Cenovus Caribou Habitat Restoration Project

Conservation offset insights from the LiDea project
Outline

• A proposed caribou model
• Cenovus’s approach to forest habitat restoration
• The LiDea projects
• LiDea monitoring and preliminary results
• Some observations on offsets
Integrating environment into all we do

Minimizing our land footprint  Reducing our air emissions  Using less water

“The status quo isn’t good enough when it comes to environmental performance.”

-Harbir Chhina, Executive Vice-President, Oil Sands
Caribou issue

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

Woodland Caribou

Decline related to habitat disturbance

We attempt to address both immediate and ultimate causes
Early seral condition

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

Disturbance, recovery and the ecological ‘theater’
Cold Lake herd landscape

82 km

19 km

8 m
Cenovus’s approach to restoration

- **Objective - successional advancement**
- **Use silviculture**
- **Tools**
  - Site preparation (cultivate or modify soil and microsite)
  - Stand modification (bend stems, roll-back woody debris)
  - Tree planting (one year old, ≈ 15 cm conifer seedlings)
Site preparation - mounding
Mounding literature

Reference: Mounding for Site Preparation, FRDA Memo No. 100, July 1989; http://www.for.gov.bc.ca/hfd/pubs/docs/Frm/frm100.pdf
Stand modification
Tree Planting
Cenovus linear deactivation (LiDea) & restoration

Video: https://www.youtube.com/watch?v=7rzqMvc4-w0
Historical Mounding
Est. 2008
Compare active vs. passive approach
Test basic silviculture for application in oil and gas

LiDea I
Est. 2011
Pilot linear deactivation
Test linear restoration techniques & monitor at site level

ROSE
Est. 2012
Restoration of OSE sites
Test a range of silviculture tools

LiDea II
Est. 2013
Forest Habitat Restoration
Test plant and animal response at site, individual and population levels

South LiDea
Est. 2016
Forest Habitat Restoration
Operational and multi-party Extension of LiDea

CLARA
Est. 2016
Forest Landscape Restoration
Apply LiDea techniques to range

Applied investigation in restoration
Historical mounding project

- Est. 2008
- Test basic silviculture
- Wet, low productivity forest
Seven summers after restoration treatment

### Height (cm)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Larch</th>
<th>Black spruce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant as is</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mound and Plant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Red**: Control
- **Blue**: Plant as is
- **Green**: Mound and Plant
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 – woody ingress

[Image of vegetation]

[Bar chart showing percentage of count ingress for different treatments]

- **PAI**: Number of cases = 271
- **M**: Number of cases = 435

Ingress into treatments after 5 growing seasons
Active restoration (silviculture) works!

Control site remains stagnant under passive revegetation since 1997

Site treated with silviculture in 2008
Restoration of oilsands exploration wells (ROSE)

Notes:
• Exploration wellsites
• range of site types
• est. 2012
• course woody debris
• mounding and ripping
• pine, spruce, larch
ROSE project

ROSE Wellsite Treatment Layout

Accounts for:
- Differences in moisture regime
- Slope
- Exposure

Silvicultural Treatment + CWD additions = Treatment layout

Legend:
- ROSE Boundary
- Sample Plot Boundary
- Sample Plot Center
- Treatment Corner Post
- Treatment Rectangle
- Installation Generation Sign

Restoration of Oilsands Exploration Well-Sites
ROSE Site #3 LSD: 11-18-70-3
Planted: Black Spruce & Tamarack
Class: Hydro Site Prep: Mounded
ROSE project results – various site types

Notes:
- PAI = plant as is
- SP = rip (dry) and mound (wet & mesic)
- CWD = course woody debris
- Planted summer 2012
- Larch on wet sites

Interpretations:
- Height ≈ 50 cm after 3 seasons
- Larch more responsive than black spruce
- Mesic sites: SP>PAI/CWD (competition)
- Dry sites: CWD>PAI>SP (drought stress)
- Wet sites: SP>CWD/PAI (excess moisture)
Linear deactivation (LiDea) project

• 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

• [Link](https://www.youtube.com/watch?v=7rzqMvc4-w0)
237 km treated in 37,000 hectares
Landscape scale
LiDea monitoring

Multiple scales, species and metrics
3-yr program completed, analysis and reporting underway
long-term effectiveness monitoring plan being developed

Site level
Vegetation development
Large mammal use & movement
Vegetation – both manual and remote measurement techniques
Wildlife use and movement – remote camera photo captures
≈102 cameras deployed

Individual level
Search, encounter, kill rates
Predict BAU > TRT ~ NAT
50 bears
64 wolves
23 moose
9 caribou

Population level
Survival, recruitment, population
Predict BAU < TRT ~ NAT
3 yrs of surveys
>1000 fecal pellet samples

≈102 cameras deployed
Wildlife response – reduced use of lines

![Image of wildlife in a forest]

<table>
<thead>
<tr>
<th>Wildlife Species</th>
<th>LiDea Treated Lines</th>
<th>LiDea Untreated Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coyote</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Canadian Lynx</td>
<td>0.1</td>
<td>1.5</td>
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<tr>
<td>Grey Wolf</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Black Bear</td>
<td>0</td>
<td>2.5</td>
</tr>
<tr>
<td>Deer sp.</td>
<td>0.1</td>
<td>3</td>
</tr>
<tr>
<td>Moose</td>
<td>1.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Woodland Caribou</td>
<td>1.5</td>
<td>4</td>
</tr>
</tbody>
</table>

Observations per 100 camera days
Utilization of features according to treatment intensity

Bar chart showing Black Bear Capture Rate by Treatment Intensity:
- Interior: A
- High: A
- Medium: A
- Light: AB
- Open: B

Camera Hits / 100 traps nights
Utilization of features according to treatment intensity
Utilization of features according to treatment intensity

Woodland Caribou Photo Capture Rate By Treatment Intensity

Camera Hits, 100 trapnights

- A
- AB
- B
- C

Treatment Intensity

- Interior
- High
- Medium
- Light
- Open
Observations on offsets & restoration

Issues:
• uncertainty, dynamic ecosystems, frame of reference, objectives, metrics

Proposed principles:
• clearly articulated values, problem statement and objectives
• biophysically effective
• forest as dynamic system, cycles of disturbance and recovery (never static)

Consider a ‘systems approach’ considering:
• processes
• inputs/outputs
• boundaries

What appropriate boundaries for system?
• Caribou range? Eco-zone? Land use or management zone?

Boundaries based on principles & best current science
Caribou habitat restoration

- Anthropogenic disturbances may create novel ecosystems
- Novel ecosystems + climate change = uncertainty
- Silviculture & active restoration increase predictability
- Attempt to resolve core problem, but...
- Other short-term management likely required
- Large, intensive disturbances required for forest health
- Confidence in restoration requires...
  - Clear policy and defined problem statement
  - Aligned regulation and management practice (align both scale and intent)
  - Inform methods with understanding of ecology & soil-plant system
Thank-you

Contact:
Michael Cody
Office: 403 766 3295
Cell: 403 604 0626
michael.cody@cenovus.com