

Donald Harron B.Sc., P.Biol.

**Assumptive Error and Overestimation of Effects in
Wildlife Model Output**

Woodland Caribou

Donald Harron B.Sc., P.Biol.

Code of Ethics – Public Responsibilities

“Ensure that public statements are unequivocal in informing the public as to the source of the statements and on whose behalf they are made”

**The following are the personal views of D. Harron
P.Biol.**

Donald Harron B.Sc., P.Biol.

- Senior Environmental Scientist with Winnipeg Consulting firm
 - ◆ Biologist for 24 years
 - ◆ Environmental Scientist issues for 22 years
 - ★ Woodland Caribou – human effects since 1988
 - ◆ Wildlife/ecosystem predictive modelling for 15 years



Journal of Ecology and Society

- **Elaboration of published letters of comment on:**
 - ◆ Schneider et.al. 2003 – Managing the Cumulative Impacts of Land Use in the Western Canadian Sedimentary Basin: A Modeling Approach
 - ★ Harron 2007 – Assumptive Error and Overestimation of Effects in Wildlife Model Output
 - ★ Schneider et.al. 2007 – Scenarios are Plausible Stories about the Future, not Forecasts
 - ★ Harron 2007 – Plausible Stories or Tall Tales?

Zone of Influence Vs Area of Effect

- **Zone of Influence**

- ◆ “A geographic area, extending from an action, in which an effect is non-trivial”

- **Area of Effect**

- ◆ An assessment tool that addresses magnitude of effect

Woodland Caribou and Linear Corridors

Zone of Influence

Dyer et.al. 2001 "Avoidance of Industrial Developments by Woodland Caribou" (J. Wildl.Manage 65(3):531-542)

★ "Caribou avoided human developments... maximum avoidance distances ... 250m (roads and seismic lines)"

■ Generic Linear corridors definition

- CARC modeling of Mackenzie Gas Project
- Deh Cho Land Use Plan

★ Suggests that a road and a seismic line have the same effect on Caribou.

- Loss of habitat over 250 m due to "avoidance"

Area of Effect

Dyer 1999 MSc. Thesis - “Movement and Distribution of Woodland Caribou ... in Response to Industrial Development in North-eastern Alberta”

★ Avoidance of Roads and Seismic Lines

- Both were 250 m
 - Statistically significant Zone of Influence

★ Area of Effect – 100 m

- Roads – 85% to 97% reduction in use
- Seismic Lines – 40% reduction in use

★ Area of Effect – 100 m – 250 m

- Roads – 72% to 77% reduction in use
- Seismic lines - 4% reduction in use

Zone of Influence Vs. Area of Effect

- **Generic use of Linear Corridor term – 250 m buffer**
 - ◆ 250 m on either side of the line or 500 m wide strip

- **Zone of Influence (as per Dyer et.al. 2001)**
 - Loss of habitat for 500 m wide area

- **Area of Effect (as per Dyer 1999)**
 - ★ Roads
 - About 400 m wide area effectively lost
 - ★ Seismic Lines
 - About 100 m wide area effectively lost

Zone of Influence Vs. Area of Effect

- ◆ Roads
 - ★ Zone of Influence and Area of Effect similar
 - 500 m vs. 400 m wide.
 - 25% overestimation of effect.

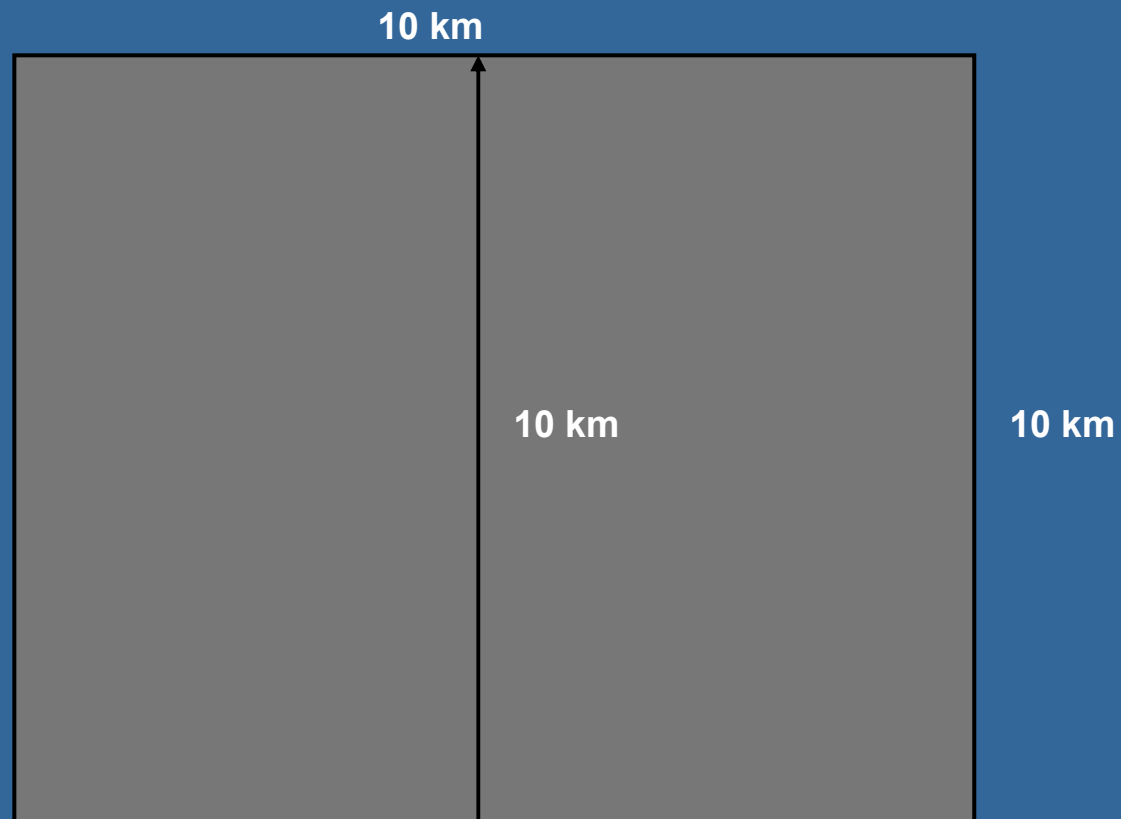
- ◆ Seismic Lines
 - ★ Zone of Influence much larger than Area of Effect
 - 500 m vs. 100 m wide
 - 500 % overestimation of effect.

Zone of Influence Vs. Area of Effect

- **So What?**
 - ◆ Isn't it better to be on the safe side!
- **Modeling Rule of**
 - **GIGO**

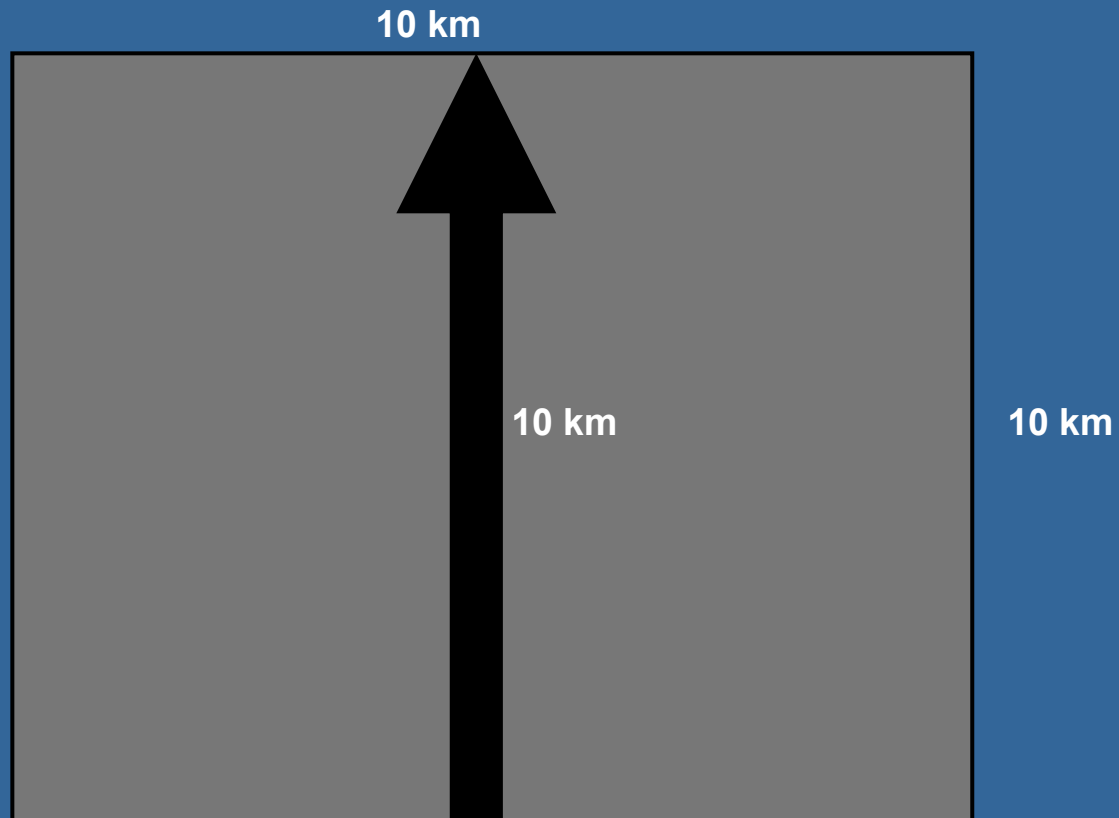
Simple Modeling Scenario

- **Model Habitat**
 - ◆ Woodland Caribou prime habitat only
 - ◆ 10 km by 10 km
 - ★ one 10 km long linear corridor per year added



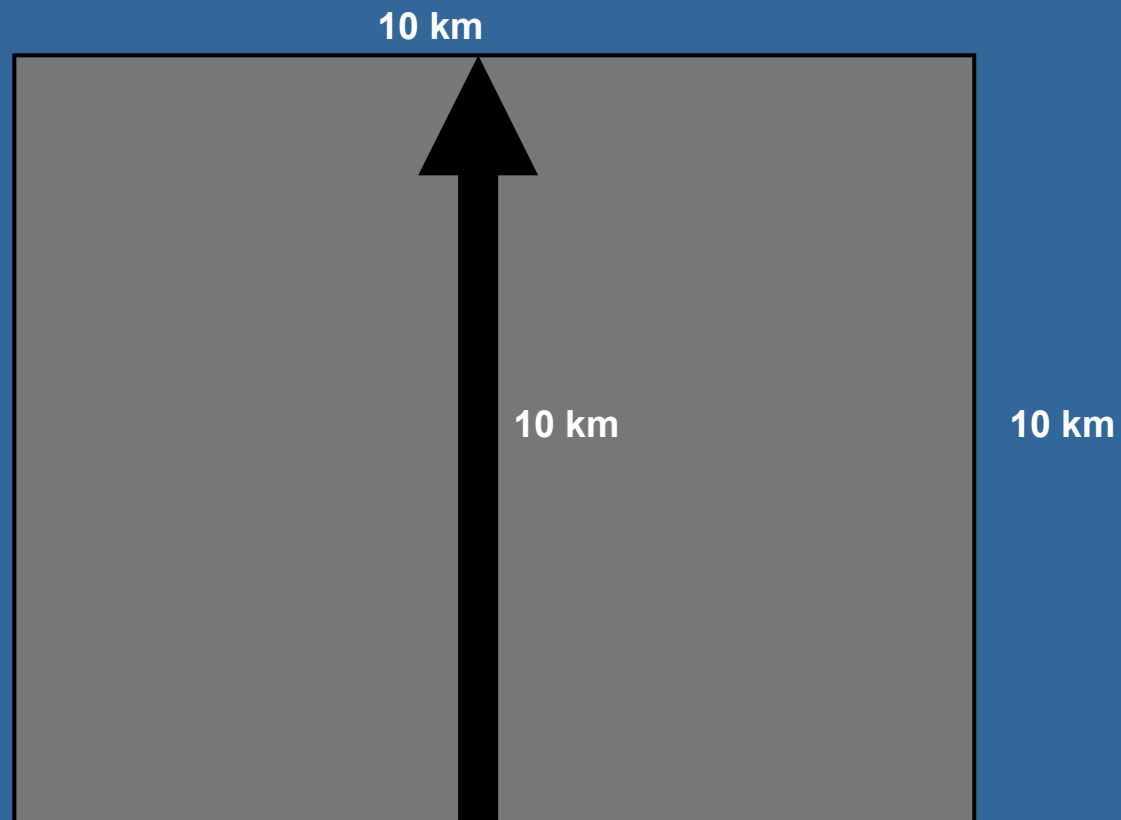
Simple Modeling Scenario

- **Zone of Influence – Linear Corridors**
 - ◆ 500 m wide habitat loss
- **20 years all habitat lost**



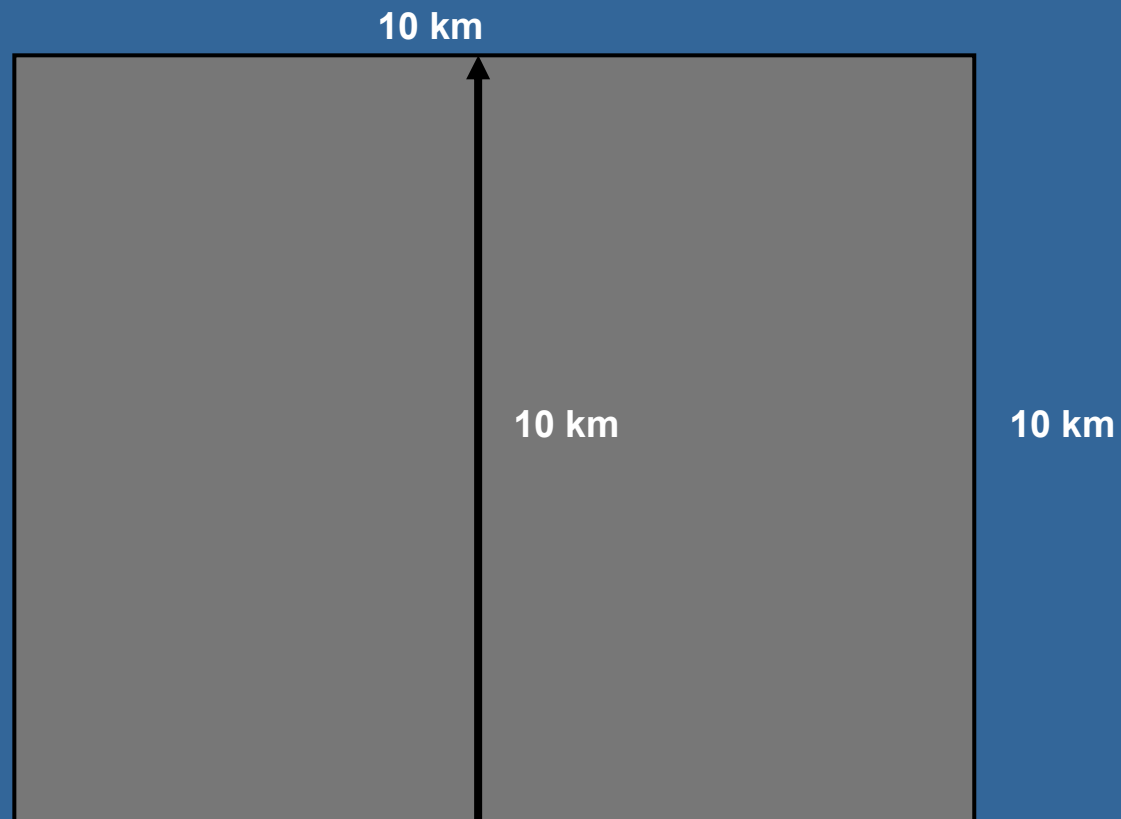
Simple Modeling Scenario

- **Area of Effect - Roads**
 - ◆ 400 m wide habitat loss
- **25 years all habitat lost**



Simple Modeling Scenario

- **Area of Effect – Seismic Lines**
 - ◆ 100 m wide habitat loss
- **100 years all habitat lost**



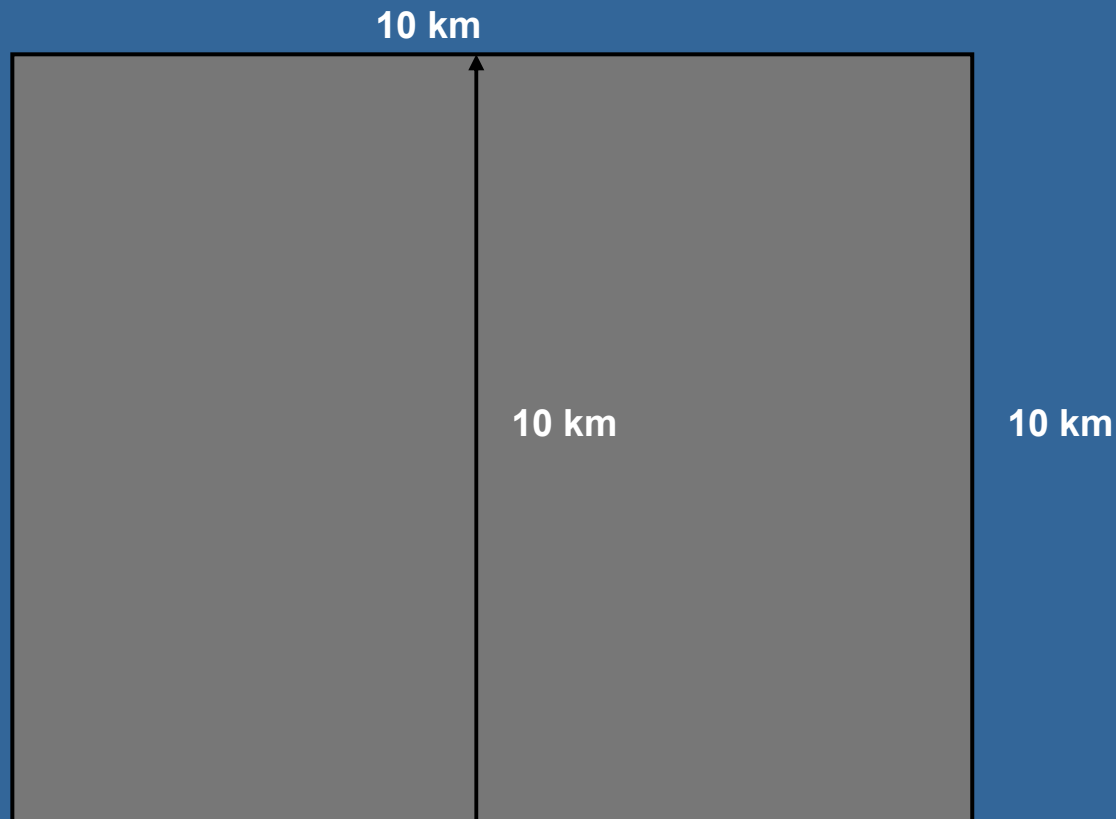
More Complex Modeling Scenario

- **Ecosystem Recovery**
 - ◆ Forests re-grow
- **Oberg et.al 2002 “Responses of Mountain Caribou to Linear Features in a West-Central Alberta Landscape”**
 - ★ “Avoidance” of roads but not seismic lines
 - ★ Seismic lines were on average older than those in Dyer 1999 area.
- **Other studies suggest caribou use of forestry cutblocks and wildfire areas returns to random after about 30 years of regeneration**

More Complex Modeling Scenario

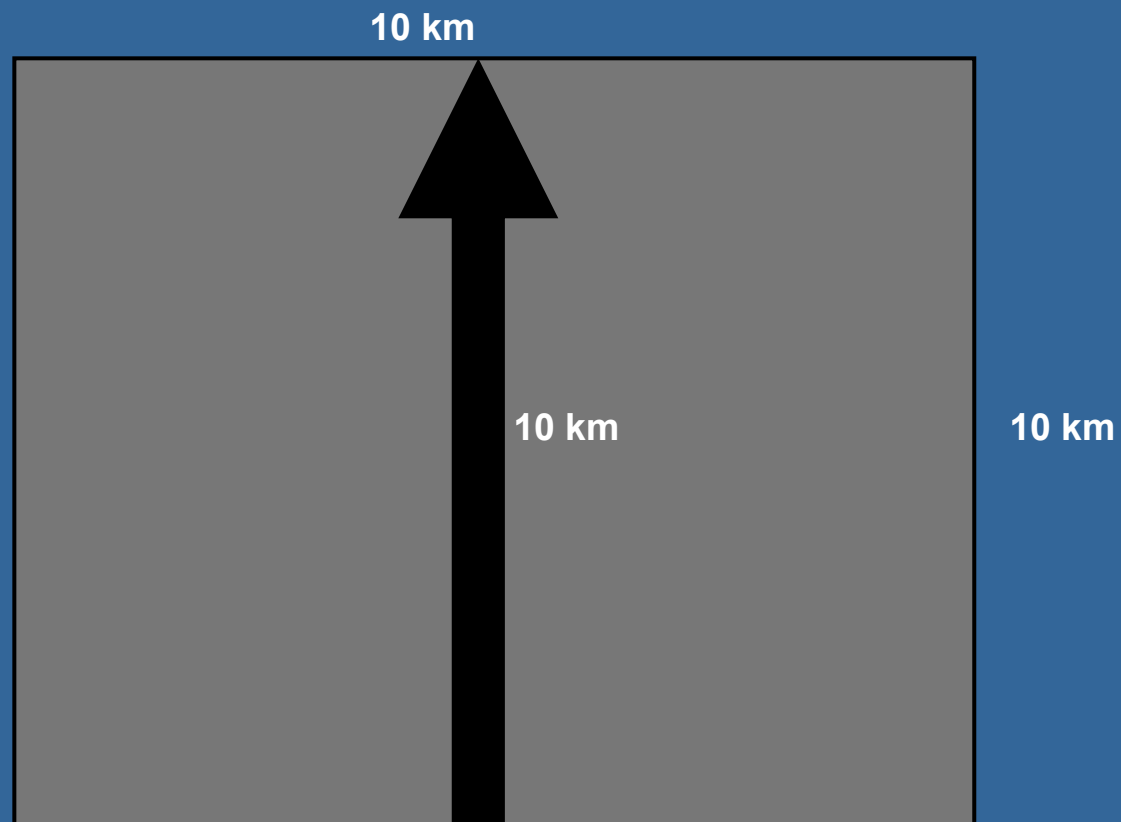
■ Model Habitat

- ◆ Woodland Caribou prime habitat only
- ◆ 10 km by 10 km
 - ★ one 10 km long linear corridor per year added
 - ★ **Roads – no recovery in 100 years**
 - ★ **Seismic lines – recovery after 30 years**



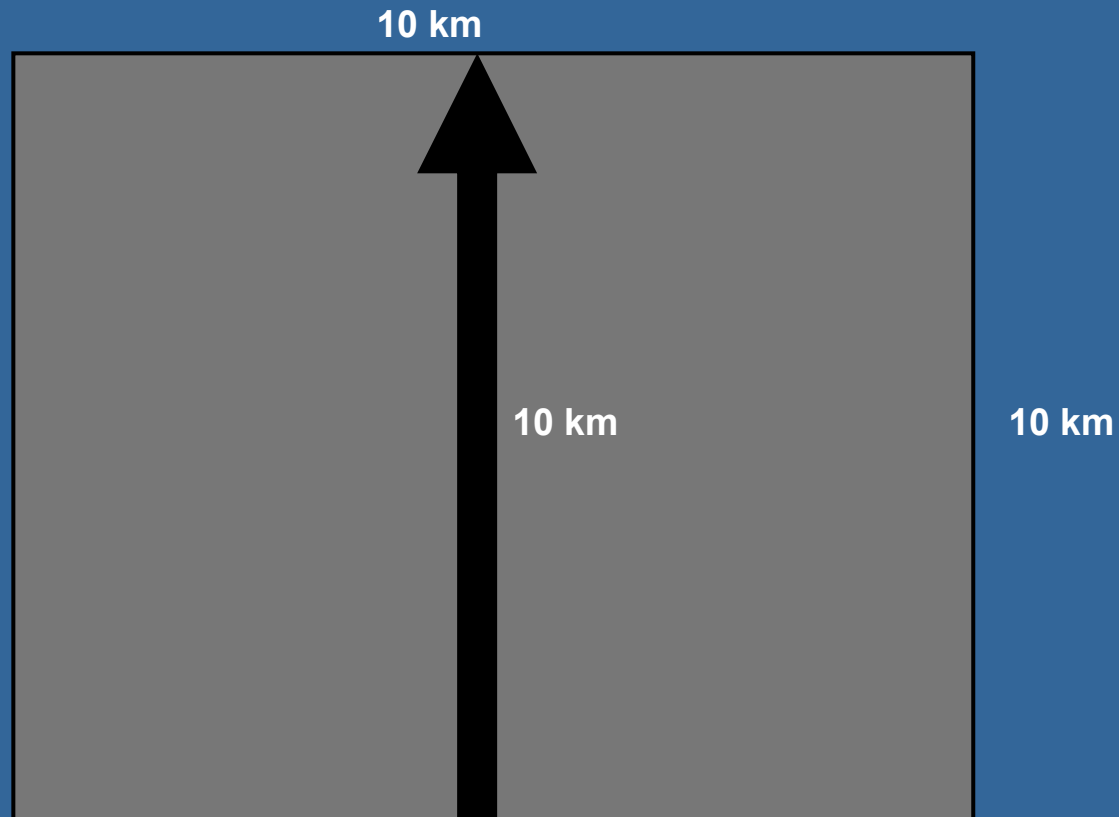
More Complex Modeling Scenario

- **Zone of Influence – Linear Corridors**
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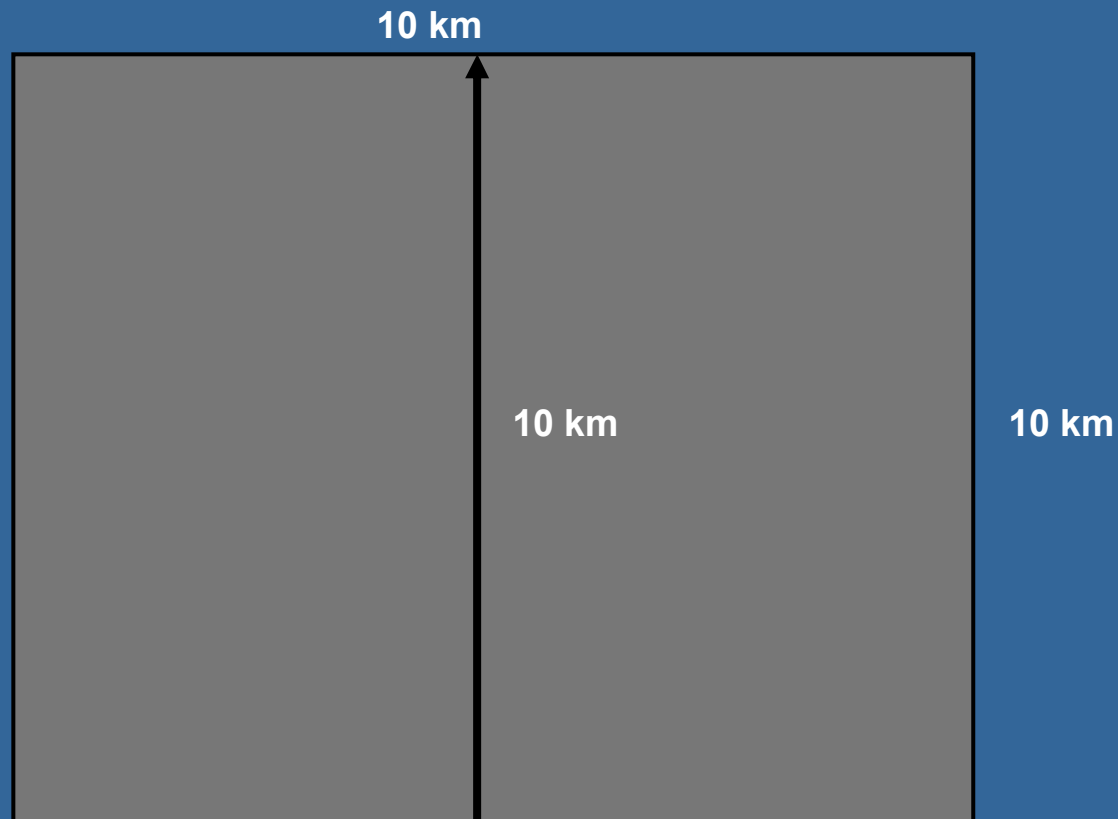
More Complex Modeling Scenario

- **Area of Effect - Roads**
 - ◆ 400 m wide habitat loss
- **25 years all habitat lost**



More Complex Modeling Scenario

- **Area of Effect – Seismic Lines**
 - ◆ 100 m wide habitat loss
- **First 30 years**
 - ◆ 30% of area lost
- **No further effective habitat decline**



Zone of Influence Vs. Area of Effect

- ◆ The use of generic linear corridors vs roads/seismic lines in the model has a very large influence on the model results
 - ★ Sustainable vs. Unsustainable
 - ★ One or two orders of magnitude error introduced into the model

Zone of Influence And Policy

- ◆ Zone of Influence definition
 - ★ Results in Policies that encourage unsustainable activities
- ◆ Area of Effect definition
 - ★ Results in policies that encourage sustainable activity

Zone of Influence Vs. Area of Effect

- ◆ Modeling Rule of

– GIGO

◆ Garbage In – Garbage Out

- Models are reflective of their assumptions

Zone of Influence Vs. Area of Effect

- Inappropriate assumptions will result in models without predictive capacity
- If Management Policy based on flawed Model output
 - ◆ Woodland Caribou conservation will not be achieved.

Role of A Professional Biologist

Code of Ethics

- **Professional Responsibilities**
 - ◆ “Participate in meetings, symposia and the like whenever possible, and endeavor to publish results of biological research and investigations in media suitable to that purpose, to disseminate biological information as widely as possible”

Role of A Professional Biologist

Code of Ethics

■ General Responsibilities

- ◆ “Accept full responsibility to the results and conclusion (including all reports) of biological investigations for which he or she is principally responsible, and refuse to allow his or her name to be associated with reports of conclusions of investigations which have been altered in such a manner as to imply substantively different conclusions than those originally stated”