HISTORICAL YUKON FORESTRY RESEARCH

1972-1992
Project summaries and priorities

Yukon
Energy, Mines and Resources

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1. Introduction

The record of forestry research in the Yukon dates back to when forestry was managed by the federal Department of Indian and Northern Affairs (DIAND). In 2003, devolution occurred which transferred federal crown forests from DIAND to the hands of the territorial Forest Management Branch (FMB). During the process of devolution, the record of forestry research was also passed over to the FMB, who, in an effort to prioritize the research, reviewed the records.

The purpose of this review was to assess the current state of the research projects, and to determine the priority of continuing the projects. To do this, each project's records were read through and descriptions were created with a common template for each project (Section 2). Once the projects were reviewed, a triage table was created and each project was ranked based on the following 5 criteria: ease of access, ease of completion, state of data, current branch priorities, and resources. From the ranking an overall priority was assigned for each project (Section 3). A map was created to display the locations of the trials across the territory, and a selection of photos are included (Sections 4 and 5, respectively).

2. Projects

NOTE: Project ID references the link to the Forest Management Research Database (FMRD), a Microsoft Access database created by FMB to facilitate research.

Lodgepole Pine thinning trial: response to thinning in a 25-year old post-fire stand

Project ID: 18

Location: GNML research forest

Dates: Established 1983, with 5 year re-measurements until 2004.

Description: The common wisdom of the day was that trees would not release after thinning because their age of 25 years. This study was established to test this theory.

Objectives: To test whether or not a 25-year old post-fire lodgepole pine stand would release following thinning.

Methodology: Four sites of different post-fire lodgepole pine regeneration densities were selected across the Research Forest. One ha blocks were measured, staked, flagged and prepared for thinning by Katimavik students in 1983. A three-meter wide perimeter boundary was cleared on all sides of each block to allow access around the boundary of each block for the removal of thinned stems, visual reference on subsequent aerial photography and vehicle travel outside of the sites. A centre line was flagged through the block and half of the block was thinned using chain saws and hand tools. Thinning was done to a nominal 2.5m by 2.5m spacing. Thinned stems were removed from the site. The remaining stems were numbered in strips from first to last back and forth across the length of the thinned portion of the block and initial measurements were taken – DBH painted on each stem. On the control (unthinned) side of the block, sub-plots of 50m2 were established randomly in which all trees were numbered and measured – DBH painted on each stem. The trial is re-measured at 5 year intervals.

Data recorded: DBH, height, and any significant tree defects

Map: Shows location of plots in research forest

Re-evaluation schedule maintained: Most re-measurements were done within a year of their required date. The 25 year milestone was passed summer 2008, and there is talk about measuring the stands in spring 2009.

Objectives met or on-going: On-going

Missing information: Some years data may be absent. Also the original study design is MIA.

Steps needed to continue: Re-measure stand and perform analysis.

Links to current FMB objectives: In Yukon post-fire lodgepole pine commonly regenerates at densities ranging from less than 5,000 to 100,000 stems per hectare. Thinning can provide larger stems which, because of their size, have a greater value.
Estimated timeline: A few days field work and the following write-up

Comments: The 25 year measurements should provide some insight to begin answering the research question.

Final Recommendation: Measure trial spring 2009 and compile data summary to date. Continue future research if results prove worthwhile.

The Swedish-Canadian Experiment

Project ID: 19

Location: GNML Research Forest, Whitehorse YT

Dates: Established 1986. Trial was last re-measured 2007, and data analysis completed 2008.

Description: The Lodgepole pine (*Pinus contorta* var. latifolia), Scots pine (*Pinus sylvestris*) and Siberian larch (*Larix sibirica*) in this plantation are from important genetic and specific geographic sources. The objectives of this research project are to: learn more about the introduction of species from Canada to Sweden and from Sweden to Canada; improve understanding of the similarities and differences between Lodgepole pine and Scots pine; learn about genetic gain in Canada and Sweden by plus tree selection of Lodgepole pine and to compare different sources of improved Lodgepole pine material; learn about resistance to insects and disease; learn more about the risks involved when transferring a crop tree to a new environment; stimulate further cooperation between Sweden and Canada in the fields of forest genetics, tree breeding, pathology, etc. Benefits of Research: in the field of forestry there are many similarities between Canada and Sweden concerning climate, biology, economy and industrial utilization. These similarities created mutual interest in establishing a research project to compare various strains of Lodgepole and Scots pine and their growth and survival under pressure from the indigenous pathogens of both Canada and Sweden. Lodgepole pine, a tree originating from western parts of North America, is also regarded by many in Canada as one of the most promising trees available for cultivation under intensive forest management. Commercial planting started in the early 70's. Large areas are also regenerated naturally. In Sweden, this species is rapidly gaining interest due to its outstanding performance when cultivated in this country. The first large scale collections of Lodgepole pine seed from western BC and the Yukon for use in Sweden commenced in 1963. From these collections, plus trees were identified by SCA, a major Swedish forest company. At present 80 million Lodgepole pine seedlings are planted every year in Sweden and over 300,000 hectares of Lodgepole pine forest now exist. So far Lodgepole pine is superior to the native Scots pine in survival, growth and health. However, an

element of uncertainty – primarily of a pathogenic nature – is always associated with the introduction of exotic species. Periodic evaluation of the growth and resistance of trees in this trial to insects and disease will enable Foresters to select seed sources which ensure optimal productivity for these species in Canada and Sweden. Plus tree seed orchard containing improved Lodgepole pine, Scots pine and Siberian larch

Objectives: Improve our understanding of the similarities and differences between Lodgepole and Scots pine; identify plus trees by identifying seedlots with superior growth and resistance to pests and disease; and learn about the risks involved when transferring a crop tree to a new environment.

Methodology: This trial employs a randomized block design that is replicated five times. Each block within the first four replicates was planted with 64 trees from a single seedlot. In the last replicate, each block contains a mix of all three species. There are twelve seedlots / blocks in each replicate. Trees were planted at 2m x 2m spacing. Each individual planted tree in this trial is marked by white straw. Each block has a center stakes that says what latitude the seedlot is from. Similar test sites were established in Sweden and at four other locations in Canada: Fort Nelson, Fort Saint John, Mackenzie and Fort Saint James. Reference: Lindgren D & Lindgren K 1990. A Canadian-Swedish species genotype environment interaction study. Paper 2.209 published in Proceedings from Joint Meeting of Western Forest Genetics Association and IUFRO Working Parties Douglas-fir, Contorta Pine, Sitka Spruce and Abies Breeding and Genetic Resources in Olympia, August 1990

Data recorded: Measurements taken are tree species identification, survival, height, and diameter at breast height. The most recent measurement of trial completed 2007, with data analysis done fall 2008. Data available online at:
< http://www-genfys.slu.se/staff/dagl/casw/CaSw.htm>

Map: Complete

Re-evaluation schedule maintained: Yes

Objectives met or on-going: Met to date, but has potential to be ongoing (FMB is currently discussing options with Swedish colleagues)

Missing information: None

Steps needed to continue: Make commitment with Swedish collaborators, which could involve periodic re-measurements of stand.

Links to current FMB objectives: Lodgepole pine, a tree originating from western parts of North America, is regarded as one of the most promising trees available for cultivation under intensive forest management. Commercial planting started in the early 70's. Large areas are also regenerated naturally. This species is not native to Sweden but it is rapidly gaining interest due to its outstanding performance there. The first large scale collections

of lodgepole pine seed from western BC and the Yukon for use in Sweden commenced in 1963. From these collections, plus trees were identified by SCA, a major Swedish forest company. Swedish trials have shown that the survival, growth and health of lodgepole pine is superior to their native Scots pine. However, an element of uncertainty – primarily of a pathogenic nature – is always associated with the introduction of exotic species.

Estimated timeline: 1 field day every 5 years

Comments: While it is not critical for our own research, the upkeep of this trial is good to maintain relationships with our colleagues overseas.

Final Recommendation: Keep in touch with Sweden and assist with trial where feasible.

Acid Rain National Early Warning System (ARNEWS)

Project ID: 20

Location: Gunnar Nilsson Mickey Lammers Research Forest, Whitehorse YT

Dates: Established 1987. Data collection and analysis to occur every 5 years.

Description: The Acid Rain National Early Warning System (ARNEWS) plot network was initiated in 1984 when the then Canadian Forestry Service decided to establish a national program to detect early signs of air pollution damage to Canada's forests.

Objectives:

1) to detect, clearly and accurately, damage to forest trees and soils caused by air pollutants or to identify damage sustained by Canada's forests (trees and soils) that is not attributable to natural causes or management practices; and

2) to monitor vegetation and soils to detect long-term changes attributable to air pollutants in representative forest ecosystems.

Methodology: http://www.eman-rese.ca/eman/reports/publications/arnews/arnews.html

Data recorded: One year (1992) of plot cards are included. No other data can be found.

Map: Complete showing location of plot.

Re-evaluation schedule maintained: Unknown

Objectives met or on-going: Need to contact CFS to see if project is still on-going.

Missing information: Data since 1992 is not accounted for

Steps needed to continue: Contact CFS and check status of research

Links to current FMB objectives: Acid rain was a major concern during the time the study was installed, but now more focus is given to climate change.

Estimated timeline: Brief (20 minutes to write follow-up email to CFS)

Comments: Conducting research within the GNML Research Forest is feasible because of it's proximity to Whitehorse. With the opening of the research forest to the public, there is an expectation that research be carried out there. The Government should honour this expectation and check the status of the ARNEWS project. There was a time when acid rain research was vogue, although it's now been kicked off the runway by climate change. However there may be value in keeping long-term baseline data records if acid rain becomes important in the future

Final Recommendation: Follow up with CFS to check status of ARNEWS project and site at GNML research forest (formerly called Takhini Forest Reserve at time of study).

Canadian Intersite Decomposition Experiment (CIDET)

Project ID: 21

Location: Gunnar Nilsson Mickey Lammers Research Forest, Whitehorse YT

Dates: Established 1992. Ongoing.

Description: The CIDET is a cooperative study of 20 researchers from the Canadian Forest Service, universities and provincial ministries investigating the long-term rates of litter decomposition and nutrient mineralization over a broad range of forested ecoclimatic regions in Canada.

Objectives: Provide data on the long-term rates of litter decomposition and nutrient mineralization for a range of forested ecoclimatic regions in Canada.

1. Examine the role substrate quality and climate have on long-term decomposition rates.
2. Examine the relative importance of site factors and microclimate on decay rates.
3. Test the influence that site moisture regimes have on decay rates.
4. Test specific hypotheses on the patterns of litter decay.

Methodology: Detailed methodology online at <http://cfs.nrcan.gc.ca/subsite/cidet/home-accueil>

Data recorded: None in FMB records because CFS is leader on research

Map: Map of Canada shows location of plots, but no detailed map of GNML research forest site.

Re-evaluation schedule maintained: Uncertain, but updated website suggests that study is being up kept

Objectives met or on-going: On-going

Missing information: N/A

Steps needed to continue: Contact CFS and check status of research

Links to current FMB objectives: Increasing concern is being expressed on the effects of climate on forest carbon budgets and how forest practices should be adapted to cope with these changes. Understanding the influences of forestry activities on climate change is a component of responsible forest stewardship. This research would provide detailed information of decomposition rates to the Yukon, and also be incorporated into a national framework to better understand long-term decomposition rates across Canadian forests.

Estimated timeline: Brief (20 minutes to write follow-up email to CFS)

Comments: Conducting research within the GNML Research Forest is feasible because of it's proximity to Whitehorse. With the opening of the research forest to the public, there is an expectation that research be carried out there. The Government should honour this expectation and follow up to check the status of the CIDET project.

Final Recommendation: Follow up with CFS to check status of CIDET project and site at GNML research forest (formerly called Takhini Forest Reserve at time of study).

Brackekultivatorn Scarifier Trial

Project ID: 35

Location: Watson Lake, Liard River site and Rancheria River site
Map Sheet 105A $60^{o}01'30"$ $128^{o}44'45"$

Dates: Commenced in 1978. Rancheria River site trial dropped in 1982 due to repeated flooding in test area. The Liard River site continued until 1984.

Description: In August 1978 a Brackekultivatorn scarifier (aka: line-mounder; Bracke) was borrowed from the BC Forest Service, and two sites in the Watson Lake area were scarified using this device and then seeded using the Walters Bullets method.

Objectives: Examine the effects of the Bracke scarification in the Liard River floodplain on:

1. Producing a receptive seedbed for natural seeding of *Picea glauca*
2. Controlling seedling spacing
3. Minimizing potential for erosion
4. Assessing preference of micro-site for seedling survival
5. Comparing the effectiveness of spot seeding vs. natural regeneration
6. Measuring vegetative competition

Methodology: Two clear-cut (1977) blocks were used as test sites, and the scarification was complete by 1979. Test trials were laid out with seeded and unseeded trials, and an un-scarified control was established. A random selection sampling pattern was used for determining plot locations. Seeding took place in August 1979. The Rancheria site was dropped in 1982 because of damage from repeated flooding, and the Liard River site was measured in 1984.

Data recorded: Plot cards were all complete. Seedling survival rate, competing vegetation, and complete maps are included.

Maps: Included and complete, within "Brackekultivatorn Trial Liard & Rancheria River Sites" (1980), "Report – Follow Up" (1981), and "Brackekultivatorn Trial Liard Site" (1984).

Re-evaluation schedule maintained: Trial was not re-measured after 1984.

Objectives met or on-going: The primary objective was met, and the 1984 report indicated that "generally the trial succeeded in showing that the Bracke does provide adequate scarification for the establishment of directly seeded *Picea glauca."*

Missing information: N/A

Steps needed to continue: The site description gives the geographic location and many maps are included in the research files. The detailed records could allow someone to re-measure the site in the summer of 2009, 30 years after the seeding.

Links to current FMB objectives: With the new Forestry Resources Act, the need for Silviculture programs and re-planting disturbed sites is ever increasing. FMB could benefit from investing some time into following up on the effectiveness of scarification in seedling establishment. The silviculture program may wish to visit site to see long term effects of Bracke scarification, including seedling survivorship and growth, erosion, and competing vegetation.

Estimated timeline: Two field days for finding site and re-measurements; some office work interpreting new data.

Comments: Prior to re-visiting the site, the Watson Lake district should be contacted to find out if there has been any use of the land since 1984 (i.e. resource development, flooding, agricultural takeover, etc…)

Yukon Wide Regeneration Reports

Project ID: 37

Location: Watson Lake and surrounding area (Liard, Hyland, and Meister River sites); Mayo and Stewart Crossing; Marsh Lake area.

Dates: 1979-1988

Description: Summary of regeneration surveys in the Yukon to 1988

Objectives: Descriptive surveys

Methodology: Systematic grid sampling of regeneration and reforestation in numerous cut-blocks

Data recorded: Block maps and summaries

Map: Maps show plot locations

Re-evaluation schedule maintained: N/A

Objectives met or on-going: Met

Missing information: Some tally cards not present

Steps needed to continue: N/A

Links to current FMB objectives: Regeneration study is probably too old to be of use (i.e. we currently have better information available).

Estimated timeline: N/A

Comments: All historical regeneration surveys are compiled into this folder for reference purposes, although as noted earlier, FMB currently has more current inventory information available.

Permanent Sample Plots (PSP's) in Watson Lake

Project ID: 40

Location: Watson Lake

Dates: 1978 and 1982

Description: Measurement of growth and yield

Objectives: Not clear, but perhaps this was the beginning of the PSP's FMB currently surveys

Methodology: A detailed sampling methods paper is included

Data recorded: DBH, height, species, slope, and aspect

Map: None

Re-evaluation schedule maintained: The 5 year schedule was maintained for a few visits, but there is missing data

Objectives met or on-going: Could be on-going but missing many years of data

Missing information: Detailed site locations absent

Steps needed to continue: Cannot continue because no site locations recorded

Links to current FMB objectives: FMB currently monitors a number of PSP's for growth and yield

Estimated timeline: N/A

Comments: If detailed locations were obtained this could provide some valuable information. FMB's current PSP's are 20 years this year (2008), and if this study were useable it would give an extra 10 years.

Final Recommendation: Drop the trials. Cannot continue this study because of missing information.

Hakmet Shelter Sowing Method

Project ID: 41

Location: Hyland River 128^{o}15'00", 60^{o}02'00"

Dates: 1980

Description: Operational sowing trial using "Ripper tooth" plough and cased shelter seeding

Objectives: Examine the success of this seeding method

Methodology: Cut block 5 was scarified using a Craig-Simpson Reforestation plough ("The Ripper Tooth Plough") pulled by a D-9 cat. The block was then seeded using Hakmet Shelter Sowing equipment.

Data recorded: No measurement of seedling establishment. There is a report on the implementation of the trial, and the operation of the seeding equipment.

Map: Complete.

Re-evaluation schedule maintained: N/A

Objectives met or on-going: Objectives met. There are many pages listing the problems with the sowing equipment and the scarification methods. There is a list of best operating conditions relating to the ease of sowing.

Missing information: None

Steps needed to continue: N/A

Links to current FMB objectives: The equipment used for sowing is ancient, and has no application in modern reforestation techniques.

Estimated timeline: N/A

Comments: The use of this equipment proved more cumbersome than effective during the operational trial. A quick Google search revealed that Hakmet Ltd no longer make this sowing equipment.

Final Recommendation: Do not use the Hakmet shelter sowing method for future reforestation in the Yukon.

Initial Measurement Lodgepole Pine Provenance Trials

Project ID: 42

Location: GNML Research Forest, Whitehorse; Watson Lake Research Forest

Dates: Established 1974. Last re-measurement on record is 1994.

Description: Forty Lodgepole pine provenances were tested in two sites in the Yukon.

Objectives: To determine the optimum seed source areas for Yukon plantations.

Methodology: Forty provenances from the Yukon, Alaska, BC, and Alberta were planted in two clear-cut and scarified pieces of land in Watson Lake and Whitehorse. Height, DBH, and survivorship were measured thereafter.

Data recorded: Data for years: 1974 – 1976, 1979, 1983, 1993, 1994. There are implementation reports, working plans and a copy of the report "Lodgepole Pine Provenance Research in Northern Canada with Particular Reference to the Yukon Territory" A report that sums up a lot of the provenance research from Yukon.

Map: Detailed mapping

Re-evaluation schedule maintained: Plantations were measured fairly consistently

Objectives met or on-going: Were ongoing until 1994 when last records of measurements were taken

Missing information:

Steps needed to continue: Re-measure both trials, then compile data and determine most successful provenances to date

Links to current FMB objectives: Yukon's FMB has a seedlot kept with PRT industries in BC which is used for replanting and seeding in the Yukon. There is an opportunity to improve seed used for planting by analyzing the success of the now 34 year old provenances, and considering using the most suitable provenance(s) for future silviculture.

Estimated timeline: Re-measuring trials in Watson Lake and Whitehorse- 3 or 4 days; compiling and analyzing data 3 days.

Comments: As Lodgepole pine provenances were planted (in some cases) far outside their natural climatic zones, this has application to climate change and adaptive management. Not only is there data on adaptation success to date but it would be possible to see how this changes with continuing climate change. These sites are part of a larger network and in addition to Yukon seedlots also contain ones from southern BC, Alberta, and the Alaska panhandle. Good potential exists to continue these trails with broader goals. The Yukon portion of the study tested 40 seedlots; the BC portion of the study tested 153 seedlots from as far away as the Cypress Hills and California.

Great records were kept throughout the trial with most, if not all, the field cards accounted for. With such a well kept historical record, this research has the potential to provide a wealth of knowledge. It would be a shame to see this valuable information go to waste, therefore it is worthwhile to complete the project

Final Recommendation: Re-measure and summarize data.

Marshall Creek Planting Trials

Project ID: 43

Location: Marshall Creek, Kilometre 1618 Alaska Hwy 60°50'15"N 137°20'53"

Dates: Established 1975, monitored until 1981.

Description: Lodgepole pine and white spruce planting trials in cut over sites and old mill site.

Objectives: Performance trial

Methodology: A total of 450 pine and spruce seedlings were row planted in two different sites, and growth and condition monitored.

Data recorded: Tally cards, status reports.

Map: Maps complete

Re-evaluation schedule maintained: Was monitored regularly until 1981, when measurements stop

Objectives met or on-going: Initial objectives unclear, but data collected suggest this research was limited to monitoring only.

Missing information: Data collection stops 1981, and no final report included. Appears that trial was dropped in early 80's.

Steps needed to continue: Re-measure trials at Marshall Creek and compile report

Links to current FMB objectives: Marshall Creek is currently being harvested and planting may be necessary in the near future. Examining the survivorship and growth of the provenances planted in Marshall Creek may be beneficial to future silviculture efforts.

Estimated timeline: 1 day field work, and 2 days data entry/compilation

Comments: While outplanting trials are not unique, i.e. moving lodgepole outside its natural range to Marshall Creek, the long term performance would be relevant for adaptive management options for southwest Yukon both in regards to climate change and spruce bark beetle. Re-measurement of Marshall Creek pine could be interesting, but re-measuring spruce may not lead to any significant new knowledge.

Final Recommendation: Site visit to locate pine, and determine then if there is any value on proceeding further.

Re-vegetation following wildfire study

Project ID: 45

Location : Aishihik burn, Carmacks burn, Liard burns

Dates: 1980-1990

Description: A study on revegetation following wildfires was conducted on four fires near the Yukon Territory British Columbia border. One wildfire occurred at Aishihik junction off the Alaska Highway in south-central Yukon in 1980; and three fires occurred near Watson Lake, Yukon Territory in 1982 - one in Yukon and two in British Columbia. This report covers the first 5 years of vegetation succession on 47 plots established in the areas burnt by these four fires.

Objectives: Monitor and describe the forest vegetation development and succession on different sites, to compare the seral stages among the site types, and to develop prediction models for vegetation succession following wildfire.

Methodology: Plots were laid out across study area and monitored for 5 years.

Data recorded: Site characteristics, burn characteristics, soils, and vegetation analysis.

Map: Complete.

Re-evaluation schedule maintained: Yes

Objectives met or on-going: Met

Missing information: Original data sheets from Liard sites are missing.

Steps needed to continue: N/A

Links to current FMB objectives: Useful research in understanding forest dynamics after a wildfire occurs.

Estimated timeline: N/A

Comments: Report is complete and compiled into BC-X-320 entitled “Vegetation establishment during 5 years following wildfire in northern British Colombia and southern Yukon Territory” (Oswald & Brown 1990) from Canadian Forest Service online at <http://warehouse.pfc.forestry.ca/pfc/3054.pdf> or in Forest Management Research Database.

Final Recommendation: None

Liard burn planting and post fire natural seeding trial

Project ID: 46

Location: West of Upper Liard village and Albert Creek Bridge

Dates: 1976-1980

Description: Planting of 600 white spruce seedlings into Liard Burn, and post fire seed dispersal

Objectives: Not mentioned

Methodology: Seeds were collected and tested for viability, Liard burn was planted, and seedlings were monitored.

Data recorded: Map, report, tally cards

Map: Complete

Re-evaluation schedule maintained: Monitored for three years 1978-1980.

Objectives met or on-going: Uncertain

Missing information: None

Steps needed to continue: N/A

Links to current FMB objectives: While the outplanting of seedlings after a burn does not offer any unique information, the post burn seed distribution study may have relevance. Seed fall was tested and germination was tested.

Estimated timeline: Not possible to complete

Comments: Since this trial has been ignored since 1980 there is no continuity in the data and it would be challenging to continue

Final recommendation: None

Haines road planting trial

Project ID: 47

Location: East side of Haines road (km 236)

Dates: Oct 1975 – June 1976

Description: Eleven pine and 23 spruce seedlings were planted in fall 1975, and 22 additional spruce planted June 1976.

Objectives: None mentioned

Methodology: None

Data recorded: Spacing of seedlings

Map: Complete

Re-evaluation schedule maintained: No

Objectives met or on-going: N/A

Missing information: Very sparse data (1 page of inter-stem spacing recorded)

Steps needed to continue: N/A

Links to current FMB objectives: In light of the current Spruce beetle infestation, reforestation of Lodgepole pine into the area could be of interest, however this raises other concerns regarding transplanting species into foreign ranges.

Estimated timeline: N/A

Comments: The entire file consists of only 2 sheets, not consisting of more than a simple description of what was done.

Final Recommendation: For interest sake, make note to visit site when in vicinity to locate Lodgepole

Cooperative hardiness trial

Project ID: 48

Location: GNML and Watson Lake research forests

Dates: 1972-1985

Description: Hardiness study of native and introduced trees and shrubs

Objectives: To test hardiness of various tree and shrub species in the Yukon.

Methodology: 73 tree and shrub species were planted and monitored for suitability

Data recorded: Condition was recorded from 1975-1980

Map: Complete

Re-evaluation schedule maintained: Yes, until 1980

Objectives met or on-going: Whitehorse portion of this trail mostly dismantled (70%), Watson portion is now not held by department.

Missing information: The trial is no longer in physical existence

Steps needed to continue: Cannot continue

Links to current FMB objectives: Testing various species for hardiness is interesting for the public's interest (i.e. there may be a motivation for local residents to know which ornamental species to plant).

Estimated timeline: N/A

Turpene study

Project ID: 49

Location: Yukon wide (Liard, Dempster, Glenlyon Range, Stewart Crossing, Carmacks, Haines Road, South Canol, Teslin, Maureen Lake, Skagway Road, Klondike Highway, Whitehorse, Kusawa Lake, Tagish Lake and Watson Lake).

Dates: 1977-1979

Description: The leaf terpenes of 93 Lodgepole pine from the Yukon and NWT, as well as those of 30 typical shore pines from more southerly locations, were analyzed by gas-liquid chromatography.

Objectives: To perform analysis of leaf terpenes to better understand Lodgepole post ice-age dispersion and glacial refugia on nunataks (protruding peaks not covered with ice or snow within a glacier).

Methodology: Leaf samples were collected from across the Yukon and shipped to a lab outside the territory. Terpenes were extracted from the leaves and the recovered oil was analyzed on gas chromatographic columns.

Data recorded: Percentages of the major leaf oil terpenes were recorded and analyzed

Map: Map of terpene type from geographic locations

Re-evaluation schedule maintained: N/A

Objectives met or on-going: Met

Missing information: None

Steps needed to continue: N/A

Links to current FMB objectives: An advanced study at the time which likely provided useful insight into post-glacial species dispersion in the Yukon. If these results were published then they were likely used as reference material for modern DNA analysis of tree dispersion.

Estimated timeline: N/A

Comments: Data from this study or related national studies could bear relevance on trees response to climate change and disturbance and their ability to re-colonize following disturbance. Data analysis and further sampling using DNA markers could add to this study. DNA analysis would be a more modern, more definite way of checking these theories. Separate DNA analysis of White Spruce supports the existence of Yukon refugia during previous ice ages. Turpene data in this study suggest a genetic distinctiveness of Yukon refugia populations, at least in pine.

Final Recommendation: Review literature to see if this research has been published, and add to research database.

Clinton Creek experimental seeding project

Project ID: 50

Location: Clinton Creek fire 64^{o}19'N 140^{o}37'W

Dates: 1975-1978

Description:

Objectives: To conduct Lodgepole Pine and White Spruce trial broadcast and spot seeding on the Clinton Creek Burn area.

Methodology: One acre plots were established under various conditions, which were then divided into four quadrants (1975). Quadrants were seeded with either broadcast or spot seeded, and either pine or spruce were planted. An evaluation of the trial was carried out in 1978.

Data recorded: Plot establishment data, photographs, and sampling results included.

Map: Complete

Re-evaluation schedule maintained: None after 1978 evaluation

Objectives met or on-going: Met

Missing information: No record of which seedlots were used, in this study, is in the file. The Pine used in this study was introduced far north of its natural range but no long term follow-up was done.

Steps needed to continue: N/A

Links to current FMB objectives: With the new Forest Act passed, there is a commitment to reforestation after disturbance. Understanding effective methods of regeneration will be critical to successful establishment of seedlings.

Estimated timeline: N/A

Comments: As these plots provide some baseline data they could be re-measured periodically to show post burn vegetative development over time. In particular the Pine should be looked at to assess its adaptability to this non-native growing environment.

Final Recommendation: Drop trial

Watson Lake water erosion and logging study

Project ID: 51

Location: Liard River, Albert Creek, Rancheria River, and Meister River

Dates: 1974

Description: Water erosion measured at Watson District sites where the riparian trees had been logged and matching areas that were not logged.

Objectives: To determine if cutting along riparian areas causes erosion or not

Methodology: Stakes were placed in the spring along clear-cut and un-logged riparian areas. These stakes were then observed in the fall to see if they have changed position.

Data recorded: Presence/absence of stakes

Map: Complete

Re-evaluation schedule maintained: No. The trial was scheduled to last 7 years, but only the first year of data was collected.

Objectives met or on-going: Not met

Missing information: Information is present for only 1 season, not the long term study as the design forecast.

Steps needed to continue: N/A

Links to current FMB objectives: FMB buffers all riparian areas according to our Timber Harvest Operating Guidelines manual.

Estimated timeline: N/A

Comments: No firm descriptive or measurement criteria. No base line plot condition information or photos. No further research value is perceived in this project.

Final Recommendation: Drop trial.

P.F.R.C. and Y.L.F.S. Reforestation Trials

Project ID: 52

Location: Watson Lake, Haines Junction, Tagish Areas

Dates: 1972-1981

Description: A mix of projects, some of which are addressed in other files. Includes 1972 Rancheria Pine and Black Spruce stock trial; seeding methods; outplanting trials for Pine and White Spruce; natural seedfall study from the Liard River; comprehensive reforestation trail involving various types of seeding and planting in prepared and unprepared ground at the Liard and Miester Rivers; fall vs. spring, scarified vs. unscarified seeding and planting; microsite selection testing.

Objectives: The object of the reforestation trial in these areas was to establish a variety of reforestation options to determine which method would be most suitable for regeneration of cut over areas in the Yukon.

Methodology: The reforestation options that were tested are: planting, broadcast seeding, spot seeding, and natural seeding. These seeding and planting methods were tested on scarified and non-scarified sites

Data recorded: Data cards are accounted for

Map: Most maps complete

Re-evaluation schedule maintained: Until 1981

Objectives met or on-going: Long term monitoring was originally planned, but not done in some years.

Missing information: Most accounted for, however there is a vast quantity of data so it's difficult to determine if information is missing. What is of greater importance is the absence of any final reports on the studies. Only one report on the scarification trials is complete, which concludes scarification favours all types of planting.

Steps needed to continue: Sort and analyze existing data, then determine importance of re-measuring sites.

Links to current FMB objectives: Understanding effective methods of reforestation is important for successful regeneration of cut-blocks.

Estimated timeline: A compilation of the data and analysis would be a serious commitment (i.e. a full time project). If all sites were remeasured there could be an entire season of field work available and the corresponding time performing data analysis.

Comments: There is a wealth of unsorted, unanalyzed data in the research file. It is a major task to undertake, however it may be worthwhile to complete these projects which have already had a considerable investment.

Final Recommendation: Prioritize this item among current projects, and determine if we have the resources and the ability to complete it.

Floristic list data forms

Project ID: 54

Location: Unknown

Dates: 1977

Description: Vegetation plots from various locations across Yukon

Objectives: Unknown

Methodology: No description

Data recorded: Lists of vegetative species in plot

Map: No

Re-evaluation schedule maintained: Unknown

Objectives met or on-going: Unknown

Missing information: Location of plots

Steps needed to continue: Cannot continue

Links to current FMB objectives: FMB records vegetation lists in many types of plots

Estimated timeline: N/A

Comments: Without the locations of the plots, there is no way to map this vegetation, and unfortunately it is useless.

Final Recommendation: None

Liard and Meister Rivers Regeneration Trials

Project ID: 57

Location: Liard River 60°08’30” 128°58’30”, and Meister River 60°19’30” 129°33’30”

Dates: 1975-1977

Description: A regeneration trial study looking at various reforestation options including planting, broadcast seeding, spot seeding, and natural regeneration.

Objectives: Determine which reforestation option is most suitable for regeneration of cutover areas in the Yukon.

Methodology: The reforestation methods tested were planting, broadcast seeding, spot seeding, and natural regeneration. These trials were established on two separate sites, one scarified and the other un-scarified, during two different time periods, spring and fall. For the planting, microsite selection was investigated as well.

Data recorded: Seedling survival rate was recorded, and records are available in Appendix B of report.

Map: General site location map included (1:500,000), but no detailed site maps found.

Re-evaluation schedule maintained: N/A

Objectives met or on-going: Objectives of trial were met, and study was carried out until complete. Study found some early trends:

- No significant planting season effect during first trial (1975/1976), however a killing fall frost favoured spring planting in terms of seedling survival during second trial (1976/1977).
- Dense vegetative competition on the unscarified plots increased seedling mortality and slowed tree growth.
- Tree growth on scarified plots was consistently better than unscarified.

Missing information: None

Steps needed to continue: Study is complete

Links to current FMB objectives: Potentially valuable information for current reforestation practices regarding the selection of reforestation methods, the choice of scarification, and the timing of planting seasons.

Estimated timeline: N/A

Comments: Results were misplaced in wrong research file for many years

Final Recommendation: None

3. Assessment of projects

Criteria table

To assess the priority of continuing the research projects, a project triage table was created (Table 1). Five criteria were assessed: ease of access, ease of completion, state of data, current branch priorities, and resources. For each of these criteria, factors were outlined which could influence the rank. A rank and score is assigned to each criteria, and the total is scored out of 10. Once the projects have been assessed, the overall score was evaluated using Table 2 to determine the priority of completing the project.

Table 1. Historical research project triage

Criteria	Factors to consider	Ranking	Score
Ease of access	Type of access (roadside, ATV, helicopter, walk-in); community (near Whitehorse, or remote with hotel requirements); other	Easy	2
		Medium	1
		Hard	0
Ease of completion	Estimated duration to complete project; publication/report requirements; analysis requirements; staff requirements; other	Easy	2
		Medium	1
		Hard	0
State of data	Additional data required; continuity of existing data; digital or paper copies; general integrity of data; time/money already invested; other	Complete	2
		Partial	1
		None available	0
Current branch priorities	Is the research outdated; is this novel research; does this work been done elsewhere; does it fit into FMB's strategic planning; other	Important	2
		Intereseting	1
		None	0
Resources	Staff; budgets; publications; contracting; other	Inexpensive	2
		Moderate	1
		Expensive	0
			Total score / 10

Table 2. Overall priority

Total score	Priority
0-4	Low
5-7	Medium
8-10	High

Project assessments

Table 3. Project assessment scoring table, with raw scores and overall priority.

Project name	ID	Access	Completion	Data	Branch	Budget	Total	Priority
Lodgepole Pine thinning trial	18	2	1	1	1	1	6	**Med**
The Swedish-Canadian Experiment	19	2	2	1	1	2	8	**High**
Acid Rain National Early Warning System	20	N/A - file closed						**N/A**
Canadian Intersite Decomposition Experiment	21	N/A - file closed						**N/A**
Brackekultivatorn Scarifier Trial	35	1	2	2	1	0	6	**Med**
Yukon Wide Regeneration Reports	37	Extensive missing data- incomplete						**N/A**
Permanent Sample Plots (PSP's) in Watson Lake	40	Extensive missing data- incomplete						**N/A**
Hakmet Shelter Sowing Method	41	N/A - file closed						**N/A**
Initial Measurement Lodgepole Pine Provenance Trials	42	2	1	2	2	1	8	**High**
Marshall Creek Planting Trials	43	2	1	1	2	1	7	**Med**
Re-vegetation following wildfire study	45	0	0	2	1	0	3	**Low**
Liard burn planting and post fire natural seeding trial	46	1	0	1	1	1	4	**Low**
Haines road planting trial	47	2	0	0	0	1	3	**Low**
Cooperative hardiness trial	48	2	1	0	0	1	4	**Low**
Turpene study	49	N/A - file closed						**N/A**
Clinton Creek experimental seeding project	50	0	0	1	1	1	3	**Low**
Watson Lake water erosion and logging study	51	0	0	0	1	0	1	**Low**
P.F.R.C. and Y.L.F.S. Reforestation Trials	52	1	0	1	2	0	4	**Low**
Floristic list data forms	54	Extensive missing data- incomplete						**N/A**
Meister River Regeneration Trials	57	0	1	1	1	0	3	**Low**
		/2	/2	/2	/2	/2	/10	

Recommendations summary

The following recommendations were determined after the priority assessment was complete. The recommendations suggest the next steps in continuing the research and/or following-up with certain projects. It should be noted that recommendations will be carried out based on their priority rank. The projects requiring a site visit will have their priority ranking re-assessed after obtaining additional information from the site visit.

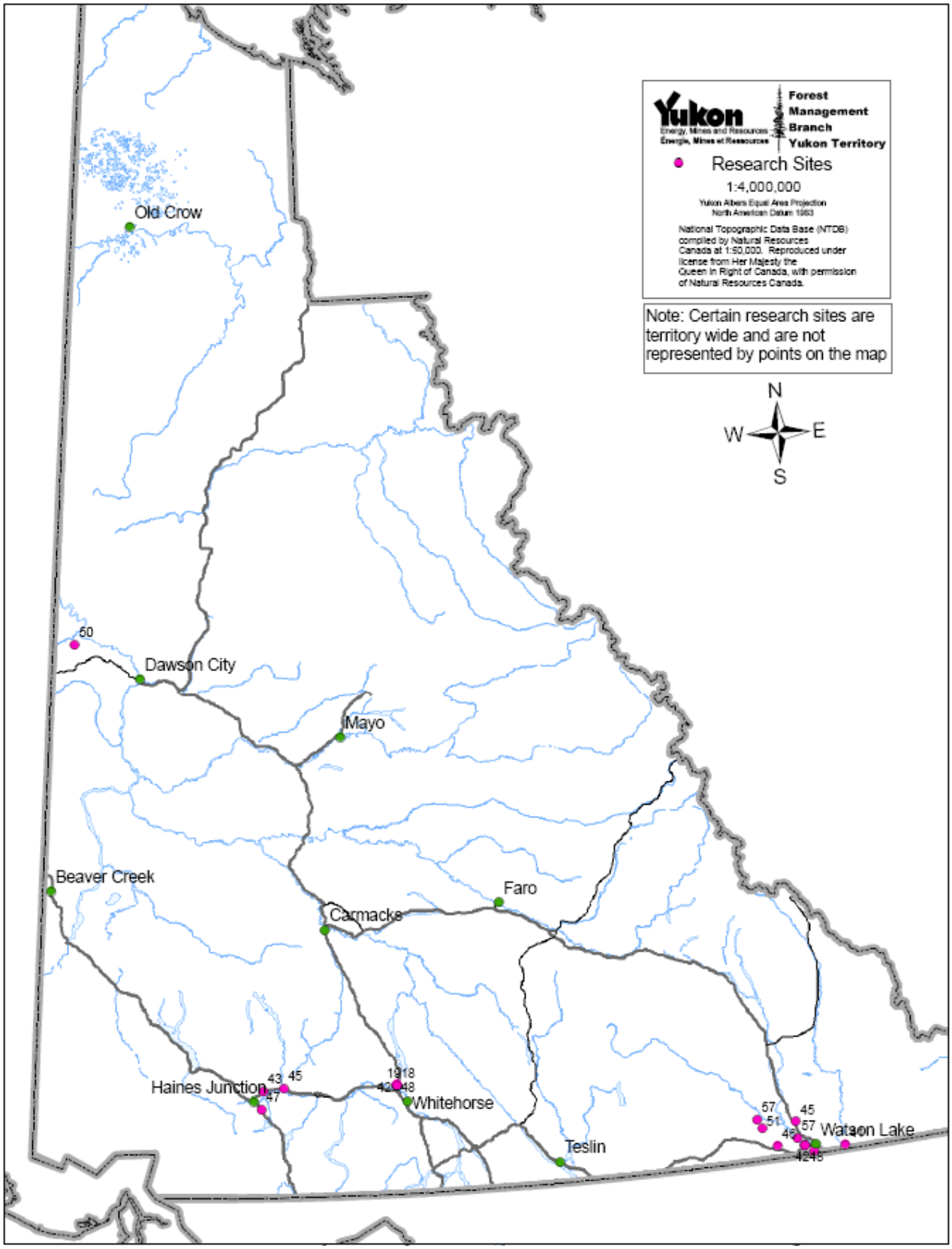
Table 4. Recommendations and comments from assessment

Project name	ID	Priority	Recommendation
Lodgepole Pine thinning trial	18	Med	Consider further research as summer student project
The Swedish-Canadian Experiment	19	High	Write-up 2007 survey results
Acid Rain National Early Warning System	20	N/A	Request any data and reports from CFS
Canadian Intersite Decomposition Experiment	21	N/A	Request any data and reports from CFS
Brackekultivatorn Scarifier Trial	35	Med	Determine is any new land dispositions have overtaken site
Yukon Wide Regeneration Reports	37	N/A	Take no action
Permanent Sample Plots (PSP's) in Watson Lake	40	N/A	Take no action
Hakmet Shelter Sowing Method	41	N/A	Scan report and enter into FMRD; send copy to archives
Initial Measurement Lodgepole Pine Provenance Trials	42	High	Check FMRD for BC MOF report
Marshall Creek Planting Trials	43	Med	Site visit - reconnaisance and re-assessment
Re-vegetation following wildfire study	45	Low	Follow-up with Jill Johnstone. Continuing this report is a highly technical, scientific process requiring the right person (PhD or MSc student).
Liard burn planting and post fire natural seeding trial	46	Low	Take no action
Haines road planting trial	47	Low	Site visit - reconnaisance and re-assessment
Cooperative hardiness trial	48	Low	Watson Lake site visit - reconnaisance and re-assessment; put up plant ID signs for surviving trials at GNML forest (Bruce Bennett or Val Lowen assisstance

Table 4. Recommendations and comments from assessment (con't)

Project name	ID	Priority	Recommendation
Turpene study	49	N/A	Take no action
Clinton Creek experimental seeding project	50	Low	Site visit - reconnaisance and re-assessment
Watson Lake water erosion and logging study	51	Low	Study design required to clarify research questions, without which cannot proceed
P.F.R.C. and Y.L.F.S. Reforestation Trials	52	Low	Hand-over to silviculture program
Floristic list data forms	54	N/A	Take no action
Meister River Regeneration Trials	57	Low	Site visit - reconnaisance and re-assessment; hand-over to silviculture program

4. Map of Yukon historical research sites



5. Photos

Photo 1. Interpretive sign at GNML Research Forest, Whitehorse

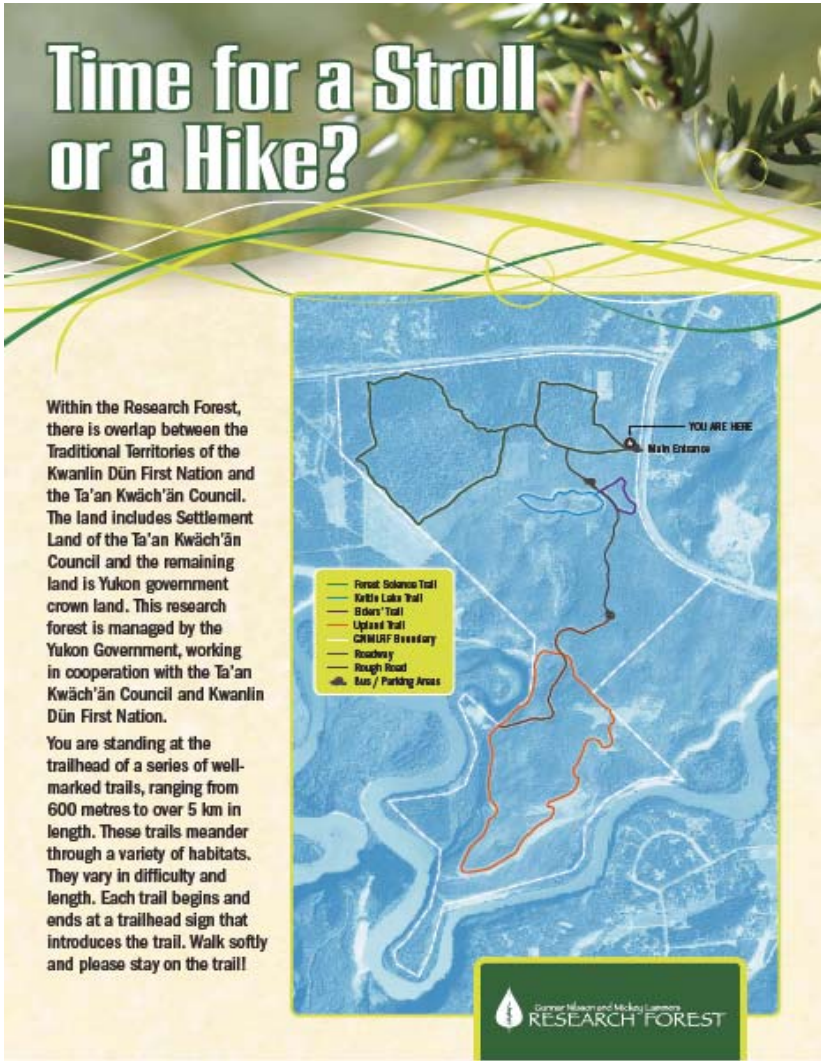


Photo 2. Trail map at GNML Research Forest, Whitehorse

Photo 3. Original Swedish-Canadian experiment (Project 19) interpretive sign, 1983

Photo 4. Updated Swedish-Canadian project interpretive sign (2008)

Photo 5. CIDET monitoring plot (Project 21) at GNML research forest, Whitehorse

Photo 6. Pine provenance trial (Project 42) at GNML research forest, Whitehorse

Photo 7. Re-vegetation following wildfire study (Project 45) plot marker

Photo 8. Site prep and plant, Rancheria River

Photo 9. Meister river trial (Project 35)

Photo 10. PSP in Watson Lake research forest (Project 40)