

LiDea forest habitat restoration project

*Forest disturbance, restoration and
regional collaboration*

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DU Workshop
Edmonton | Jan 21 2016

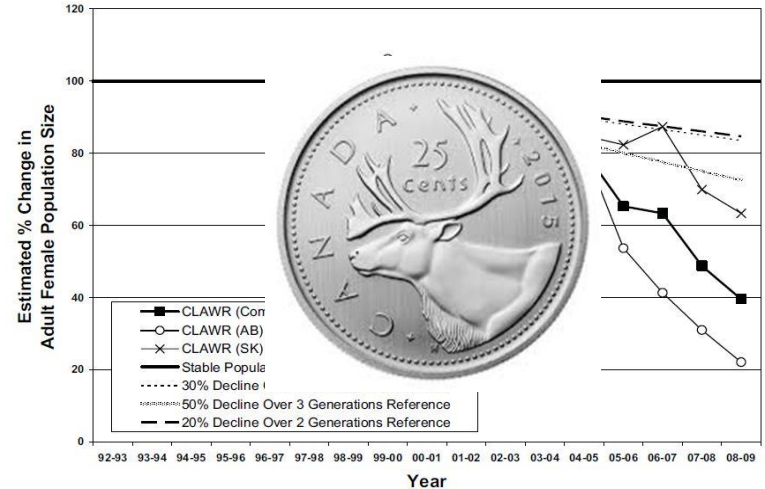


Outline

- **Social and Ecological Context**
- **Potential Solutions**
- **LiDea Forest Habitat Restoration Project**
- **Restoration Results**
- **Collaboration – RICC**
- **Steps Forward**

Caribou issue

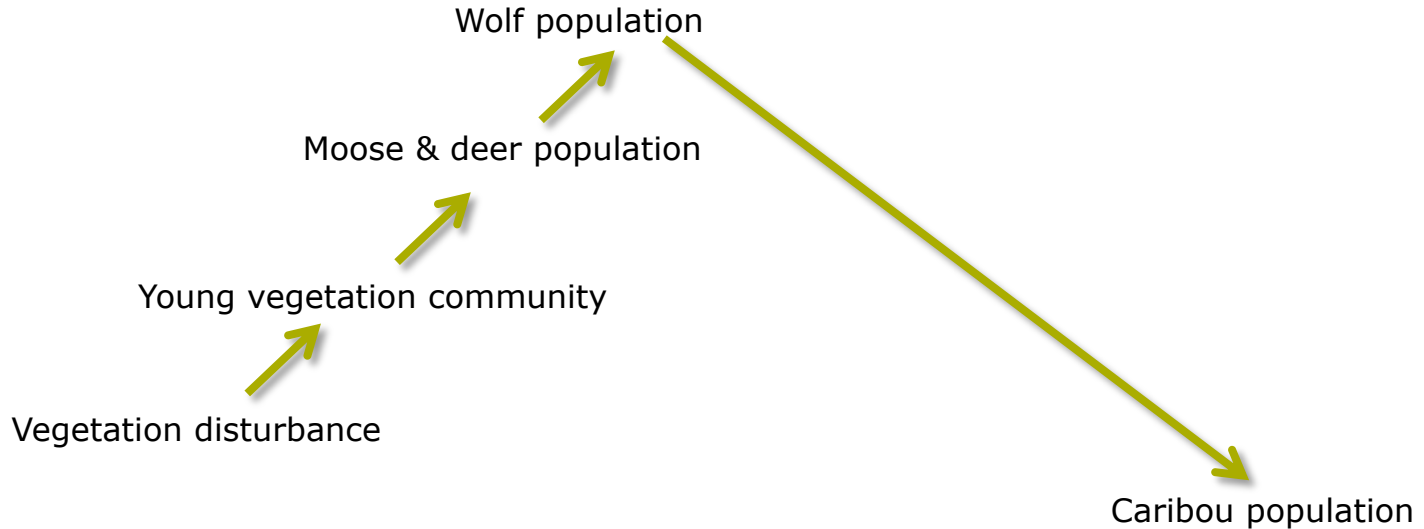
- Iconic Canadian species
- Traditional Aboriginal value
- Significant media attention
- Hardy + sensitive



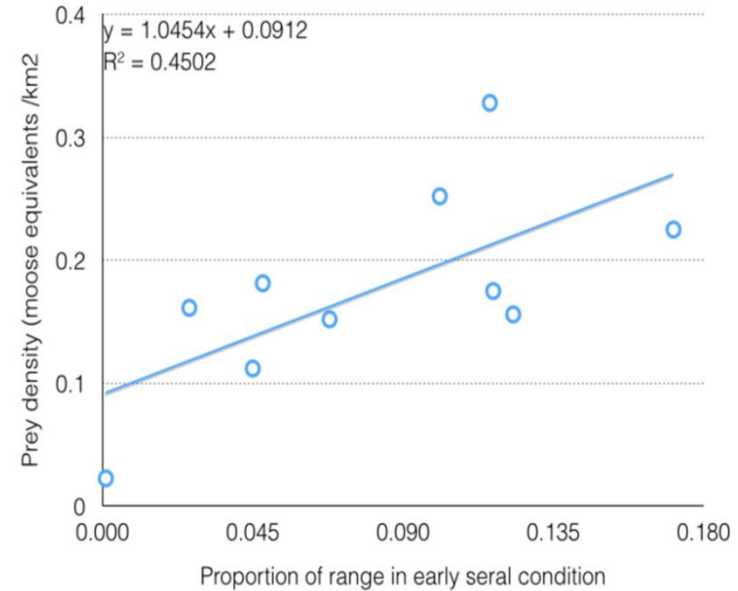
Reference: Alberta Sustainable Resource Development and Alberta Conservation Association. 2010.

A Basic Model

Decline related to habitat disturbance

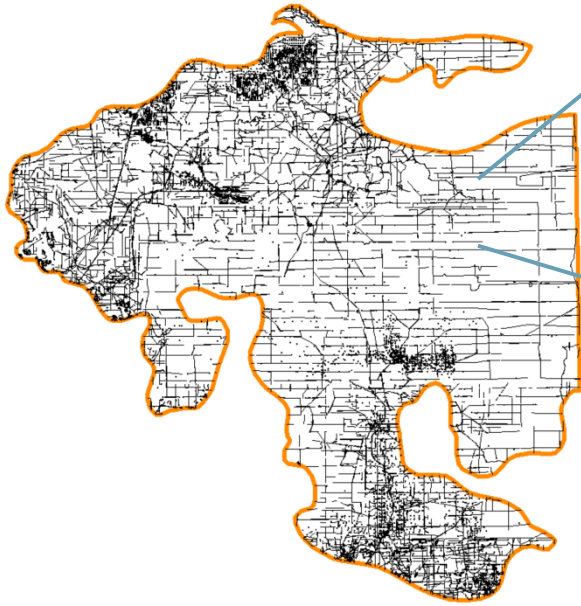


Early Seral Condition



Reference: Wilson S.F. 2014 Integrated Management of Boreal Caribou in Northeastern BC. BC Boreal Caribou Research and Effectiveness Monitoring Board

Cold Lake herd landscape



The ecological stage



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Cleared in 1997

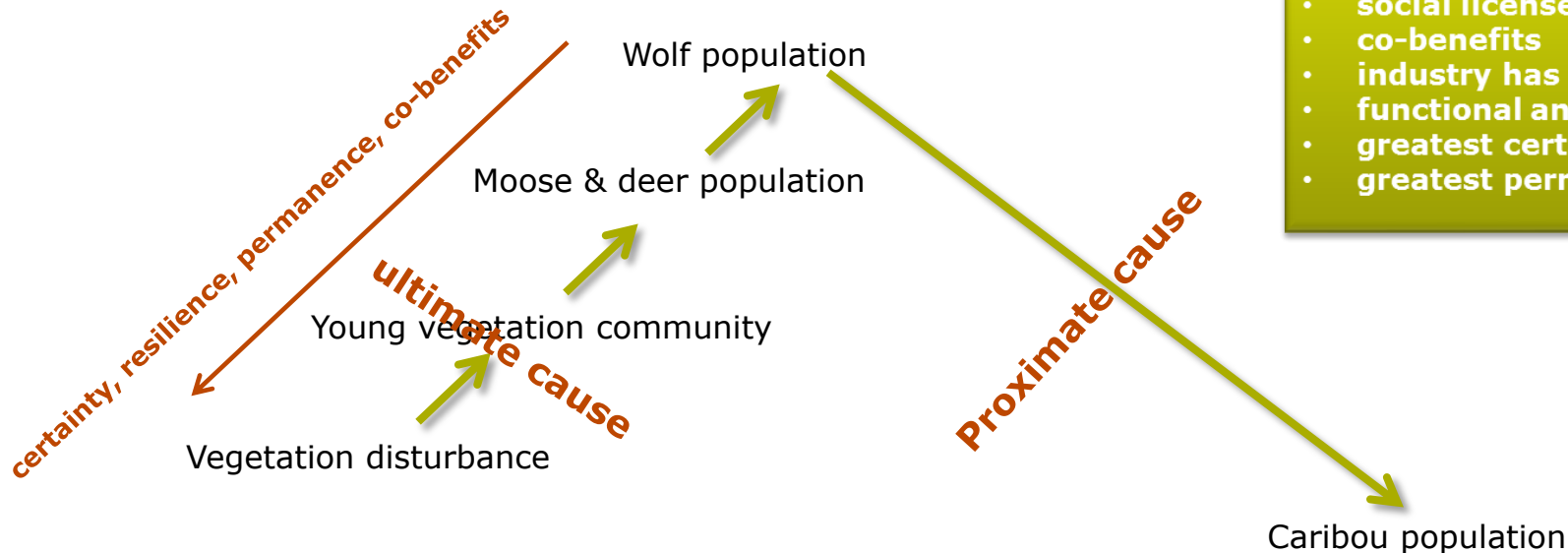


Alternative examples



Caribou: how can we address this?

disturbance - restoration



Restoration positives

- social license
- co-benefits
- industry has ability
- functional and numerical
- greatest certainty
- greatest permanence

We attempt to address both proximate and ultimate causes

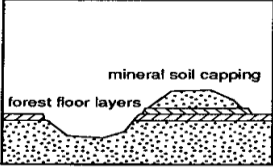
Silviculture



Mounding Literature

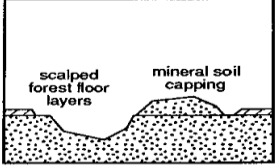
SUMMARY

Inverted humus mounds



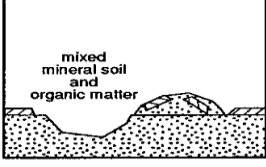
- good on nutritionally poor sites;
- good for rich sites with fine textured soil;
- not recommended for drought-prone sites or sites with deep, loose duff.

Mineral mounds



- best for cold, but slightly drought-prone sites.
- not recommended for nutritionally poor sites.

Mixed mounds



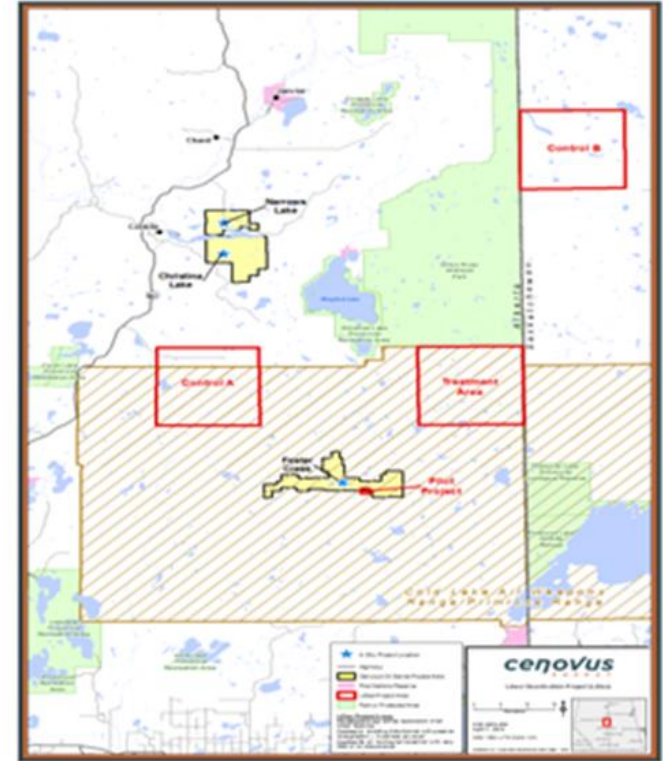
- best for slightly drought-prone, nutrient-poor sites,
- not recommended for sites with abundant competing vegetation;
- avoid creating large chunks of organic matter that cause air pockets.

NOTE: None of these mound types is recommended for sites with a significant risk of summer drought.

Reference: Mounding for Site Preparation, FRDA Memo No. 100, **July 1989**;
<http://www.for.gov.bc.ca/hfd/pubs/docs/Frm/frm100.pdf>

What is LiDea?

- Forest habitat treatment for restoration
- Mounding, planting and stem bending
- Objectives:
 - ↑ conifer abundance/growth
 - ↓ trafficability/sightlines
 - restore species distribution
 - adaptive, operationally viable methods
 - controlled design – measured/monitored
- <https://www.youtube.com/watch?v=7rzqMvc4-w0>



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Treatment prescription



Legend

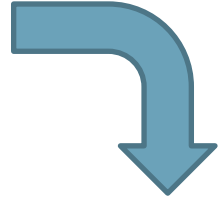
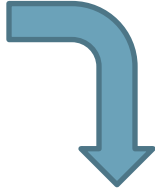
LineA

Treatment

- █ Mound + WD + Plant
- █ Mound + Plant
- █ WD + Plant
- █ Fill Plant +WD
- █ Stem bending
- None

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Cenovus approach to restoration



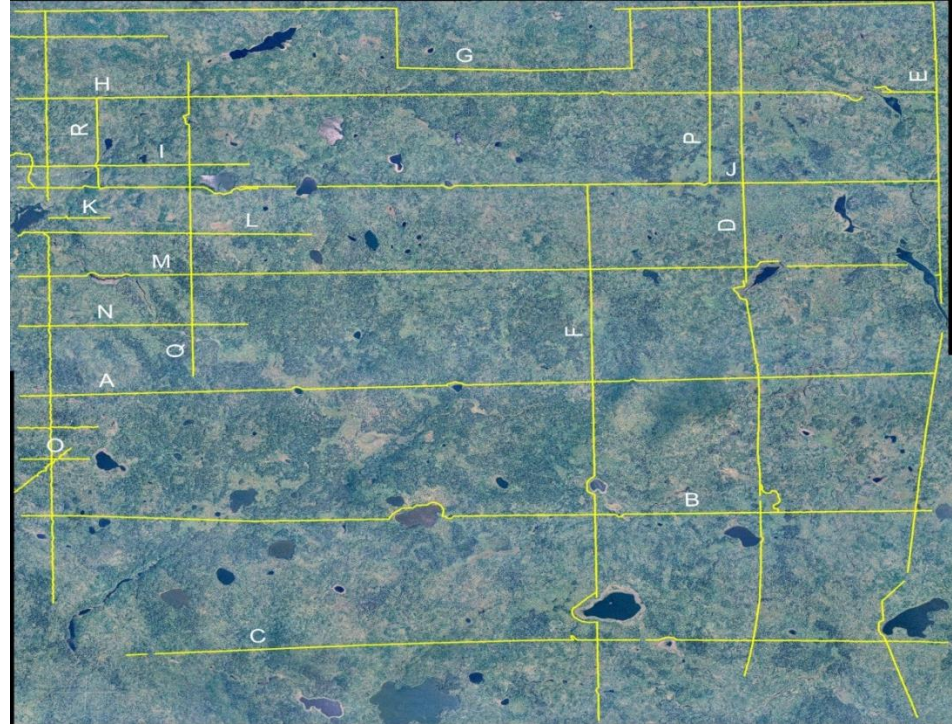
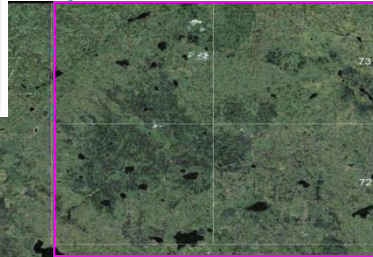
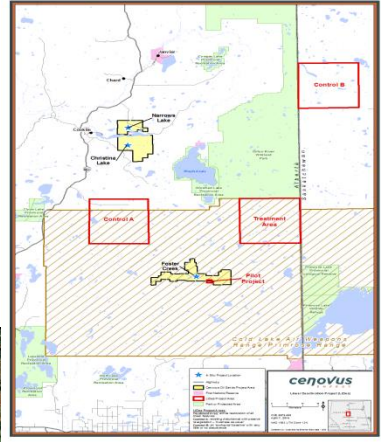
Video: <https://www.youtube.com/watch?v=7rzqMvc4-w0>

Landscape scale



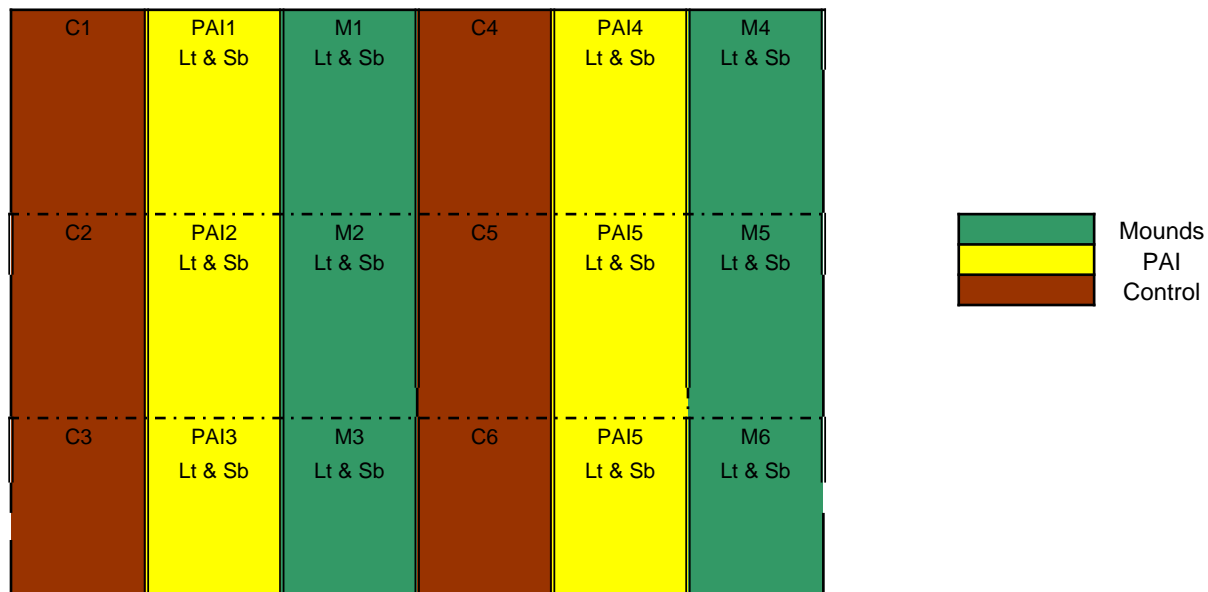
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252 km treated in 37,000 hectares



Mound/plant results - controlled design

Site Layout



Without silviculture



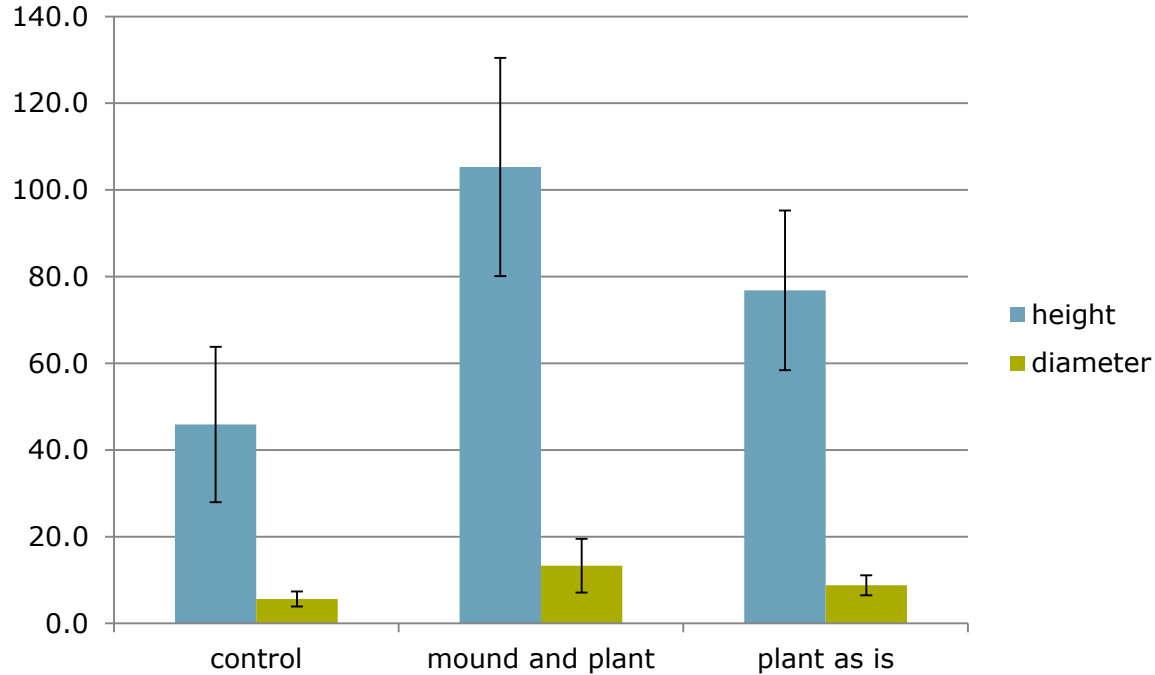
Control site remains stagnant under passive revegetation since 1997

With silviculture

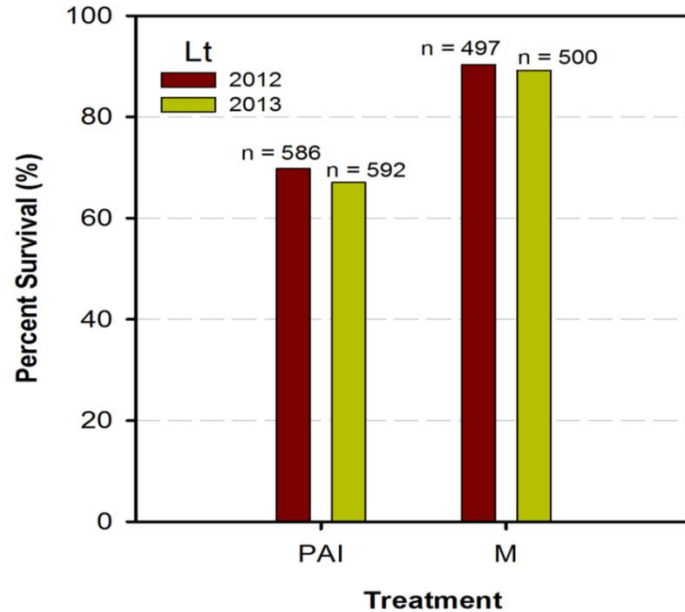


Site treated with silviculture in 2008

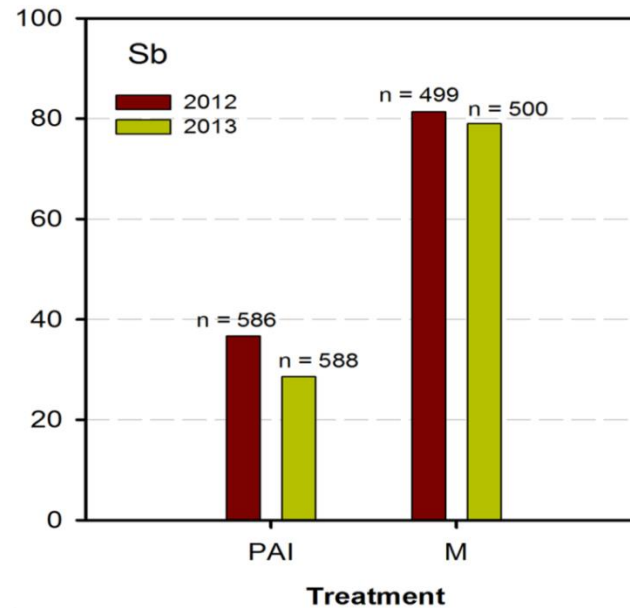
Vegetation response – better growth rate



Vegetation response - better tree survival

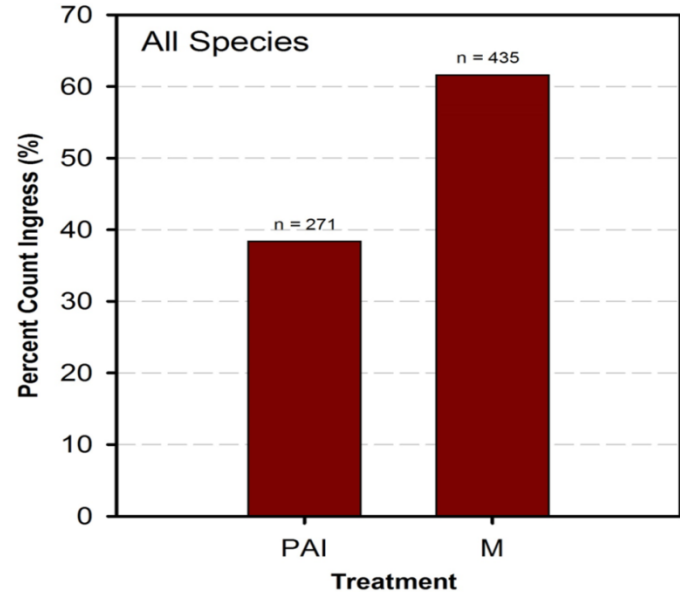


Larch survival 4 and 5 years following plant-as-is (PAI) and mound/plant (M)



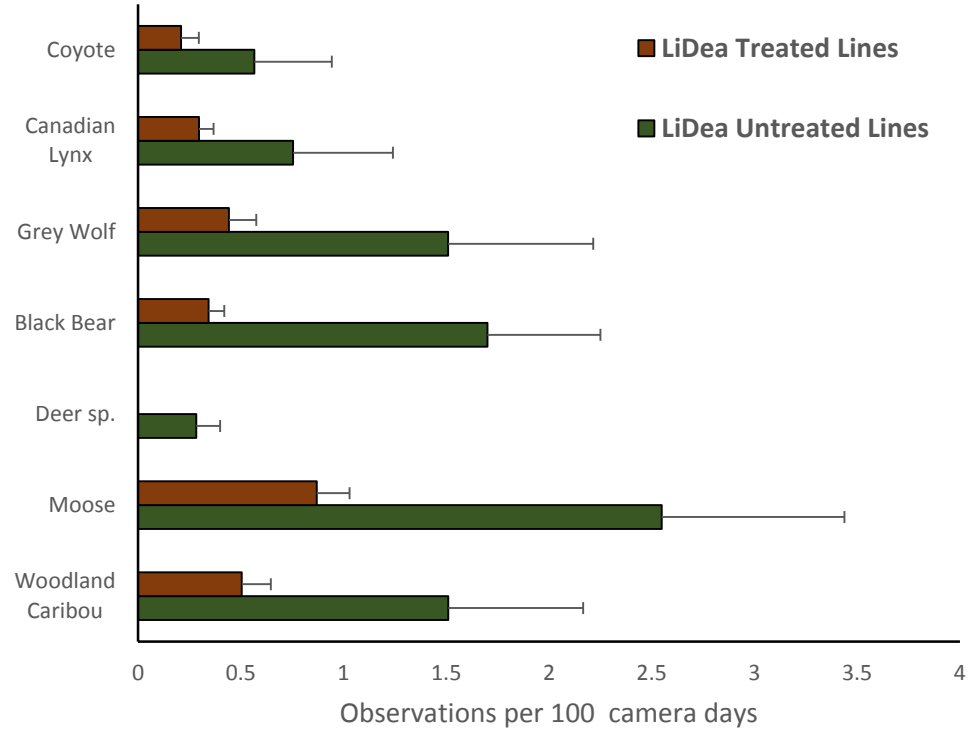
Black spruce survival 4 and 5 years following plant-as-is (PAI) and mound/plant (M)

Vegetation response – increased woody ingress

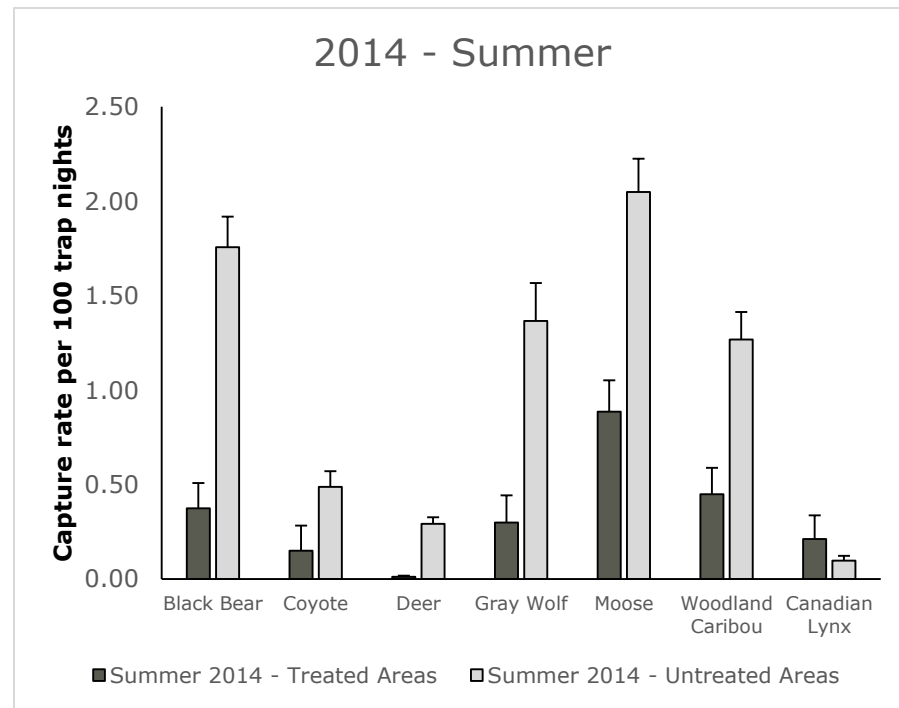
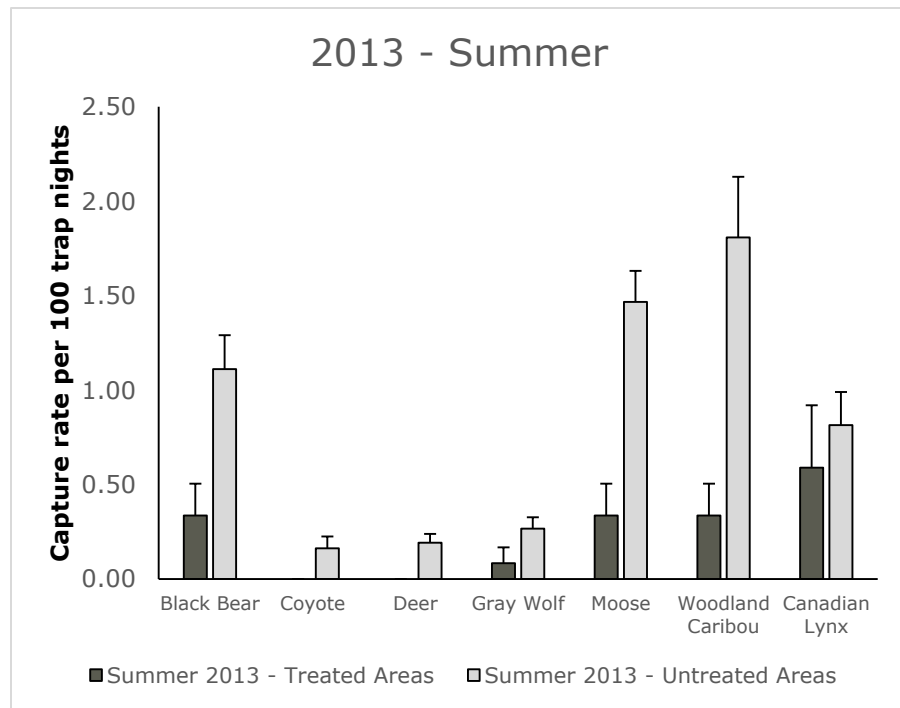


Ingress into treatments after 5 growing seasons

Wildlife response – reduced use of lines

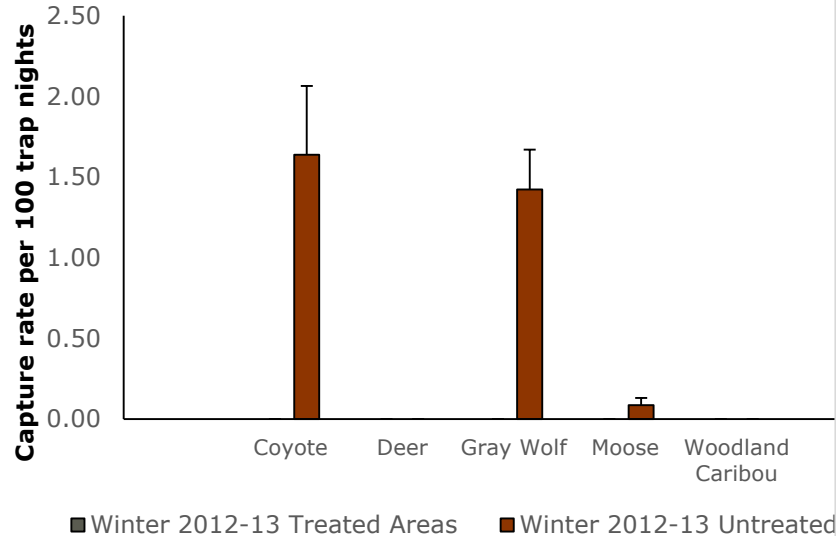


LiDea - summer capture rates

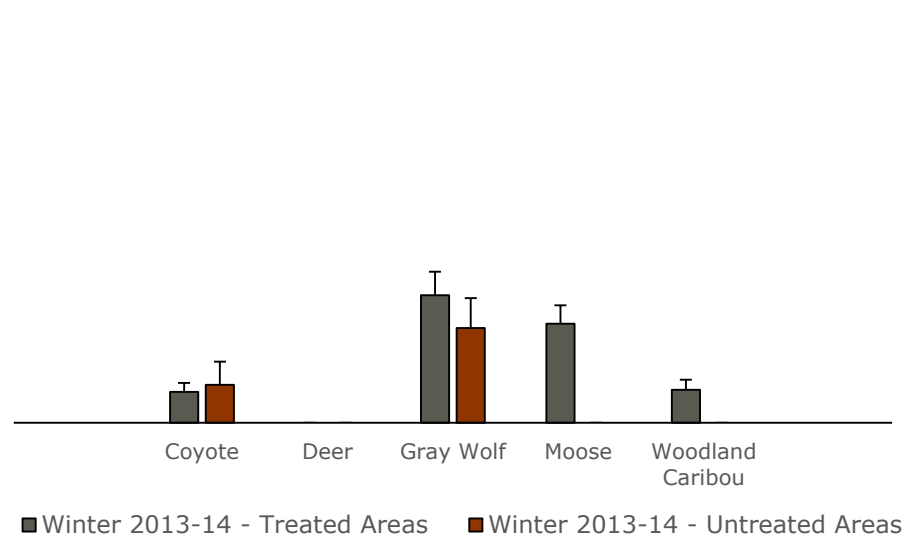


LiDea – winter capture rates

2012-13 Winter

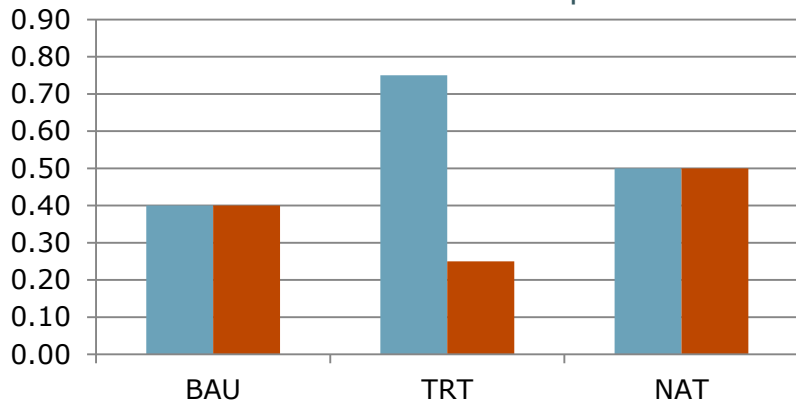


2013-14 Winter



Wildlife response – moose recruitment

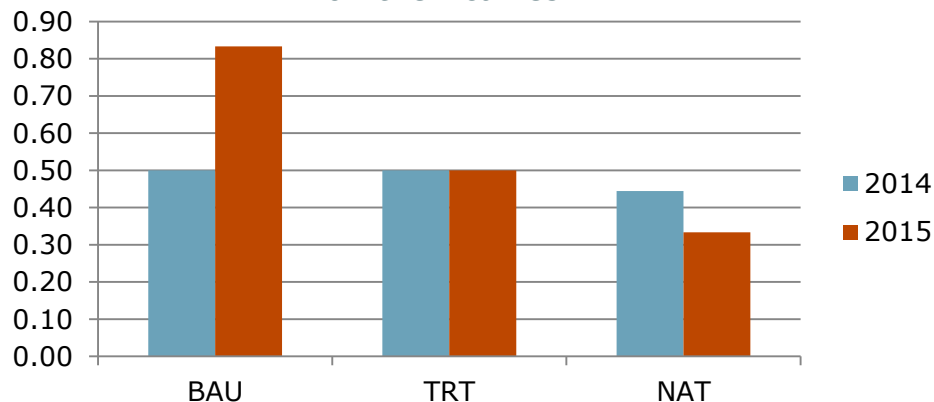
Number of calves alive (late summer)
relative to the number produced



Although the data are somewhat consistent with predictions, further data collection will improve our understanding of response to treatment

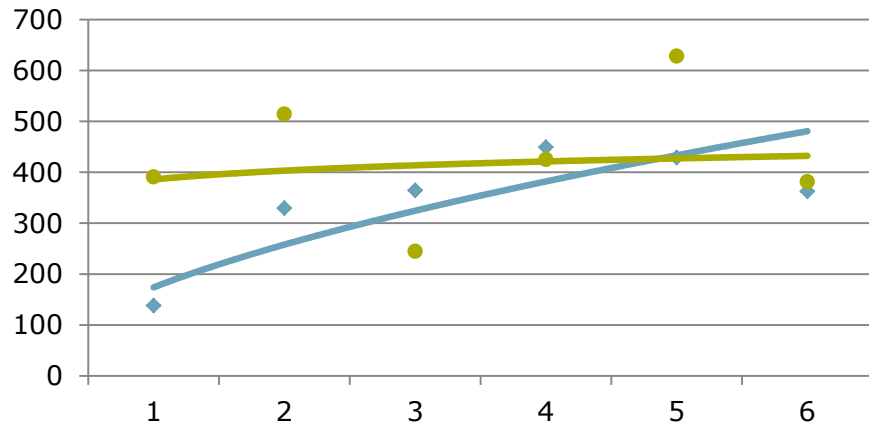
■ 2014
■ 2015

Proportion of cows affected by predation
on their calves



Association with seismic lines

Wolves

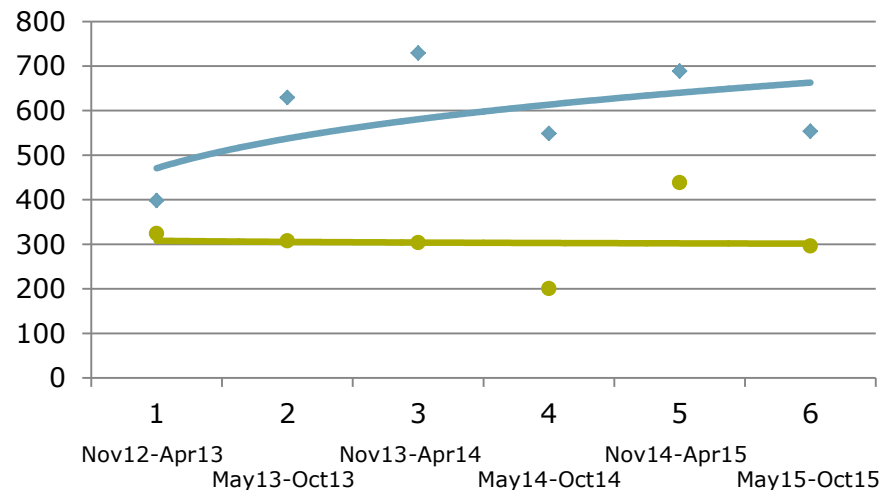


Proximity (m) to seismic over time

In TRT

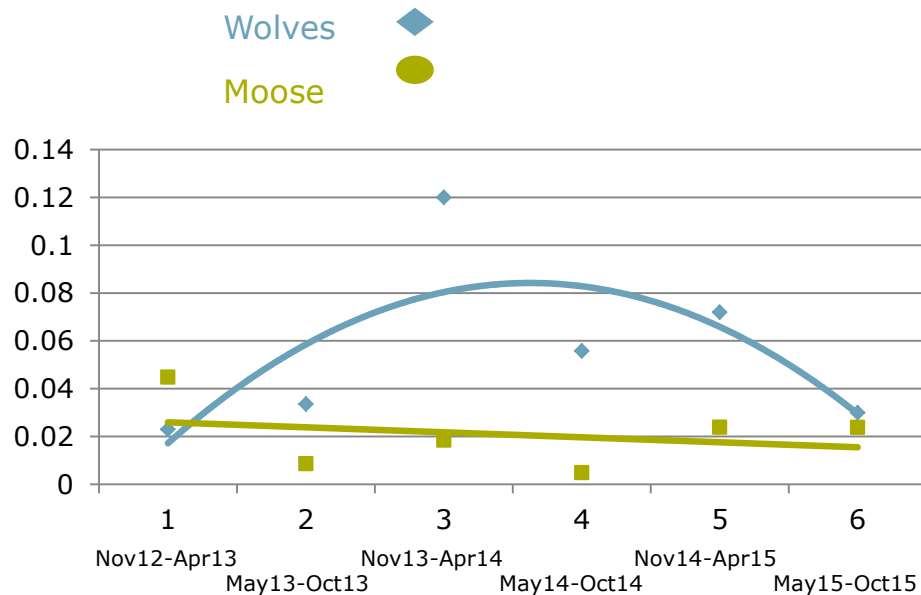
Out of TRT

Moose



Proportional use of seismic

Proportion of locations (while in the TRT) on seismic over time



Next steps for restoration?

Treatment methods and equipment

- amphibious, ultra low ground pressure
- implements vs. excavator buckets
- transplanting

Seed stimulation and delivery

- gibberellins
- seed pucks

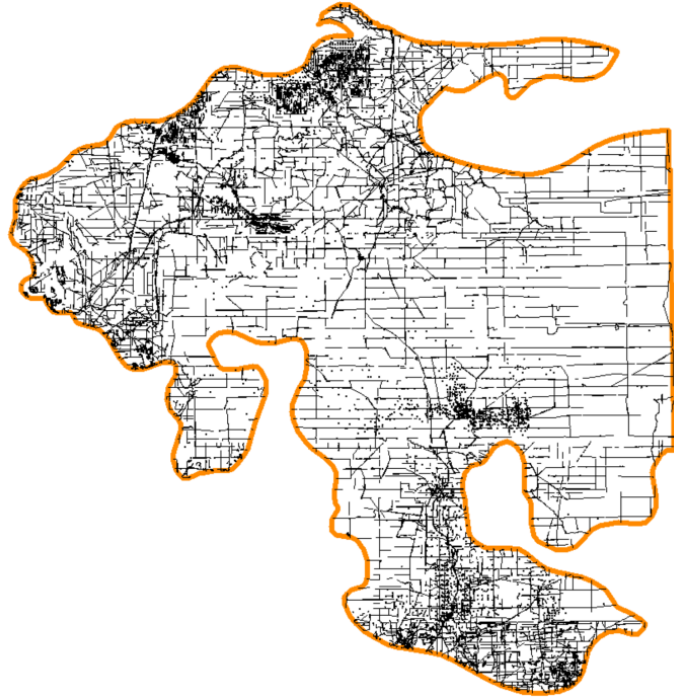
Landscape scale optimization

Improved predictability



Regional Industry Caribou Collaboration (RICC)

Adaptive management at landscape scale



Why collaborate?

- Canada Federal Caribou Recovery Strategy - action planning
- Herd/landscape level problem, crosses lease boundaries
- Growing consensus: strong, integrated measures needed
- Need for a viable multi-party management model
- Economy of scale, technical opportunity, data share, etc.
- Opportunity for technical excellence and tenure
- Need to de-conflict research
- A common business risk and classic win-win opportunity

RICC mission and scope

Mission:

- conserve & restore caribou/habitat
- regional collaborative range-based effort
- maintain viable resource industry

Technical scope:

empirical research, baseline condition mapping and assessment, investigative trials, monitoring and active adaptive management, implementation of integrated land management

Geographic scope:

- Cold Lake Caribou Range,
- East Side Athabasca Range (ESAR)
- portions of the Saskatchewan boreal forest to the east

Current objectives

Coordinated restoration across the geographic scope of interest

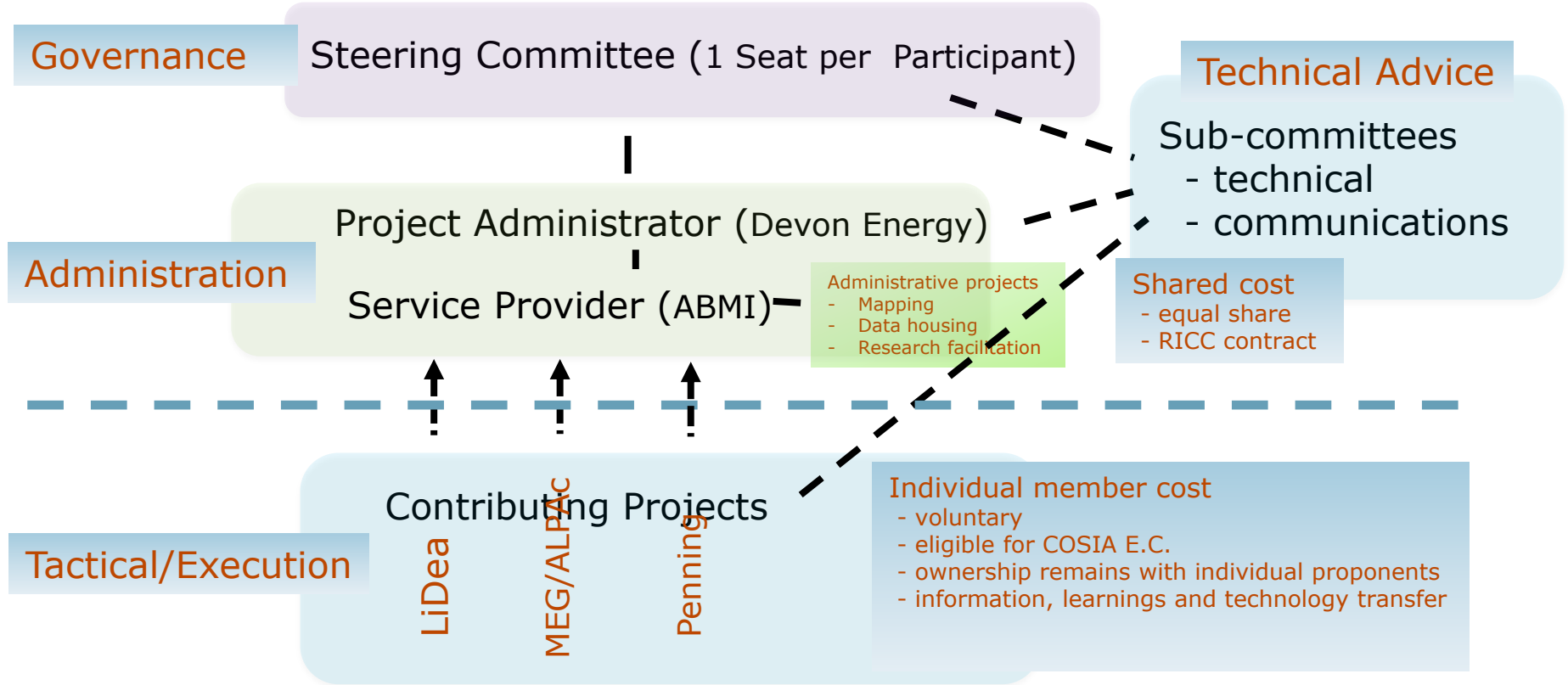
Ecological research allowing identification of land management priorities

Investigative trials on habitat/wildlife – management recommendations

Alignment with emerging caribou range plans

Cross-company and cross-industry coordination leading to a working landscape

RICC structure & governance



Concerns & challenges

- Flawed assumption of passive recovery on bog and fen
- Assumption that silviculture is too expensive
- Restoration requires viable industry, a working landscape
- Allure of silver bullet or superficial remedies
- Public land administration, dispositions and tenure
- Need facilitative/enabling restoration ground rules
- Climate change, fire, deer
- Large patch sizes vs. wide distribution of development

Can we buy time, wait for forest cover?

- Bog and fen susceptible to stagnation or paludification
- Time not correlated with return to forest cover
- Moss layer inhibits spruce seed germination
- Site specific decision required
 - forest type & regeneration mechanism, distance to surface water
 - bog and fen should be scarified
- Risk and liability associated with stagnation
- Opportunity cost

Boreal succession \neq Classical theory

Evidence in the boreal suggests:

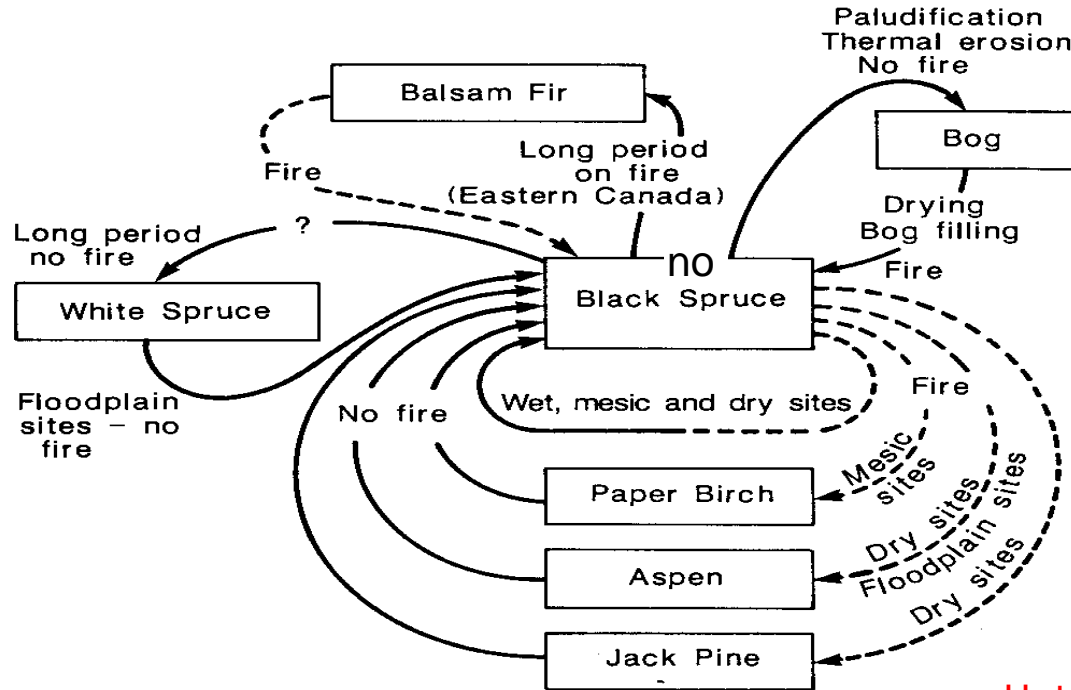
- classical theory fits poorly (Rowe 1961)
- variability in dynamics, multiple pathways possible
- risk of generalization and over-simplification
- strong biotic filters

Risk - assumption of recovery with passive approach

What is required?

- active restoration
- adequate successional model and understanding

Boreal succession



Hutchinson 2009

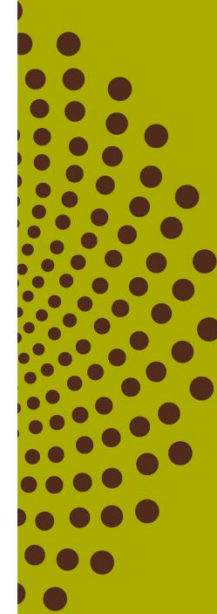
The ecological context

"Without an adequate theoretical and/or empirical knowledge of succession, successful land management is generally a matter of luck..."

Kimmins, J.P. 1987 Forest Ecology, MacMillan Inc., New York



Thank you



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