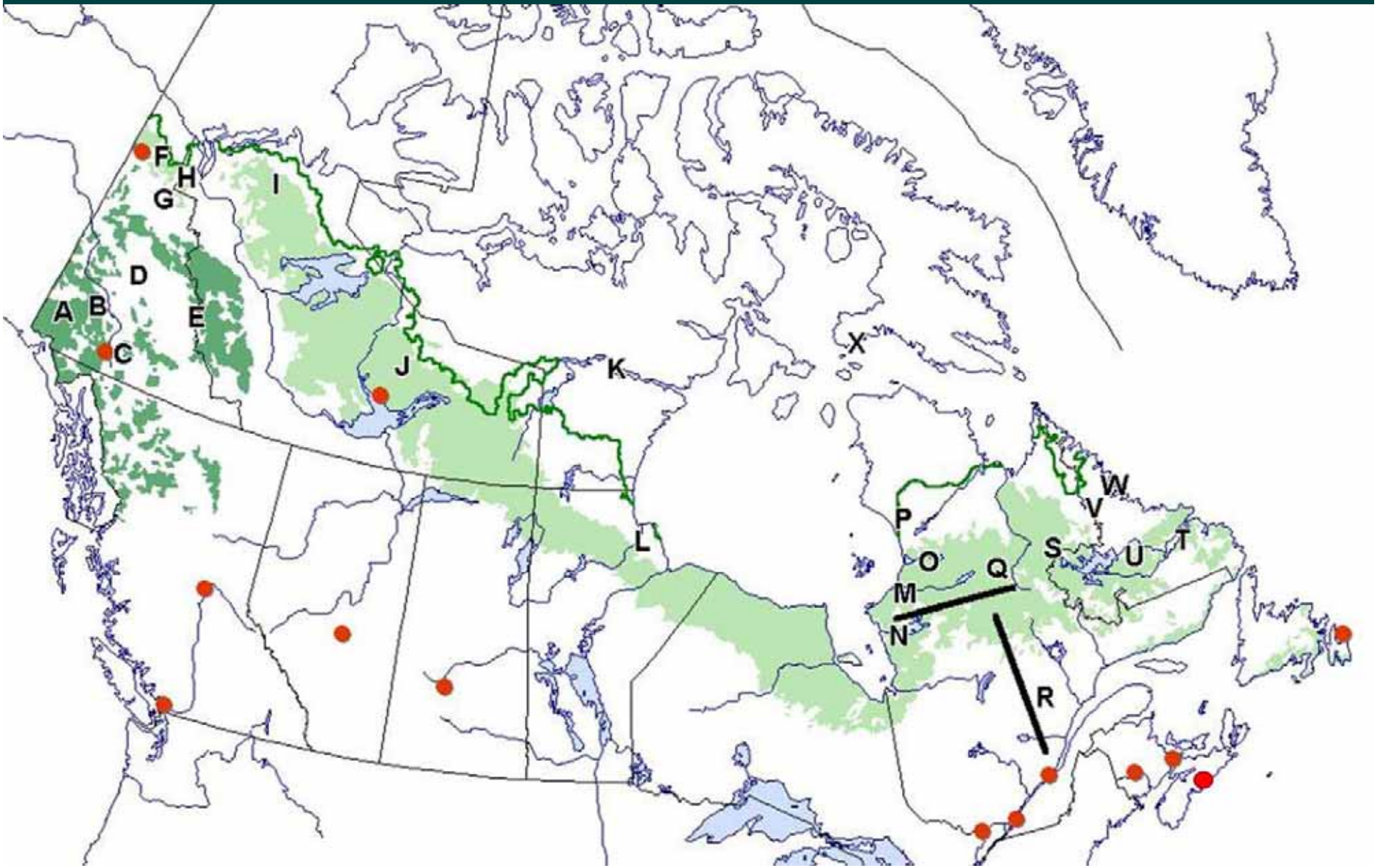
PPS Arctic Canada

Active sites

INTERNATIONAL POLAR YEAR 2007-2008
ANNÉE POLAIRE INTERNATIONALE



The PPS Arctic Canada Team

- 20 PIs or lead researchers
- 3 post-docs
- 30 graduate students
- 19 undergraduate students
- 37 northerners including students
- 13 others (collaborators, technicians, residents)

= 122 team members


The Mealy Mountains Research Team 2008


Photo: Brian Starzomski


Photo: Danielle DeFields

PPS Canada OBJECTIVES

1. To analyze change in tree and shrub distributions.
2. To collect environmental data.
3. To investigate biotic influences.
4. To determine the spatial structure.
5. To assess the role of disturbance.
6. To develop models for the assessment of environmental change on ecosystems, processes and resource availability.

Funding situation

- $2.5 million for PPS Arctic Canada from the Government of Canada IPY program
- Funding started 2006/07
- Funding until 2011, but last field season for most researchers was last year (for this grant)
- No other group funding applied for, although some individual research projects continue

Key messages from annual report

- Significant progress in collecting data, training students and engaging northern communities
- Excellent data were collected
- Preliminary results:
  - Local factors affect the spatial pattern of treeline
  - Tree seedling recruitment benefits from thin soil, caribou and phenotypic plasticity, but is hindered by fires, continuous daylight and *Sphagnum*
- Several regional workshops are being conducted, Old Crow workshop was a success

Workshop in Old Crow Yukon

- Use of local plants for subsistence and medicine

Photo: JillJohnstone

Canada West

Status of projects: West

Rod Savidge: Carmacks,Yukon

- Established 4 permanent transects across treeline
- Vegetation surveys in mineral trenches
- Data from 70 data loggers
- Air and ground photos for change
- Results: lots, notably many seedlings
- 2009: analysis and final field trip to retrieve data from data loggers

Status of projects: West

Jill Johnstone: Dempster Highway, Yukon

- Collection of cones with germination tests
- Seeding treatments in burned and unburned sites
- Seedling reruitment low without fire
- Results: treed tundra fewer trees and fewer cones per tree compared to closed canopy forest
- Very successful workshop in Old Crow
- 2009: 2nd year data for seeding experiments

Status of projects: West

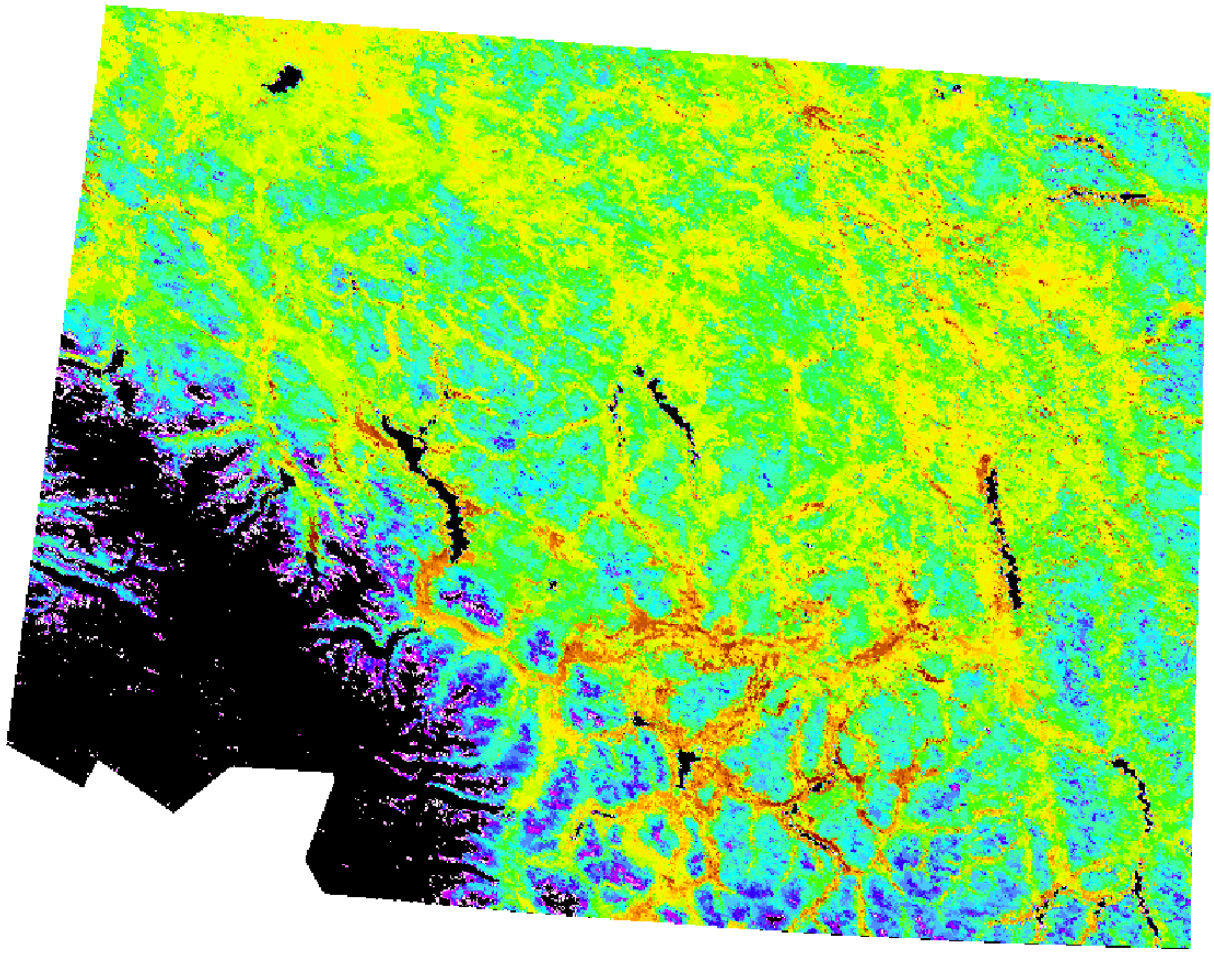
Scott Green: Dempster Highway, Yukon

- Dendroecology and seedling surveys across climatic gradient
- Water relations in seedlings, field measurements and controlled conditions
- Results: continuous photoperiods may impose unique physiological limitations to seedling establishment, tree genotypes may have high phenotypic plasticity in resource allocation traits
- 2009: A new research initiative examining forest response to future climate change

Status of projects: West

David Hik, Ryan Danby: Kluane, Yukon

- Treeline mapping, permanent monitoring plots at treeline
- Microclimate data, soil temperature, snow cover using remote sensing
- Effects of shrub expansion, nutrient cycling at shrubline
- Results: shrubline is advancing, shrubs cool soils in summer and cause warming in winter



Legend

SNOW OFF_DURATION_2007

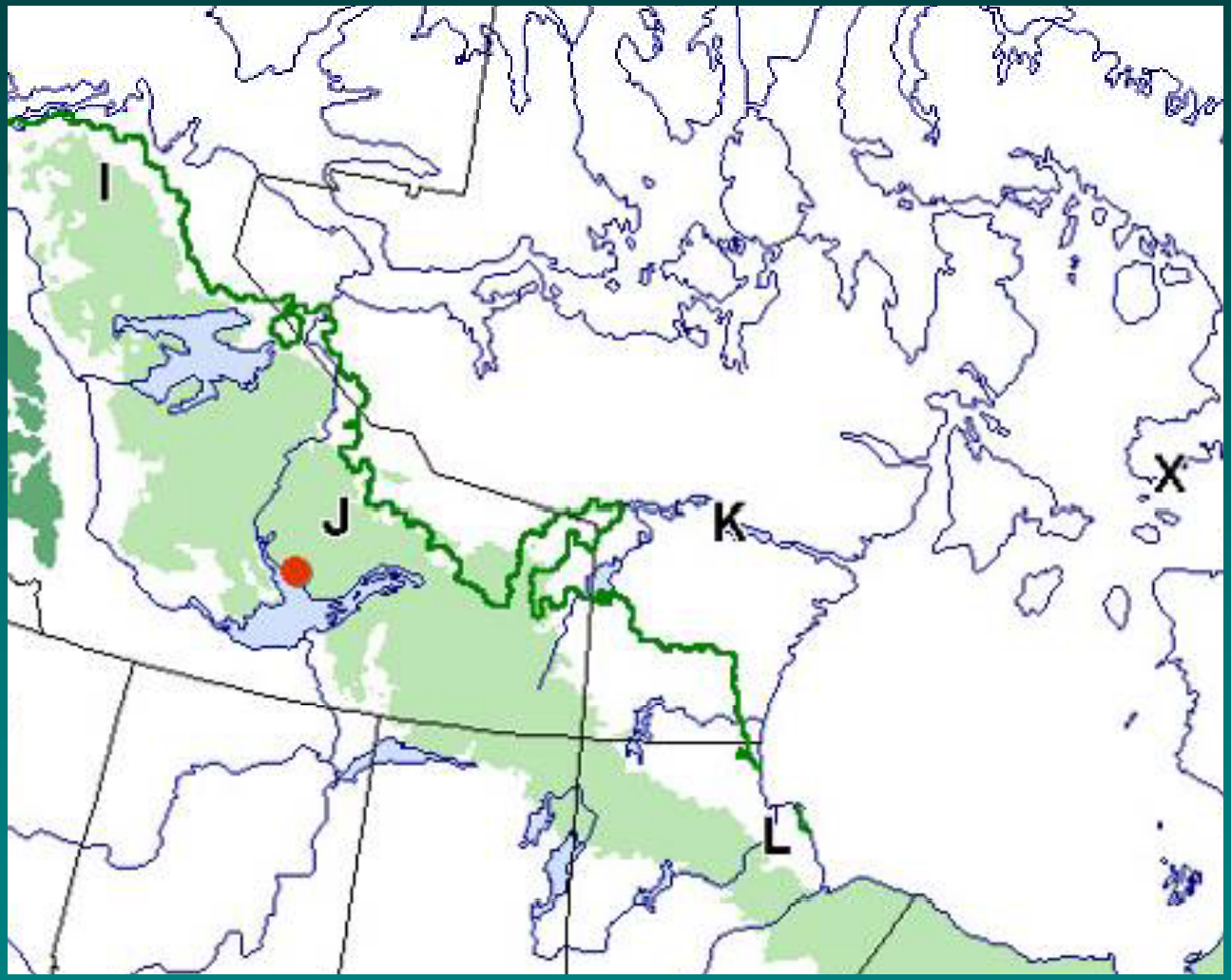
Value

High : 240

Low : 0

0 50 100 200 Kilometers

Status of projects: Central



Status of projects: Central

Greg Henry: Mackenzie Delta, NWT

- Six tree islands studied in early 1990s relocated, remeasured
- Cones collected, trees cored
- Microclimate stations from 2004 available
- Results: no seedlings found in tree islands but transplanted seedlings survived
- 2009: further research on tree islands, protocols

Status of projects: Central

Pete Kershaw: Macmillan Pass, NWT and Churchill, Manitoba

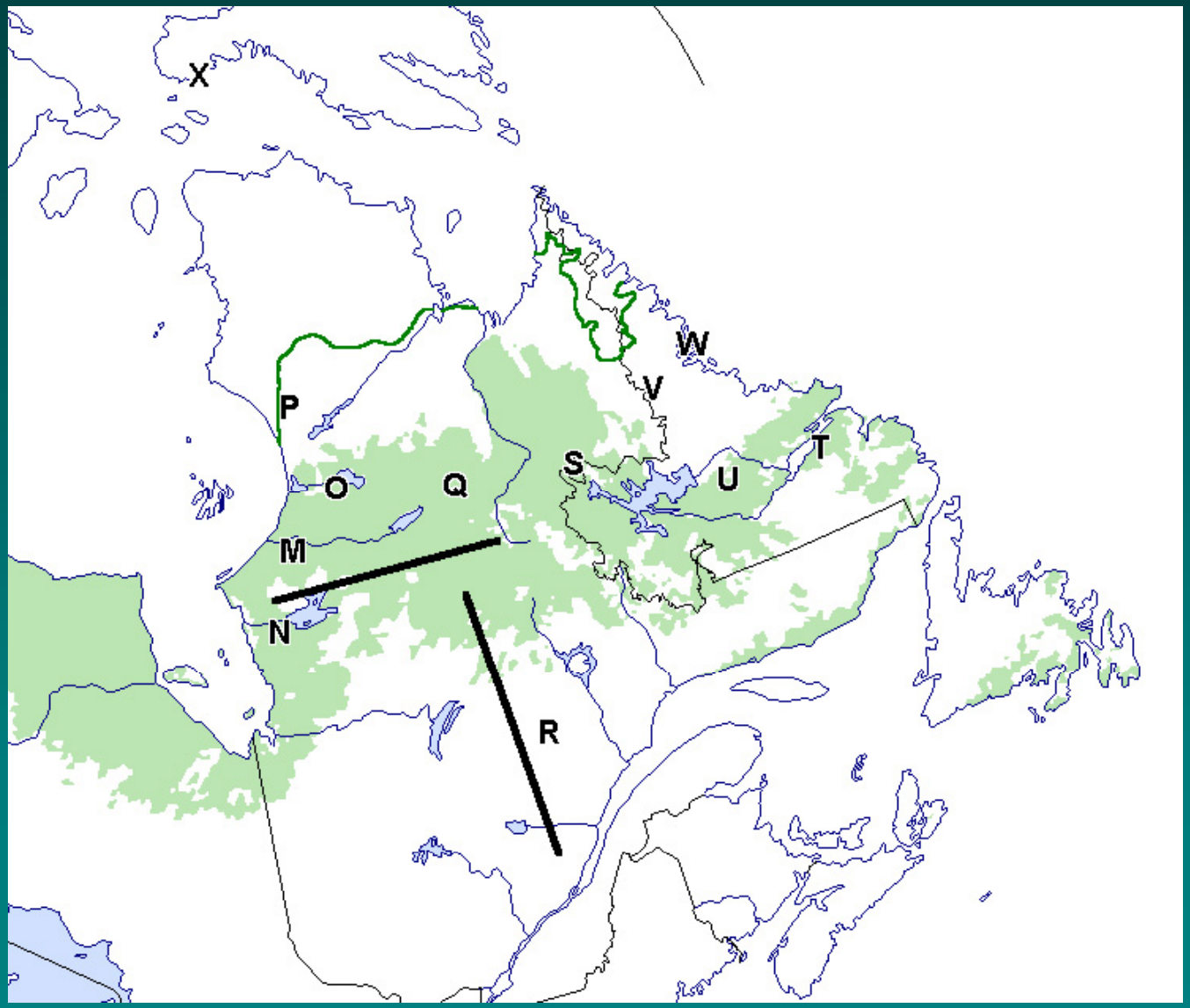
- Established permanent plots to assess seedlings, saplings, trees
- Microloggers installed to assess temperature, also snowpack
- 2009: sample processing, related lab work, analysis

Status of projects: Central

Nancy Doubleday, Shawn Donaldson: Cape Dorset, Sanikiluaq, Baker Lake, Rankin Inlet, Iqualuit, Nunavut

- Documentation of old photographs
- Community workshops
- Interviews for food choice project
- 2009: finish interviews, results presented to communities

Canada East



Status of projects: East

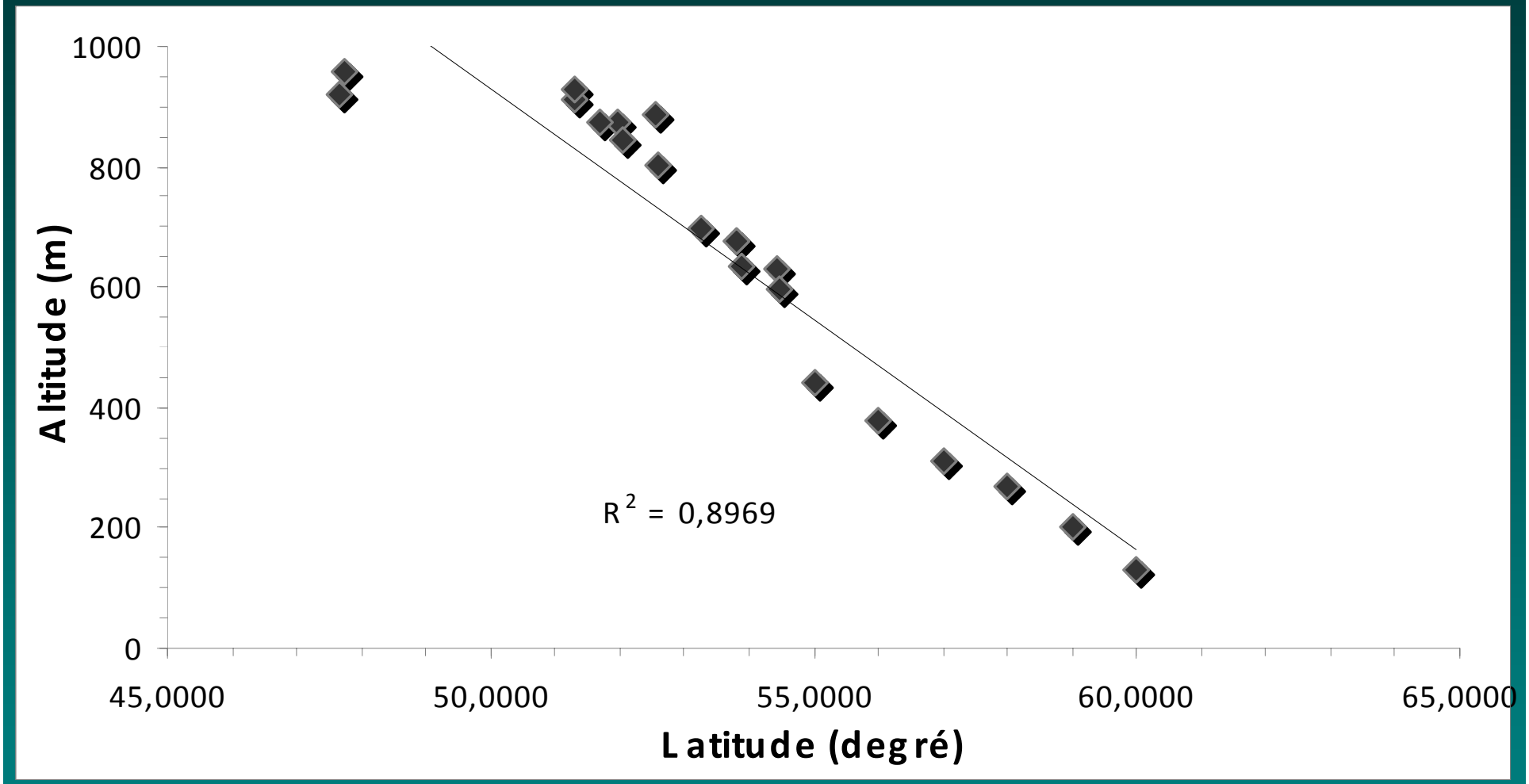
Stéphane Boudreau: subarctic Québec

- Effects of caribou on seedlings, effect of hydroelectric reservoirs on caribou
- Seed collection, germination trials, dating of trampling scars
- Results: greater production of black spruce seed at treeline, caribou-disturbed sites better for germination, no major impact of hydroelectric dams on caribou
- 2009: finish field work, analysis

Status of projects: East

Serge Payette: northern Québec

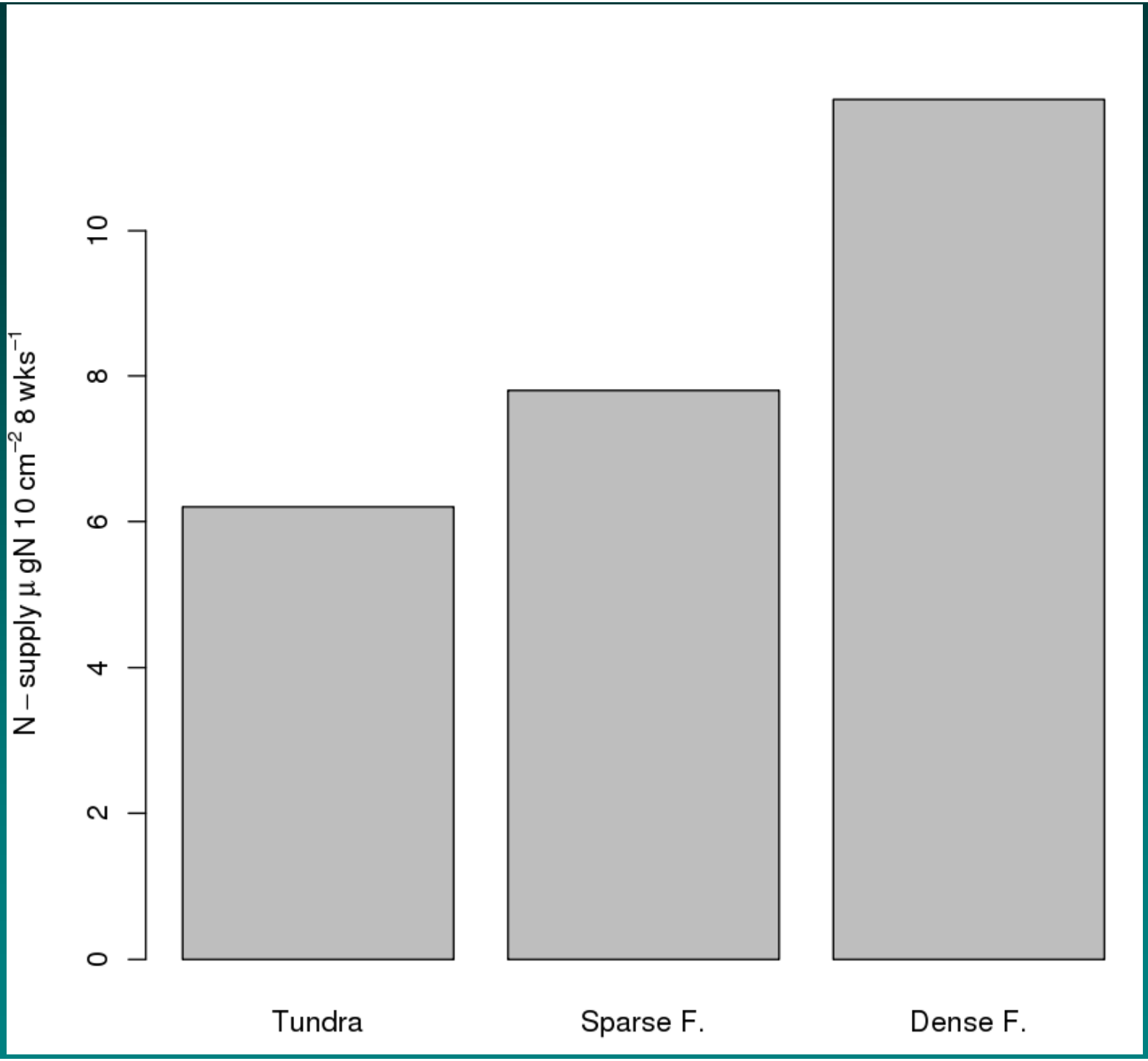
- 16 tundra-covered mountains sampled
- Effects of tundra area, time since fire and other factors on plant diversity
- Results: treeline position strongly related to latitude; diversity, especially of vascular plants, related to latitude, tundra area, time since deforestation


1000
800
600
400
200
0
Altitude (m)
R 2 = 0,8969
45,0000
50,0000
55,0000
60,0000
65,0000
Latitude (degré)

Status of projects: East

Frank Berninger: Schefferville, Québec

- 81 plots in forest tundra ecotone, 1 weather station
- Vegetation structure, dendrochronology, decomposition, soil nutrients
- Simple leaf canopy photosynthesis model
- Results: nitrogen supply rate decreased from closed forest to tundra
- 2009: field work including collecting probes and decomposition sample, analysis


N – supply μgN 10 cm^{-2} 8 wks^{-1}
0
2
4
6
8
10
Tundra
Sparse F.
Dense F.

Status of projects: East

Alvin Simms: Labrador

- Aerial photographs, satellite imagery, vegetation measurements
- Model land use change by integrating GIS and Expert Systems
- Examination of satellite imagery, Labrador Innu knowledge base

Status of projects: East

Trevor Bell, Colin Laroque: Labrador

- Paleoclimatic reconstruction of central Labrador, tree growth, submerged subfossil wood in ponds above treeline

Status of projects: East

John Jacobs: Labrador

- Ongoing climate monitoring along elevational transect, soil nutrient probes, soil temperature monitors
- Results: growing degree-days key bioclimatic indicator, nutrient levels and organic layer greatest in forest-tundra transition and least in forest

Status of projects: East

Gavin Kernaghan: Labrador

- Soil bioassays for mycorrhizae, soil nutrients, outplanting of black spruce seedlings
- Results: different fungal species in different soil types, 25% survival of outplanted black spruce seedlings

Status of projects: East

Luise Hermanutz, Paul Marino: Labrador

- Moss growth, seed rain, seed bank
- Experimental plots for effects of groundcover, herbivory and nurse effects on black spruce seedlings
- Tree stand history and recruitment using dendrochronology, effect of natural disturbances
- Results: allelopathic effects of Sphagnum on seedlings rather than facilitation from shrubs, lots of seeds but only 2 black spruce germinants
- 2009: last field season

Status of projects: Post-docs

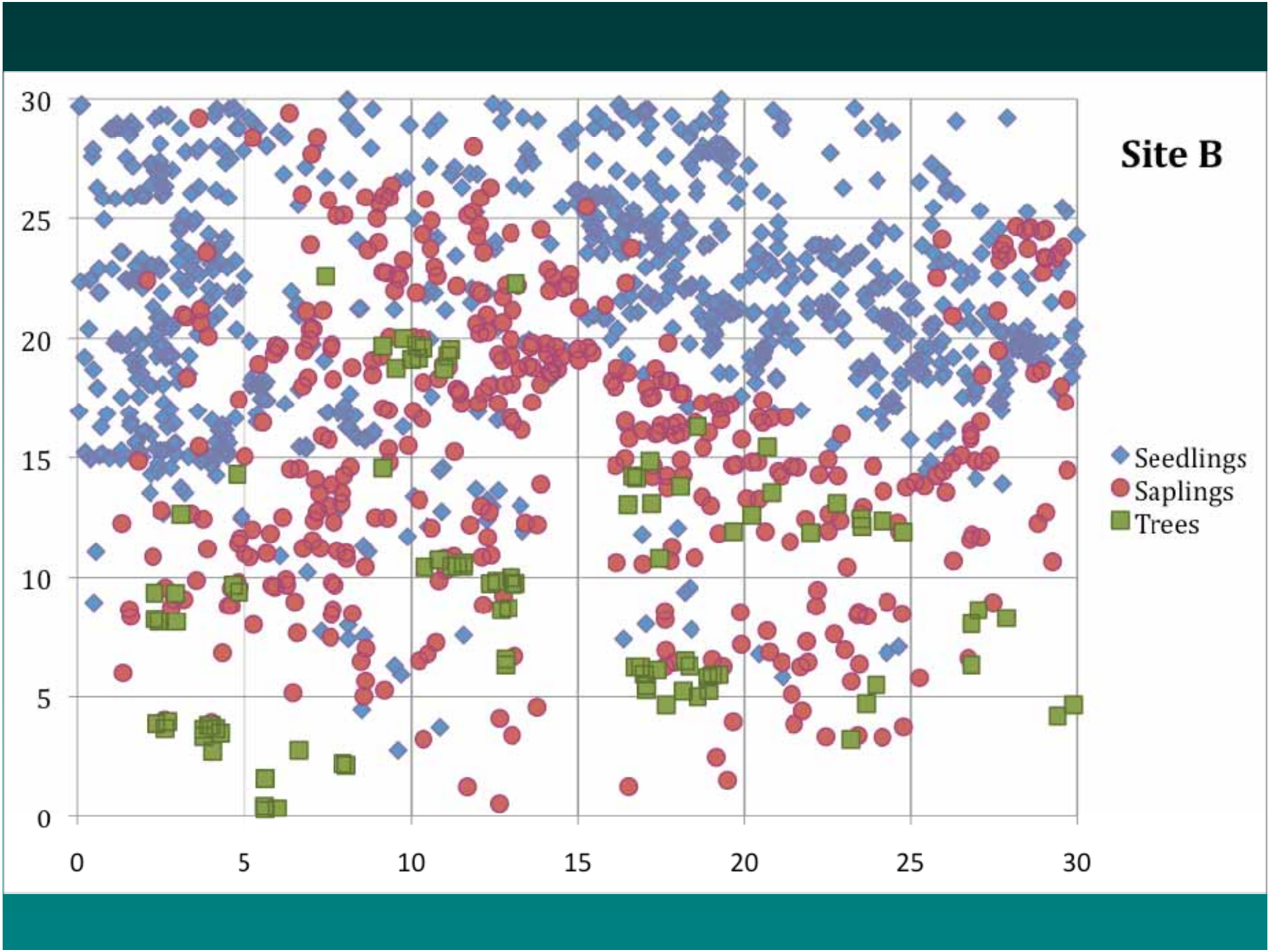
Brian Starzomski, Keith Lewis: Labrador, Yukon

- Two years of point count data for treeline bird communities, showing strong community preferences for vegetation volume and habitat type
- You'll hear more about this later

Status of projects

Karen Harper: Labrador, Churchill, Yukon

- All trees mapped within 30 x 30 m plots in all 3 study areas for spatial pattern analysis
- Vegetation structure sampled across edges of krummholz in Churchill and Labrador
- Results: spatial pattern of trees and seedlings variable among sites, affected by local factors such as aspect, exposure to wind
- 2009: project on integrating knowledge on treeline into northern classrooms with visits to the Yukon, northern Quebec and Labrador


Site B
30
25
20
15
10
5
0
0
5
10
15
20
25
30
Seedlings
Saplings
Trees

Implementation of protocols

- Dempster, Yukon (Carissa, Jill)
- Carmacks, Yukon (Rod)
- NWT (Greg, planned for 2009)
- Churchill, Manitoba (Pete, Karen)
- Labrador (Labrador group)

- Community protocols in progress (Nancy, Shawn)

Products: scientific and non-technical

- Scientific publications: synthesis papers, special features within PPS Arctic (CJFR special feature)
- Books: coffee-table book, children's book
- Data: metadata, long-term data storage
- Photographs
- Plant workbook with quotes of plant uses from elders as educational legacy of PPS Arctic
- Other: national tree seed storage, national treeline map, plant collections

Theme representation

- ???

Thoughts for the future from Karen

- I would like to see more group applications for funding but I am not in a good position to lead these applications.
- It would be great to focus attempts to get funding in order:
  - to continue annual meetings (even if it means charging a registration fee)
  - to resample our plots 10 years later in 2018.
- Let’s keep up the pressure to publish these synthesis papers!