



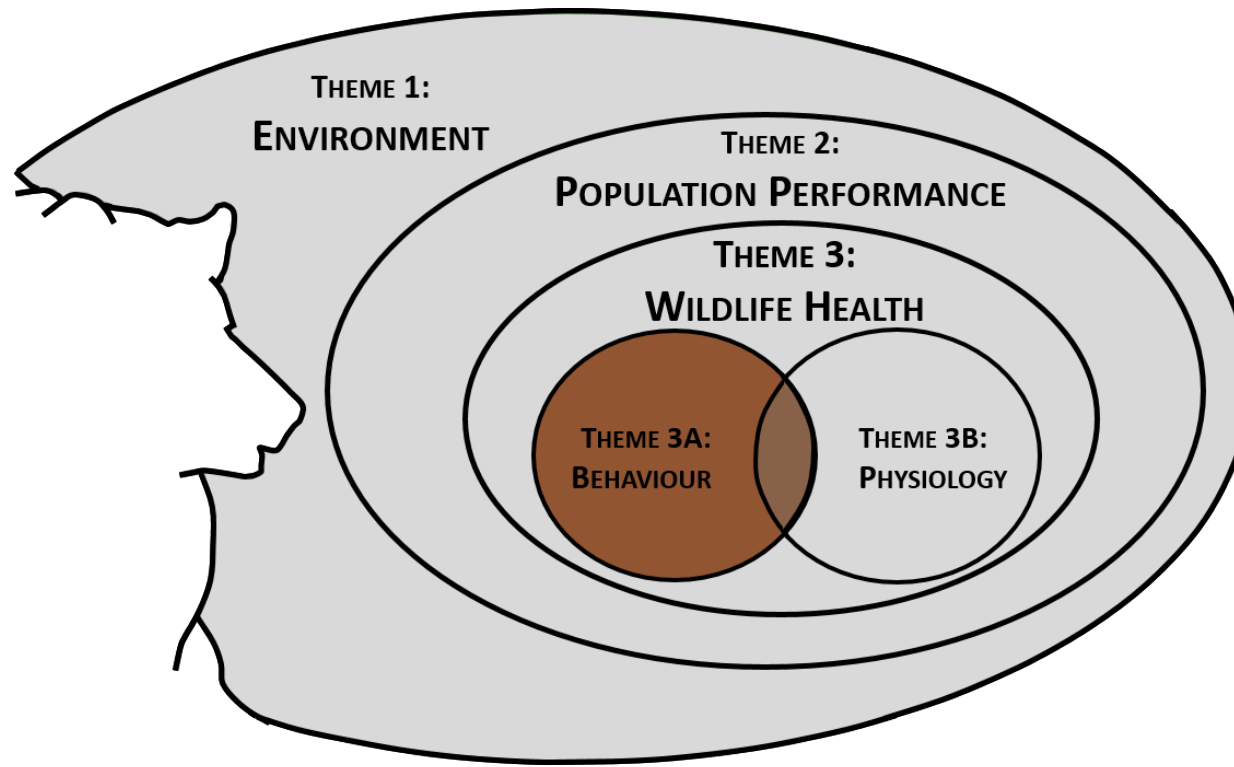
Incorporating perception into understanding grizzly bear behavioural response to roads

3rd Annual General Meeting

Bethany Parsons

MSc Student, Integrated Remote Sensing Studio

bethany.arndt@alumni.ubc.ca



Research question

Q3A.4 What are the fine scale movement, health and survival responses to cumulative effects that are dynamic in space and time?

Link to Industrial Research Need

5. Are the movement patterns of grizzly bears being impacted by natural resource extraction activities, including the development and use of roads and linear features, and have approaches to access control on the landscape influenced habitat use or grizzly bear movements?

7. Have changing landscape conditions affected grizzly bear mortality risk within the study area?

Roads and Grizzly Bears

- Most mortalities human-caused near roads
 - 19/22 mortalities within 500 m of a road (Boulanger et al. 2014)
- decreased reproductive success at high road densities (Roever et al. 2008)
- Greater use of roads than null expectations
 - Potential attraction to roadside food
- Traffic dependent



Perception and Response to Roads

- The first step in decision making is perception:
 - Animals perceive and respond to risks and attractants
 - To better understand grizzly bear behaviour around roads, I investigate how the bear perceives the road



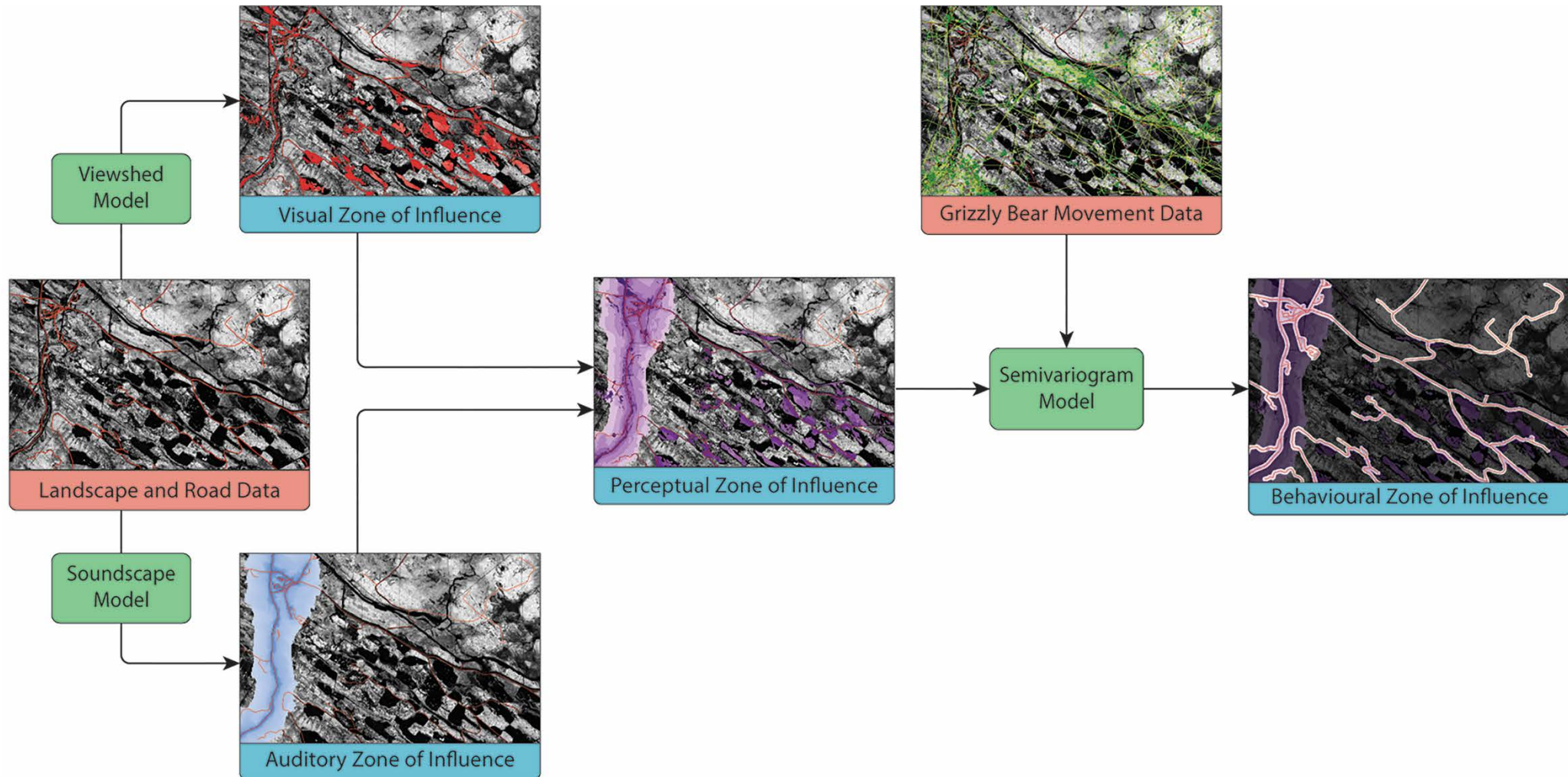
Alistair Fraser

Objectives

Advance understanding of road impacts on grizzly bears by incorporating biologically significant variables associated with what a bear sees and hears

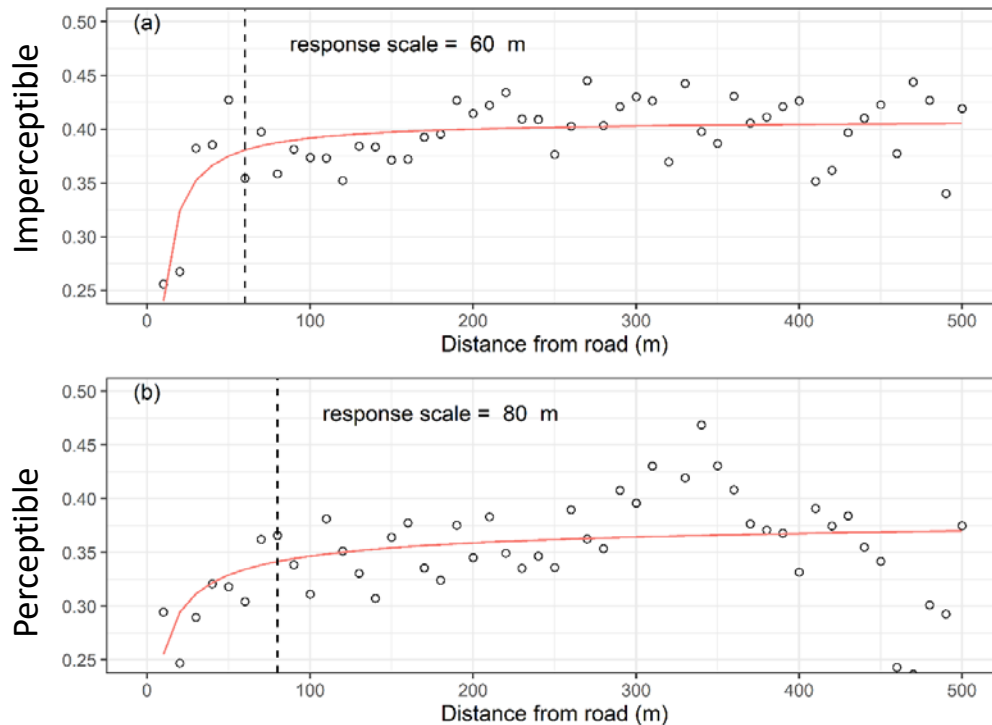
- 1) Build zones of influence around roadways based on grizzly bear perception and movement
- 2) Use perception layers to analyse grizzly bear selection and survival

Zones of Influence - Methods



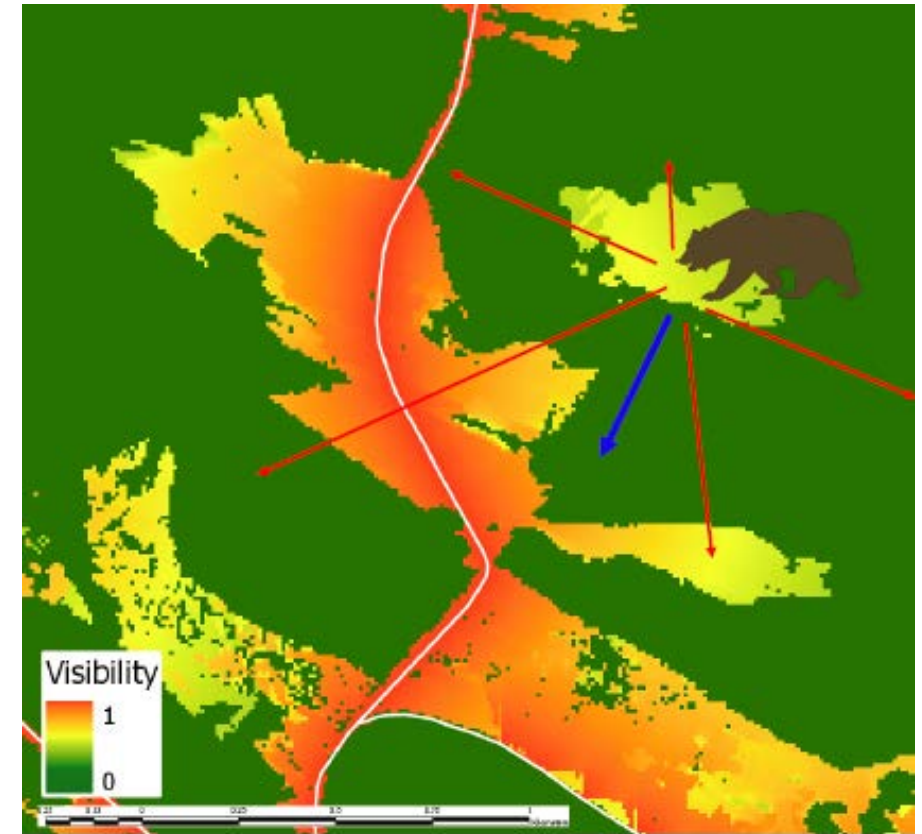
Zones of Influence - Results

- Grizzly bears responded at further distances to roads when they could perceive the road than when the road was imperceptible



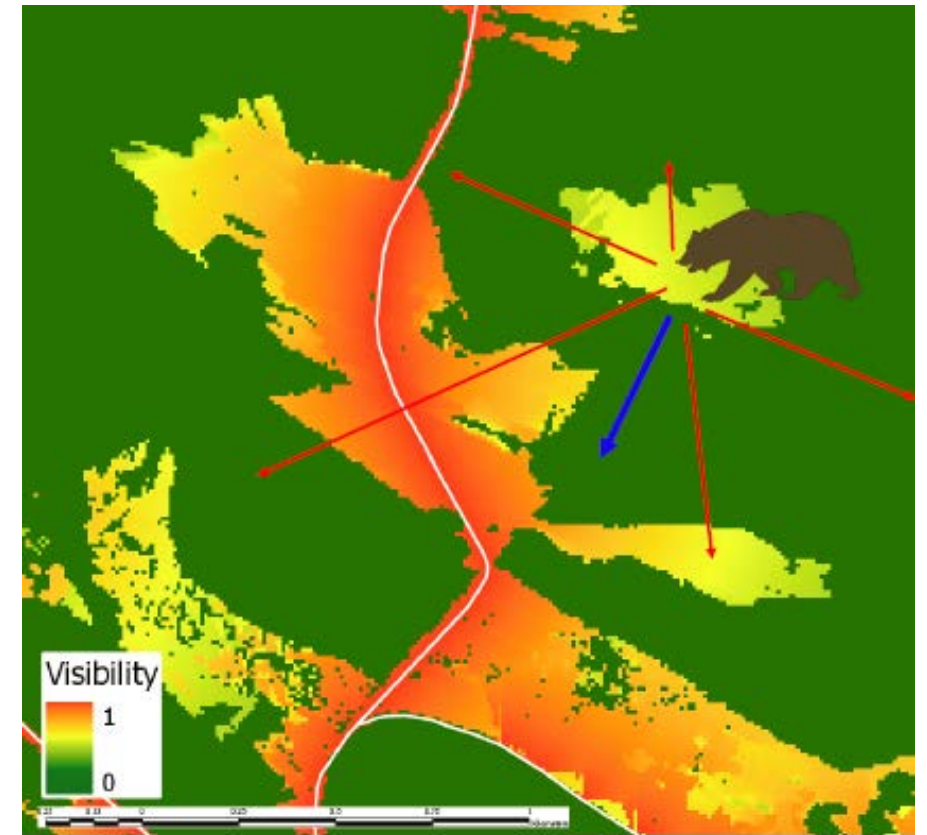
Selection - Methods

- Step Selection Analysis
 - Compare true steps with five random steps
- Models:
 - Core
 - Core + distance to road
 - Core + visibility
 - Core + sound
 - Core + perception
- AIC tally on individual bear-years, following Berman et al. 2019



Selection - Methods

- Step Selection Analysis
 - Compare true steps with five random steps
- Models:
 - Core
 - Core + distance to road
 - Core + visibility
 - Core + distance to road + visibility
- AIC tally on individual bear-years, following Berman et al. 2019



Selection - Results

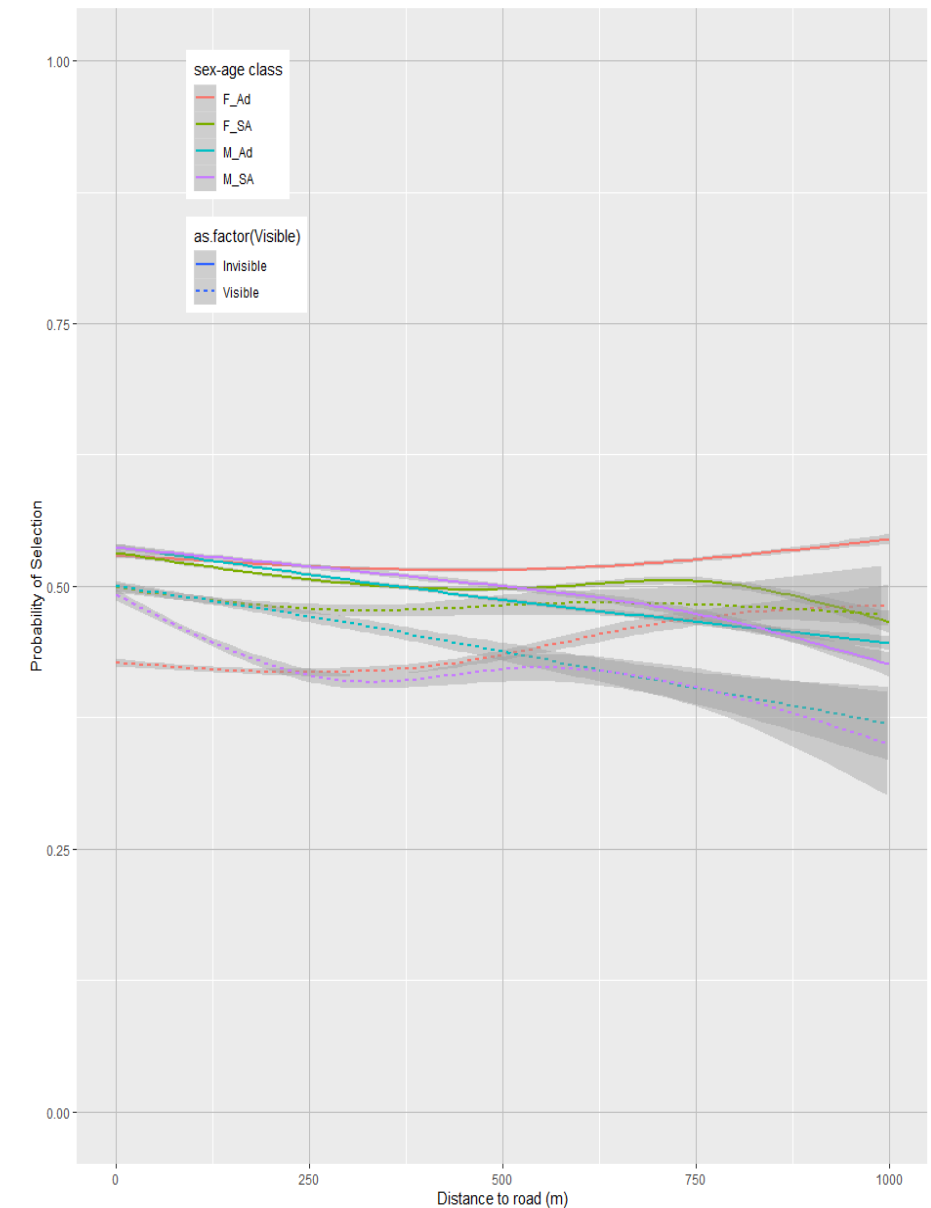
	Core	Road Distance only	Visibility only	Road Distance and Visibility
AIC tally	1	5	14	49
Mean AIC weight	0.012	0.067	0.240	0.682

- When compared to core and road models, visibility models are supported by 63/69 bears and 92.2% of the AIC weighting

Selection - Results

	Core	Road Distance only	Visibility only	Road Distance and Visibility
AIC tally	1	5	14	49
Mean AIC weight	0.012	0.067	0.240	0.682

- When compared to core and road models, visibility models are supported by 63/69 bears and 92.2% of the AIC weighting
- Grizzly bears tend to select for areas near the road, but prefer areas that are invisible to the road, indicating risk avoidance
- Patterns depend on sex and age class

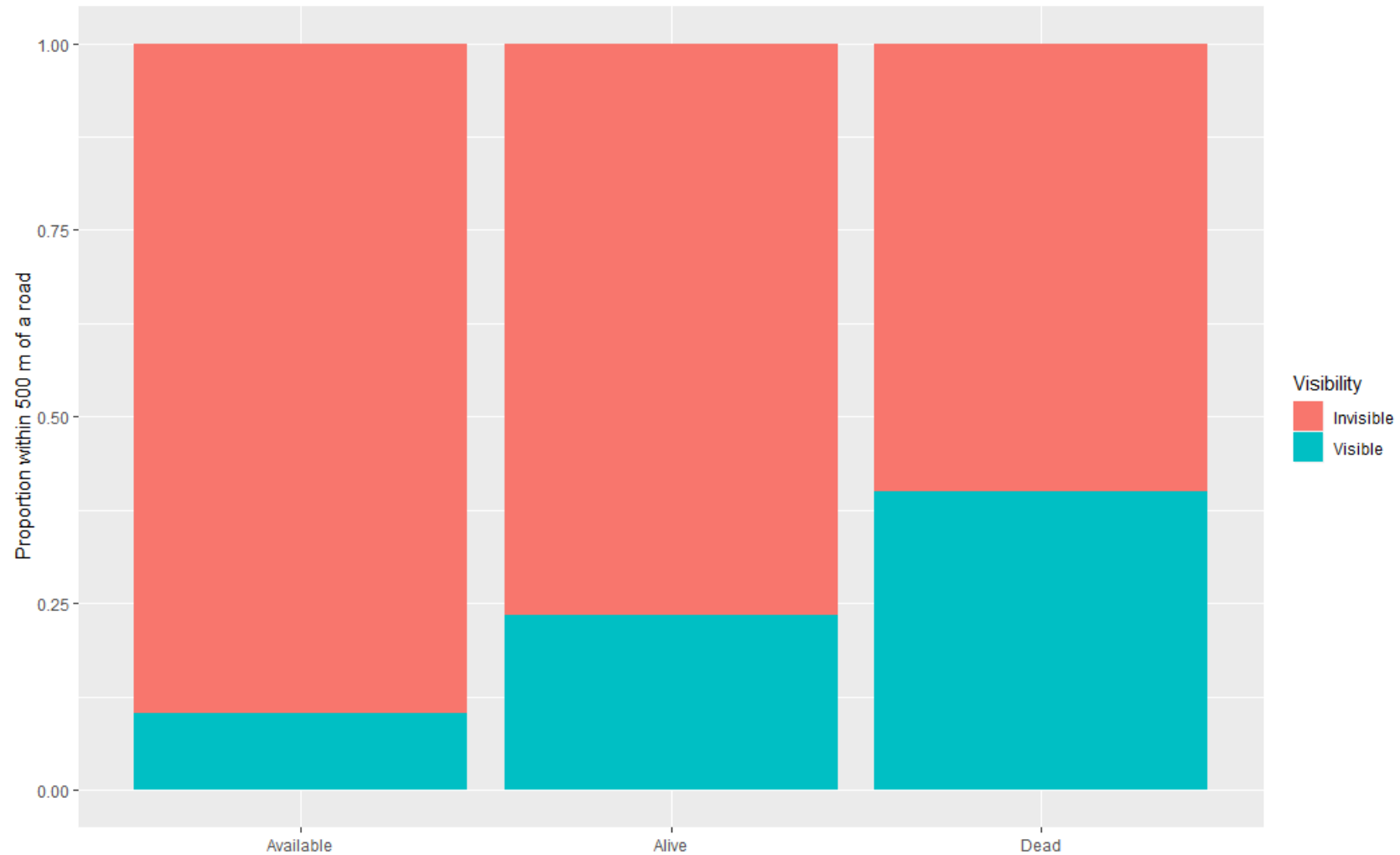


Survival

- Are grizzly bears more likely to be killed within a viewshed?



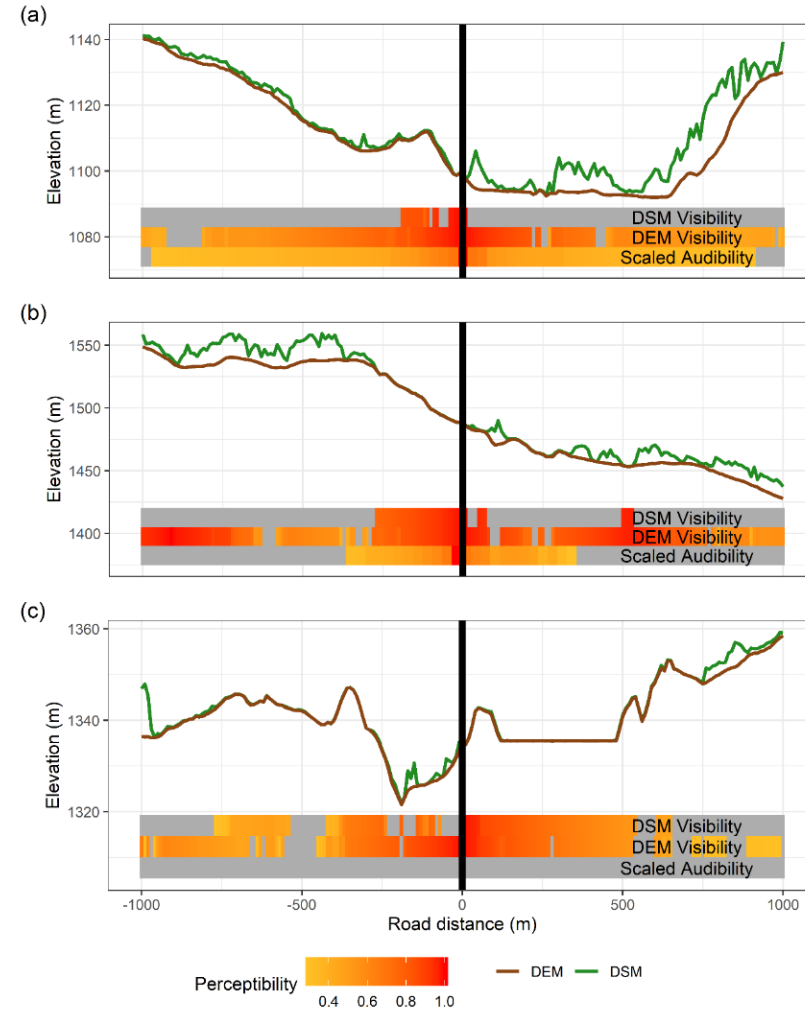
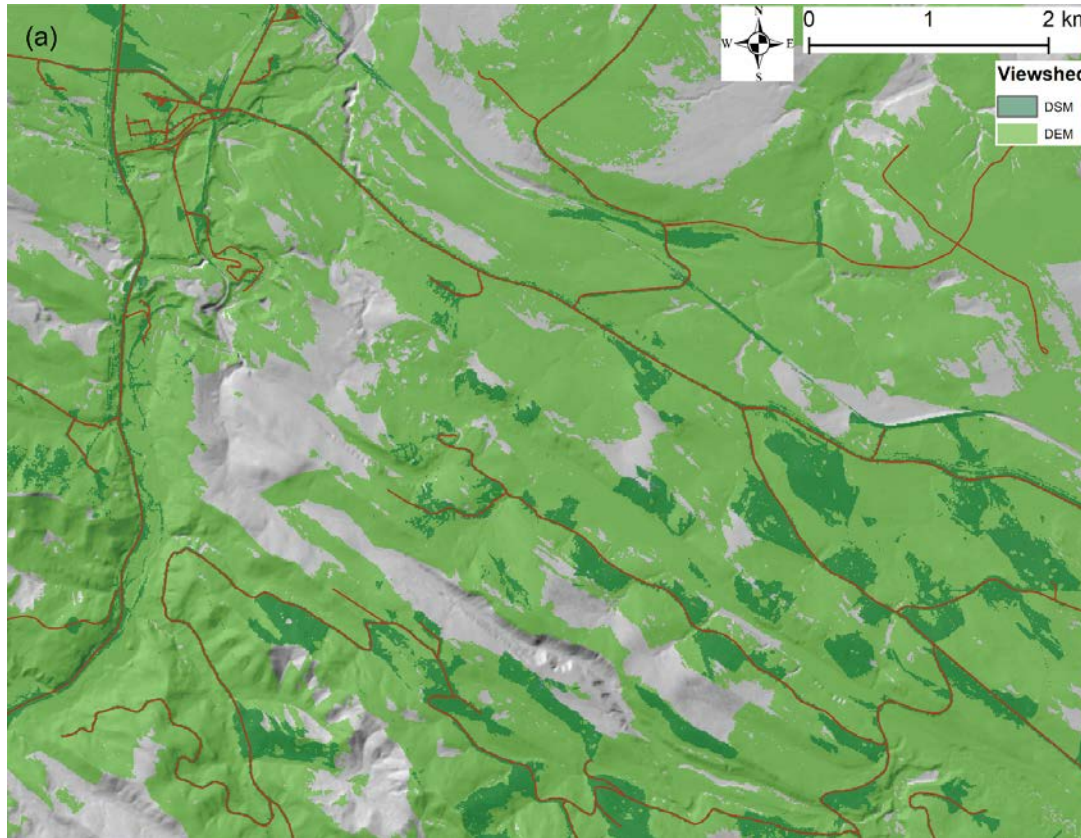
Survival - Results



Key Results

- Roads influenced grizzly bear movement at greater distances when perceptible from roads
- Although grizzly bears selected for areas near roads, they preferred areas invisible to roads
- More deaths occurred in areas visible to the road than expected based on landscape availability

Visibility and Forest Management



Recommendations

- Harvesting should use configurations that decrease visibility to roads
- Vegetation buffers should be planted or maintained along roadsides to reduce propagation of sight and sound
- Roads with high perceptibility to surrounding areas should be a priority for access management



Thank you!

Bethany Parsons

MSc Student, Integrated Remote Sensing Studio

bethany.arndt@alumni.ubc.ca



Teck



FOREST RESOURCE
IMPROVEMENT
ASSOCIATION OF ALBERTA

