trap monitoring program for spruce budworm (Government of the Northwest Territories since 1998)

- The program takes place in areas where outbreak levels of spruce budworm are not present.

✓ International boreal experiment (IBEX) (Nahanni National Park Reserve since 1995)

- The physiology and phenology of flowering tree species (trembling aspen) is monitored. Parameters measured include dates of first pollen, flowering, and leaf bud burst. Ice break-up and climate are monitored simultaneously.

✓ Climate change impacts on the productivity and health of aspen (CIPHA) (Canadian Forest Service since 2000)

- This study has 72 plots spread from Manitoba through Saskatchewan, Alberta, and northeastern British Columbia to the Northwest Territories. Three plots are located in the Mackenzie Valley, north of Fort Liard near the Poplar River. This is a collaborative project between the Canadian Forest Service and Environment Canada.

GAPS AND RECOMMENDATIONS FOR MONITORING

A list of monitoring gaps and recommendations for future monitoring under the NWT Cumulative Impact Monitoring Program is found below.

Gaps

➙ Adequate ground truthing for landscape unit classification (lack of local knowledge)

➙ Limited monitoring data on abundance and location of rare plants, medicinal plants, and exotic plants in the NWT

➙ Baseline monitoring of contaminants in vegetation throughout the NWT

➙ Long term monitoring data for permanent forest plots

➙ Incomplete fire history work for the NWT

➙ Limited large scale monitoring of vegetation re-growth following forest fires

Recommendations

➙ Increased monitoring of rare plant, medicinal, and exotic plant locations in the NWT

➙ Promotion of monitoring by volunteers and researchers for programs such as Plantwatch NWT

➙ Increased monitoring under the International Tundra Experiment (ITEX) and International Boreal Experiment (IBEX) programs in the NWT

➙ A comprehensive community-based program to document traditional knowledge about the forest and plant species for the NWT

➙ Expansion of monitoring network of forest health monitoring plots (through Canadian Forest Service) and biodiversity monitoring plots (through Smithsonian Institute/Man and the Biosphere Biodiversity Program)

➙ Increased frequency of monitoring of vegetation re-growth following forest fires

➙ Use of satellite imagery to monitor re-growth of vegetation following forest fires

➙ Ensuring monitoring of spruce budworm and other insect outbreaks continues on a yearly basis

REFERENCES

Relevant monitoring reports, past monitoring programs, research documents, and scientific publications are found below.

Overall

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