Cumulative effects and impacts: an environmental perspective

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Overview

- Why now?
- Temporal and spatial extent
- Thresholds and resilience
- Options for advanced planning
- What values should we use

Why now? The goal…

- **We need dialog to ensure a goal of resilient ecosystems, vibrant economies, and healthy communities**

  … over the long term

Pressure not just from industry …

"opportunity to develop Liquefied Natural Gas"

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About 162 results (0.27 seconds)

Mandate Letter - Government of British Columbia
www.gov.bc.ca/premier/cabinet.../rich_coleman_mandate_letter.pdf
Jun 10, 2013 - generational **opportunity to develop Liquefied Natural Gas**. This will demand determination and purposeful work. ' We are committed to building ...

Mandate Letter - Government of British Columbia
www.gov.bc.ca/premier/cabinet.../coralee_oakes_mandate_letter.pdf
natural resources, and the resourcefulness and diversity of our people and businesses. We have a generational **opportunity to develop Liquefied Natural Gas**.

Mandate Letter for Minister Polak - Government of British Columbia
www.gov.bc.ca/premier/cabinet.../mary_polak_mandate_letter.pdf
Jun 10, 2013 - generational **opportunity to develop Liquefied Natural Gas**. This will demand determination and purposeful work. We are committed to building ...

To grow our economy and create high-paying jobs for British Columbians, I am asking you to keep your ministry focused on the *BC Jobs Plan*. Our province is blessed with both abundant natural resources, and the resourcefulness and diversity of our people and businesses. We have a generational opportunity to develop Liquefied Natural Gas. This will demand determination and purposeful work.

Appointment letter to Minister of the Environment, Hon. Mary Polak

Mandate Letter - Government of British Columbia
www.gov.bc.ca/premier/cabinet.../todd_stone_mandate_letter.pdf
Jun 10, 2013 - generational **opportunity to develop Liquefied Natural Gas**. This will demand determination and ' purposeful work. ' -- 7. We are committed to ...

Mandate Letter - Government of British Columbia
www.gov.bc.ca/premier/cabinet.../terry_lake_mandate_letter.pdf
Jun 10, 2013 - generational **opportunity to develop Liquefied Natural Gas**. This will demand determination and _ purposeful work. We are committed to ...

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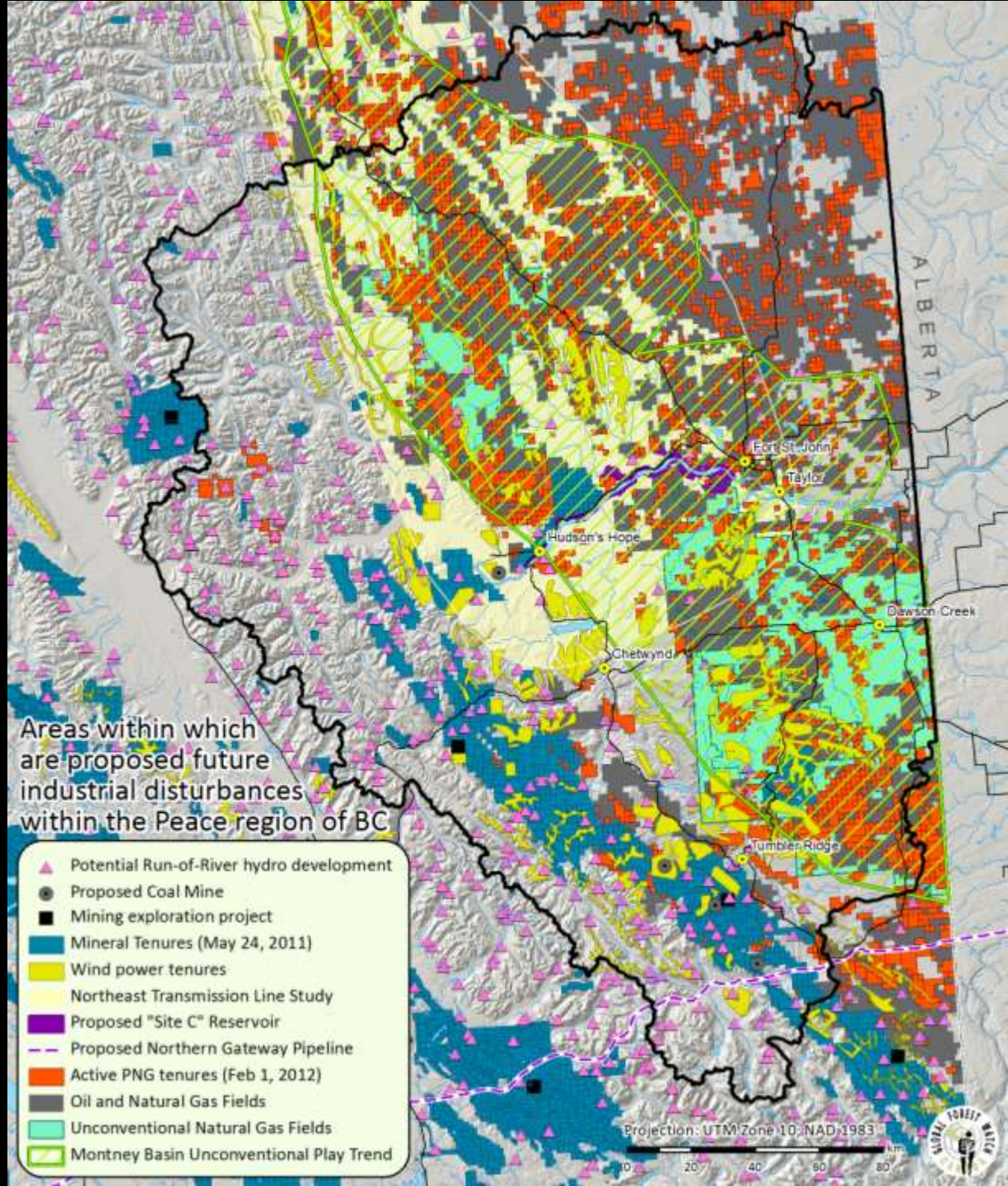
Recall

- Effect is the change
- Impact is the consequence

Present and proposed industrial developments within the Peace



Cumulative effects and impacts

- **Both effects and impacts are easier to document looking backwards**
- **Complexities and so many effects often make it difficult to relate specific impacts to specific effects**
- **We must be able to look forward …**

Cumulative impacts?

- **In some cases area of impact may be somewhat easier to delimit**
  - **e.g., and air shed**

- **Measures will change with scale**

Direct effects, indirect effects, cumulative effects and complexity

Journal of Wildlife Management 75(1):204-212. 2011
doi: http://dx.doi.org/10.1002/jwmg.28

Invading White-Tailed Deer Change Wolf-Caribou Dynamics in Northeastern Alberta

A. David M. Latham,[1,a] M. Cecilia Latham[a], Nicole A. McCutchen,[2,b] and Stan Boutin[a]

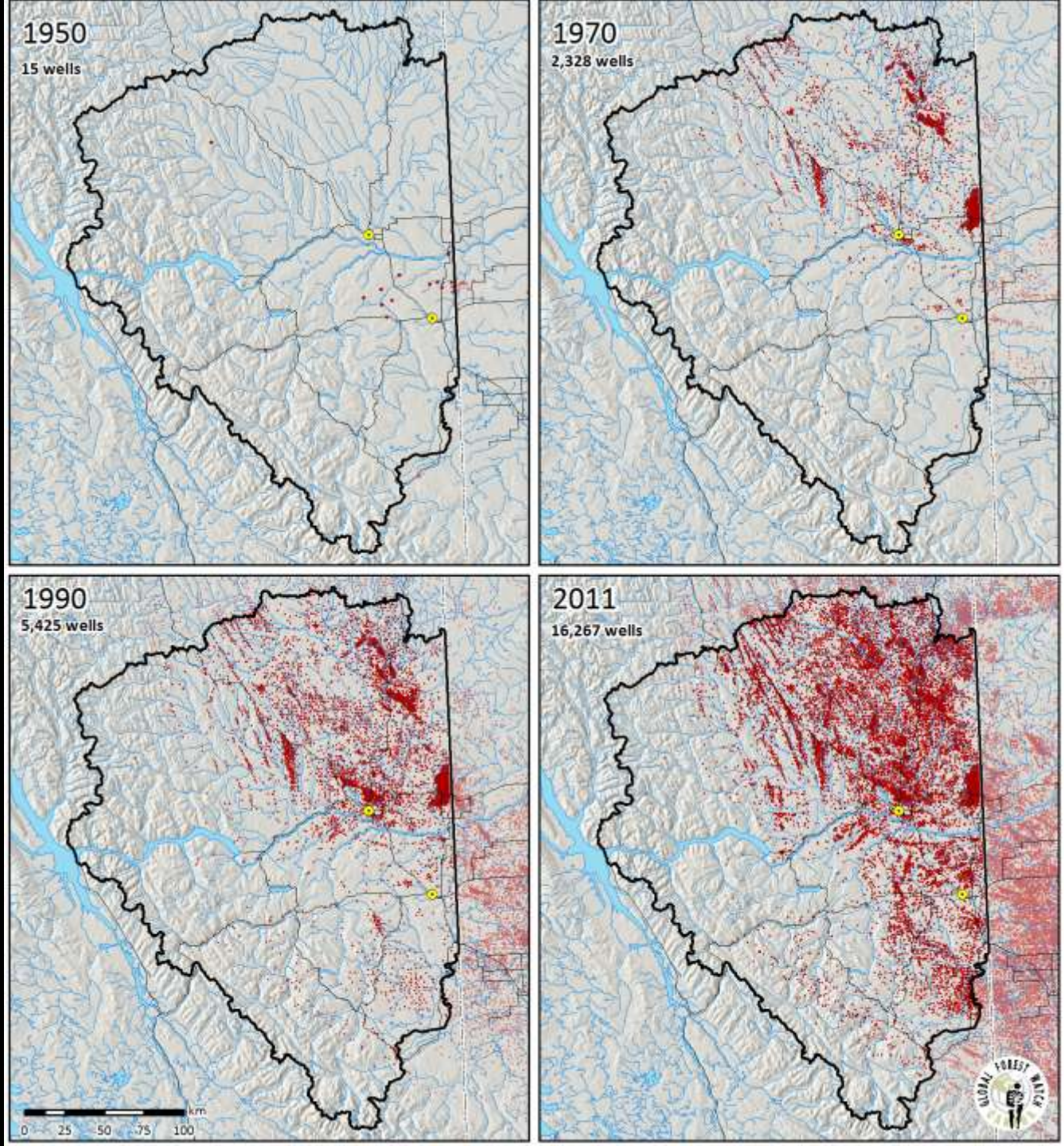
- Large increase in linear features, cut blocks, roads
- Increase in early seral stages
- Increase in white-tailed deer then wolves
- Decline in caribou
- Which impact was the cause?

Temporal Scale

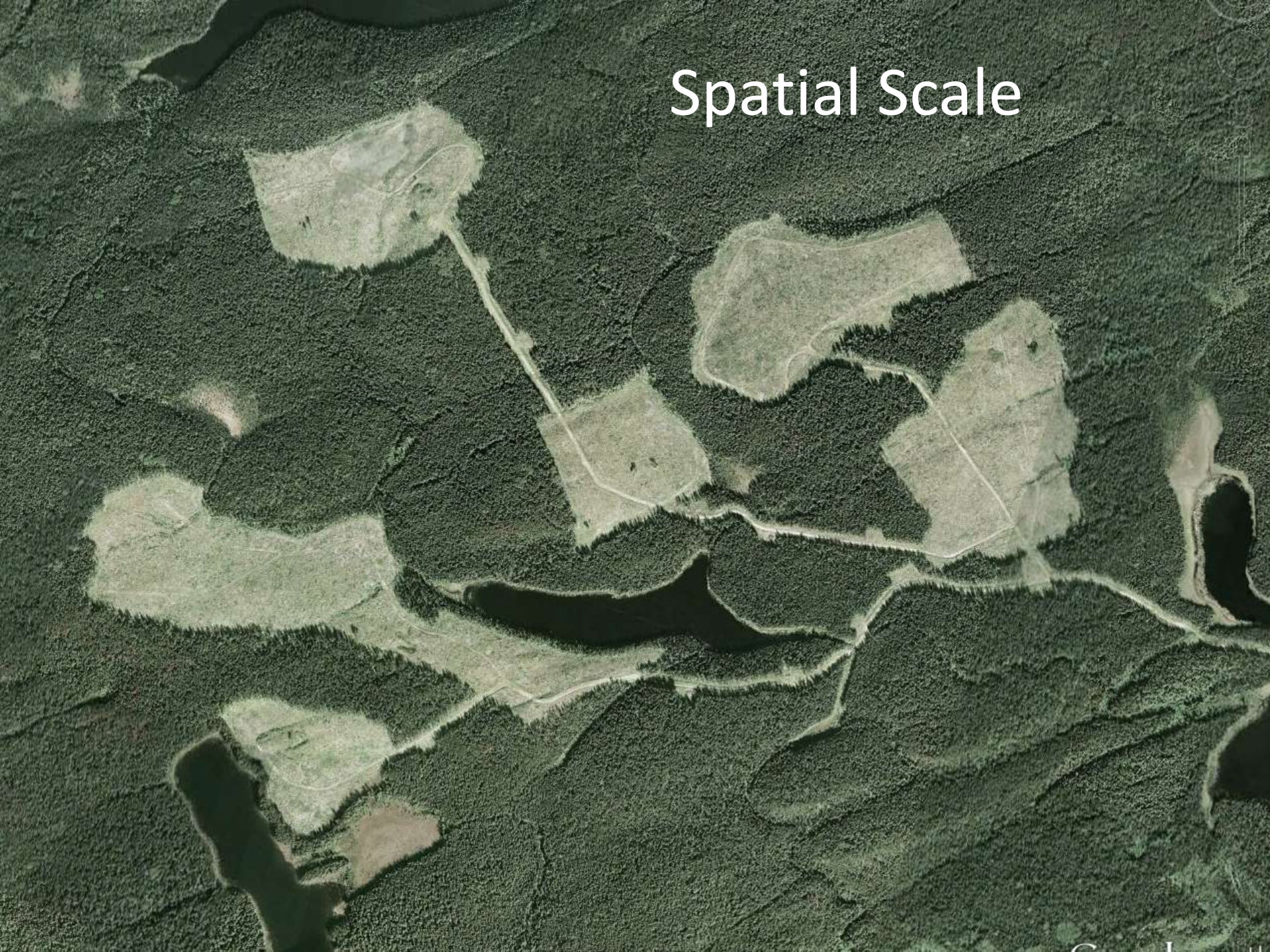
Conventional Wells
1950-1970 =
110 / year

1970-1990 =
147 / year

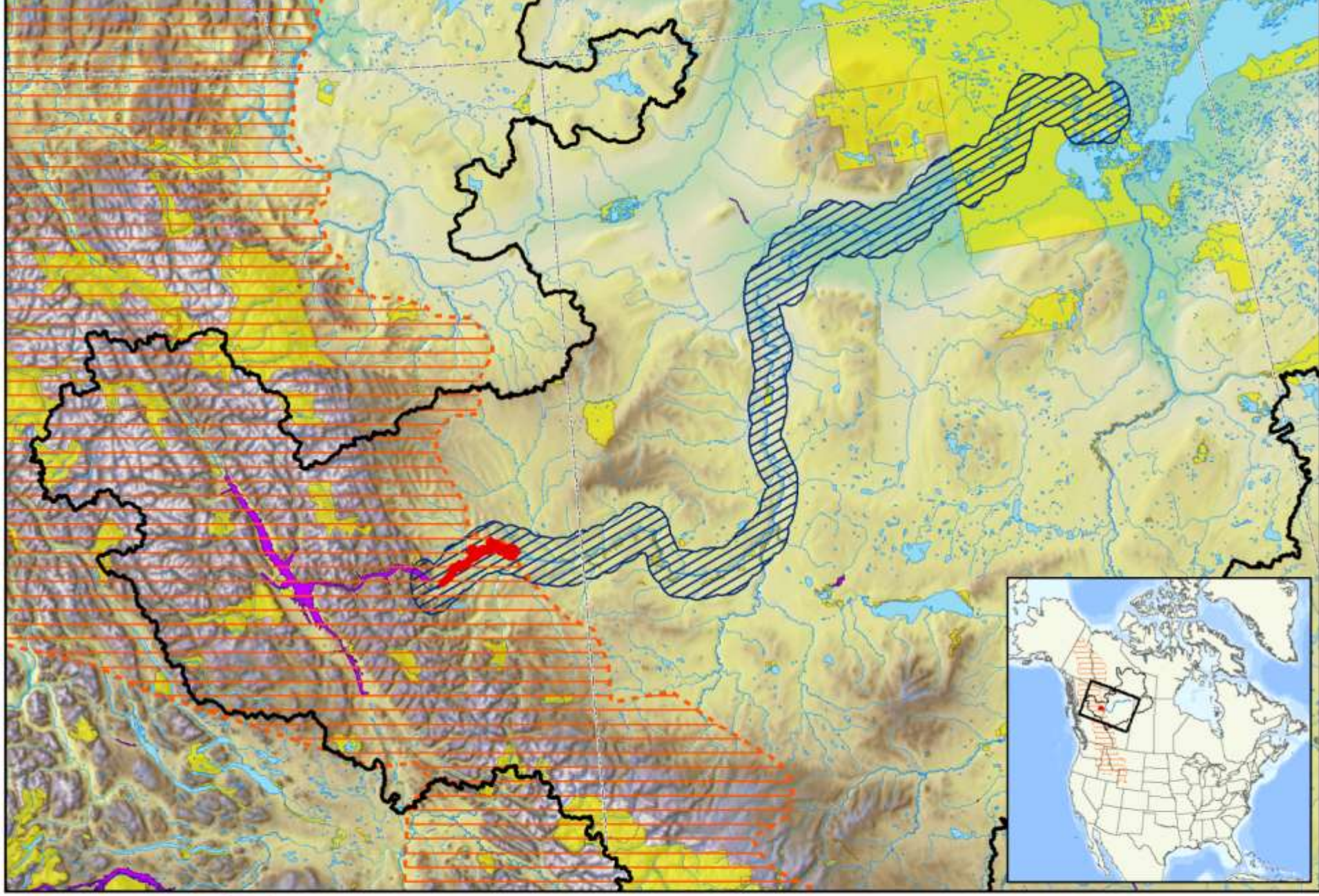
1990-2011 =
493 / year



Spatial Scale




Davie Muskeg Rd



Site C (Draft)

Site C
Y2Y boundary
Peace river buffer zone (20km)
Reservoirs
Protected areas
Great Slave lake drainage area

Projection: BC Albers Equal Area Conic
Datum: NAD 1983

0 50 100 150 200 km

They argue that while Site C might bring about relatively small changes compared to the existing dams, the cumulative effect could push the Peace-Athabasca Delta toward collapse.

Parks Canada's Submission to the Joint Review Panel for BC Hydro's Site C Clean Energy Project

Submission of Parks Canada Agency November 25, 2013

WAC Bennett and Peace Canyon Dams have already altered peaks and lows of Peace River …

Alberta and NWT Governments

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Great Slave lake drainage area

Projection: BC Albers Equal Area Conic
Datum: NAD 1983

0 50 100 150 200 km

‘Other effects and scale’

Holmes Hydro can proceed without environmental assessment

The Canadian Press Posted: May 18, 2013 1:30 PM PT | Last Updated: May 18, 2013 2:19 PM PT

The Holmes River empties into the Fraser River southeast of McBride, B.C. (Google Maps)

“The BC Supreme Court has ruled that a hydro-electric development consisting of 10 power generation sites along a 40-km stretch of river should be allowed to proceed without an environmental assessment”

Some approaches

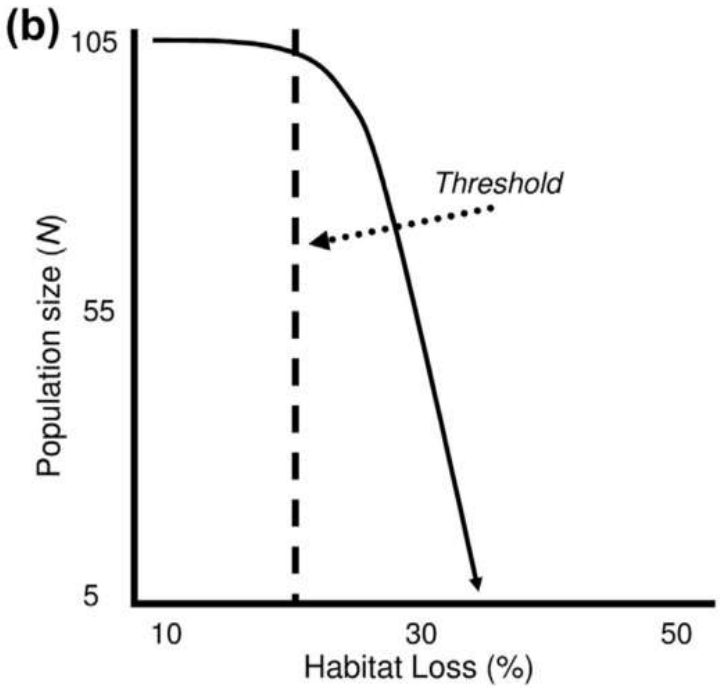
- Thresholds
- Legislative requirements (e.g., species at risk)
- Ecosystem resilience

- Integrated planning

Identifying thresholds and limits

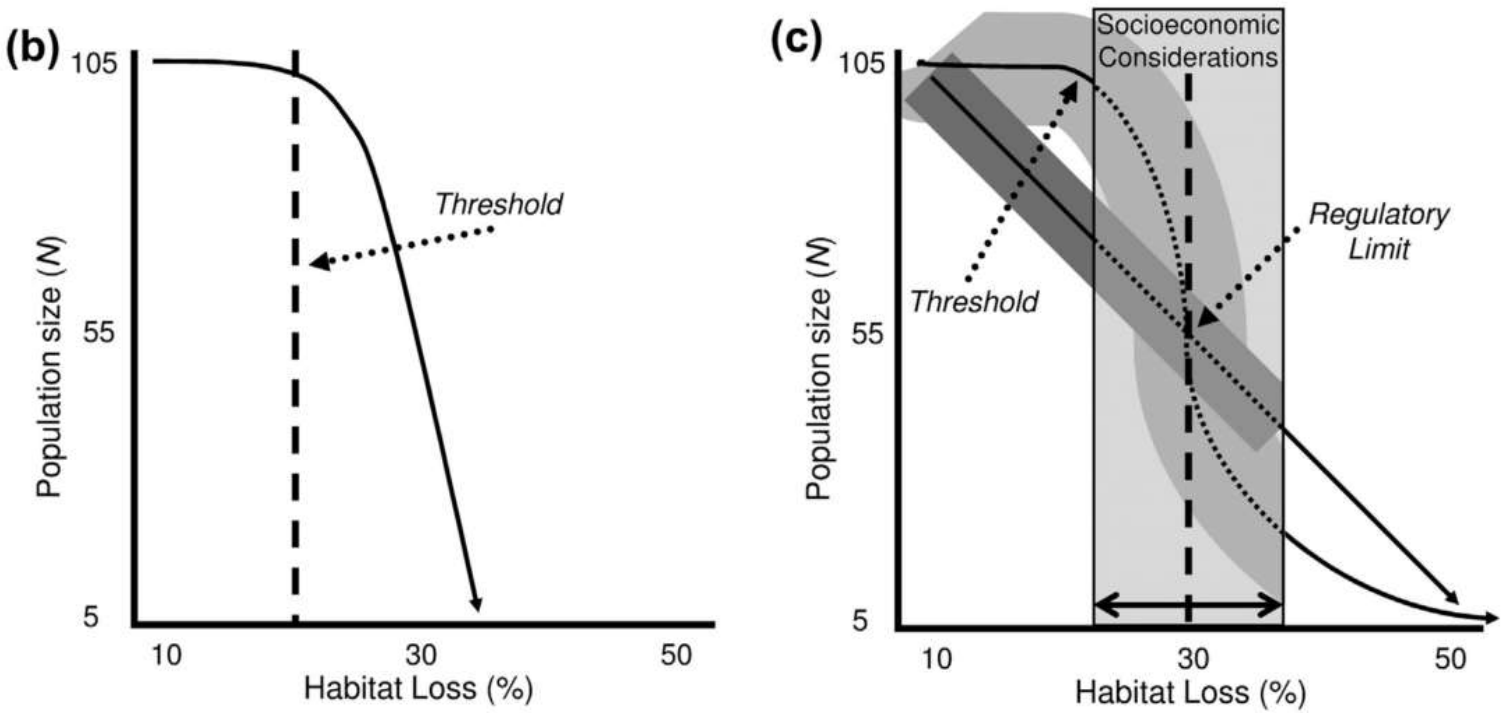
- **Ecological thresholds are defined as points where small changes in land use produce large nonlinear ecosystem responses**

Identifying thresholds and limits



Johnson, C. J. (2013). Biological Conservation 168: 57-65.

Identifying thresholds and limits

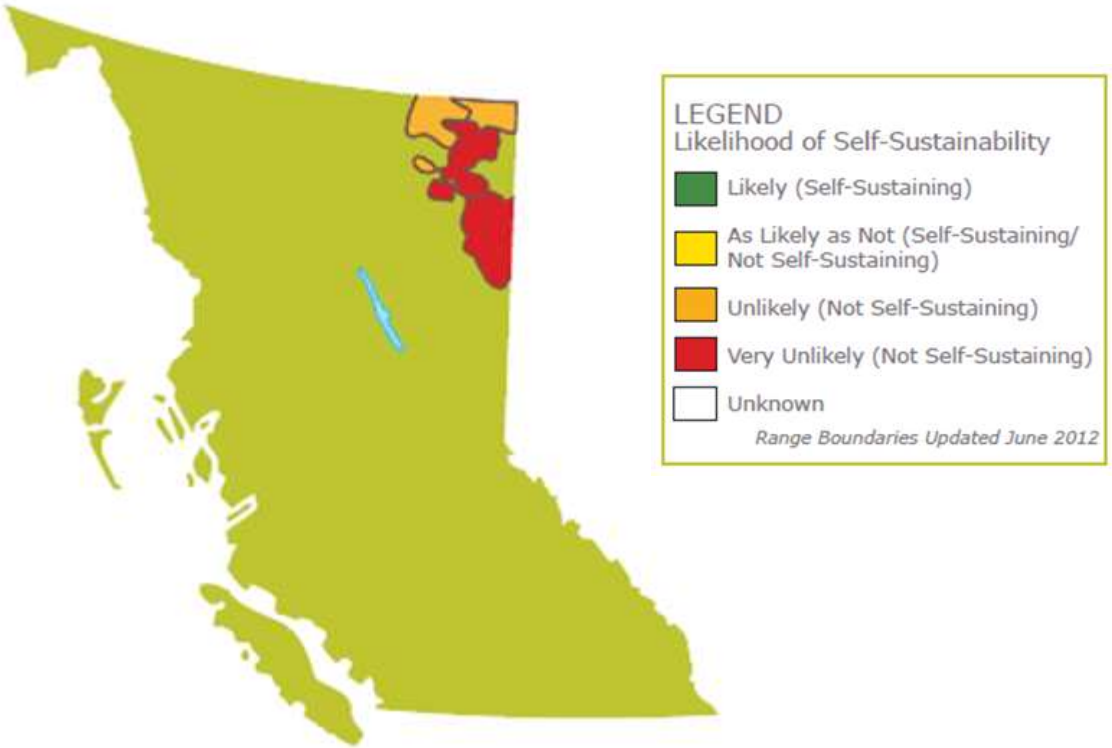


Johnson, C. J. (2013). Biological Conservation 168: 57-65.

Legal Thresholds

- Species at Risk Act
- Do we want to manage an environment at the edge of thresholds?
- Which thresholds?

Do thresholds matter?



CPAWS report December 2013: "Population Critical: How are caribou faring?"

Progress towards boreal-ecotype Caribou conservation?

	Action Plan or Recovery Strategy in place?	Stand alone provincial SAR[1] Legislation?	Caribou listed under stand alone SAR legislation?	Problem with over reliance on predator management?	Application of a cumulative effects lens linked to approvals?	Challenges implementing plans & policies?	Grade	Supporting Information for Grade
BC	yes but inadequate	no	n/a	not yet[2]	no	yes	LOW	B.C.'s Boreal Caribou Implementation Plan is inadequate because it accepts continued caribou decline in all boreal caribou ranges rather than maintenance or enhancement of self-sustaining populations. It defers recovery to the future and essentially accepts the extirpation of two of B.C.'s six boreal caribou herds and lacks strong caribou habitat protection in a region with a large footprint by the oil and gas sector's development and tenure.

- **Current approach is to delay recovery for approximately 50 years …**
- **If status changes to endangered then not meeting legal requirements**

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Ecosystem resilience

- A framework for understanding a natural resource system's dynamics and the supply of valued ecosystem services
- Project approval and potential synergistic impacts can be better evaluated when the system's ecological resilience, or transformation, are considered (Walker et al. 2004)

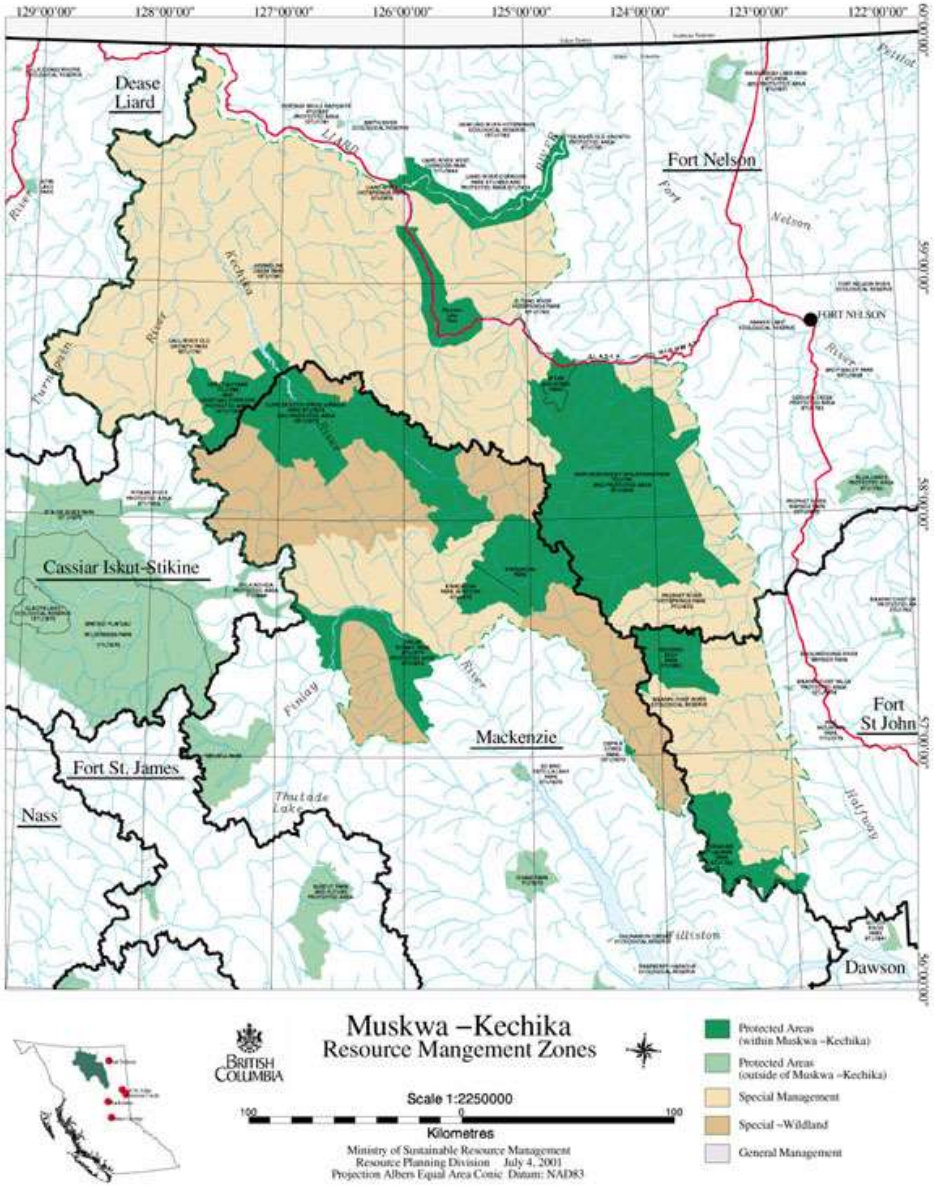
What if we plan ahead of time?

- **Planning increasingly being used in voluntary air-shed plans**
  - **We do have thresholds for air quality …**
  - **But what is the regulatory mechanism if the process relies on voluntary compliance?**

What do we need to plan around cumulative impacts?

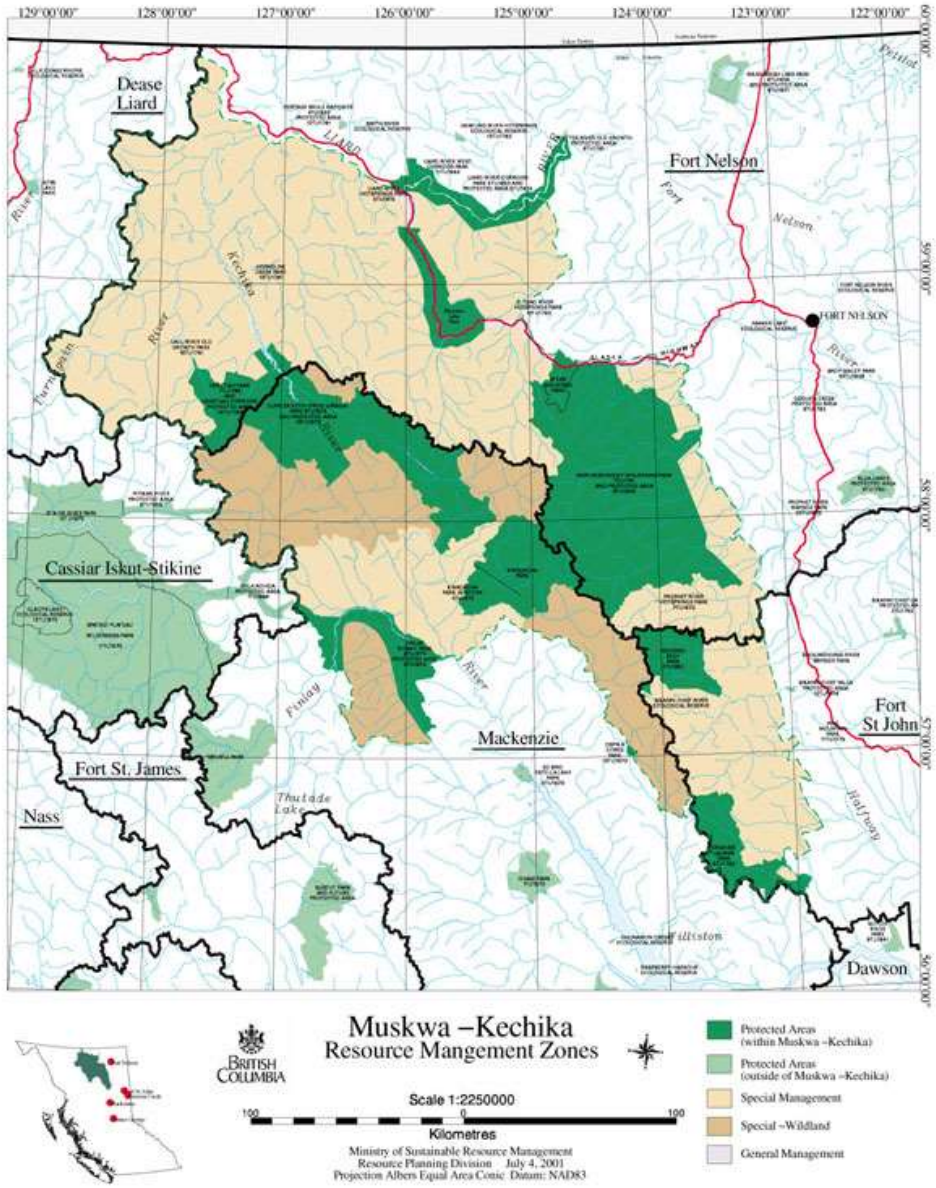
- **Cross-sector prior knowledge of developments**
- **Ability to plan at appropriate spatial scales**
- **Set of values to assess cumulative impacts against**

Muskwa Kechika



- **Majority in SMZs**
- **Development allowed within SMZs**
- **Values set in legislation**

Muskwa Kechika



"maintain in perpetuity the wilderness quality, and the diversity and abundance of wildlife and the ecosystems on which it depends"

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ALCES

- A Landscape Cumulative Effects Simulator

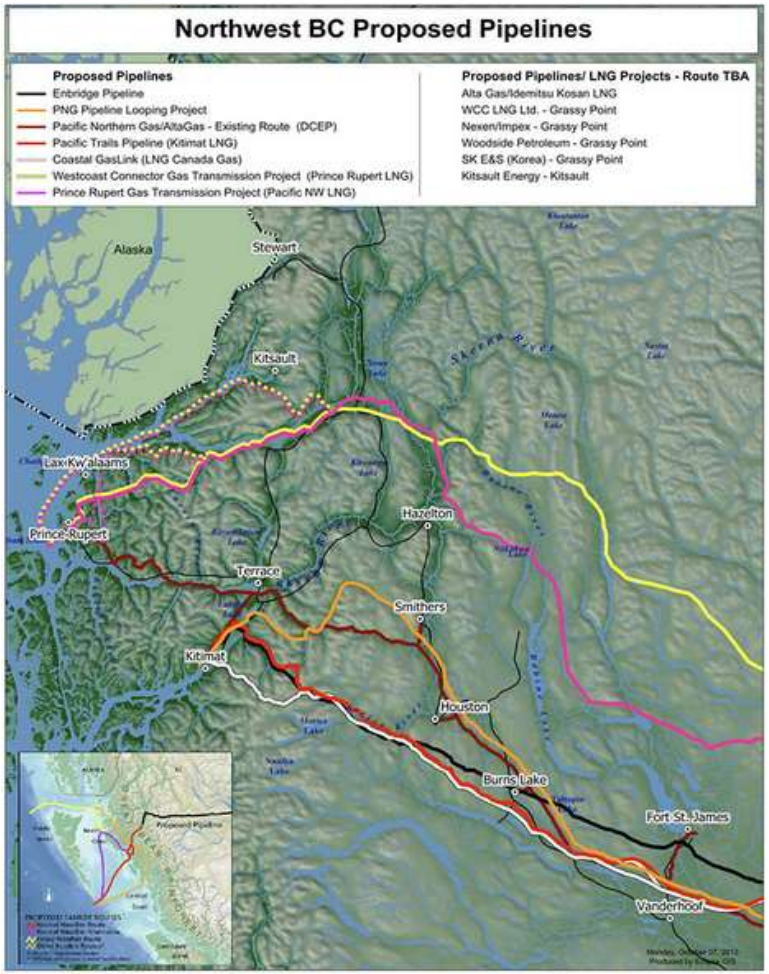
ALCES

- **With known goals …**
- **Simulations involving a suite of "best practices" demonstrated that substantial improvements in ecological outcome measures can be achieved, while maintaining a sustainable flow of economic benefits, through alternative management scenarios**

Schneider, R. R., J. B. Stelfox, S. Boutin, and S. Wasel. 2003. Managing the cumulative impacts of land uses in the Western Canadian Sedimentary Basin: a modeling approach. Conservation Ecology **7**(1): 8. [online] URL: http://www.consecol.org/vol7/iss1/art8/

Opportunities to reduce effects?

- **What about shared transportation corridors?**
- **Would require several major paradigm shifts**



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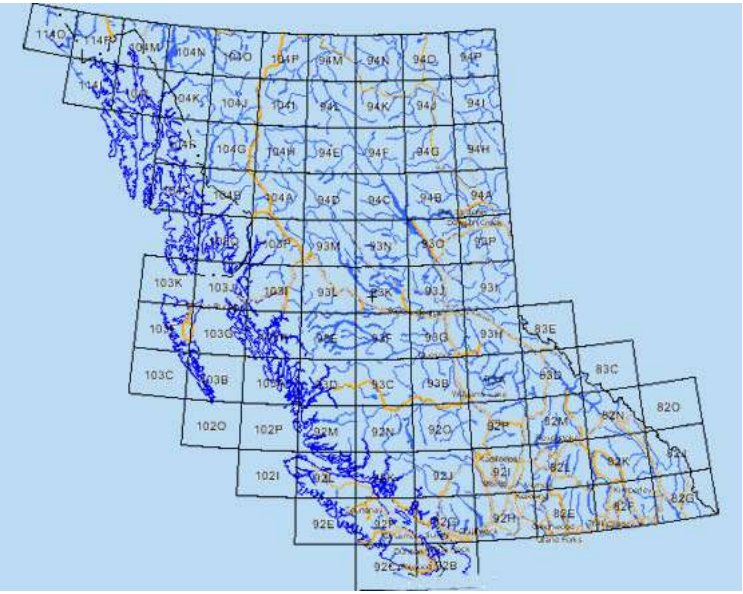
Opportunities to reduce effects?

- … but developments begin individually

Ministry of **Energy and Mines**
and Responsible for **Core Review**

Mineral Titles Online



Which impacts (values) should we consider?

- **Should we examine a single species?**
- **Effects on biodiversity?**
- **Effects on ecosystems?**

Which impacts (values) should we consider?

- Should we examine a single species?
- Effects on biodiversity?
- Effects on ecosystems?
- Sustainable communities
- Healthy communities

- How do we include them all?
- Who should decide?

What should the values be?

- **Setting social, economic, and ecological objectives is ultimately a process of social choice informed by science. (Weber et al. 2012) – land-use planning as a wicked problem**

Back to our goal

- But how do we compare economic, ecosystem, health and aesthetic values?

- We need resilient ecosystems, vibrant economies, **and** healthy communities …

Should these be targets or constraints?

- **Should economics be a value or a constraint (as in the ALCES scenarios)?**
  - **i.e., constrain growth while minimizing fluctuations?**
  - **But often small links between local communities and resource revenue stream**
- **Maximizing rates of resource extraction not an acceptable value …**

Cumulative Effects

- To forego addressing cumulative effects is option foreclosure
- We've managed many of our renewable resources in a sustainable way, why are we willing to ignore the sustainability of the larger landscape (inclusive of many values) when we look at non-renewable resources?