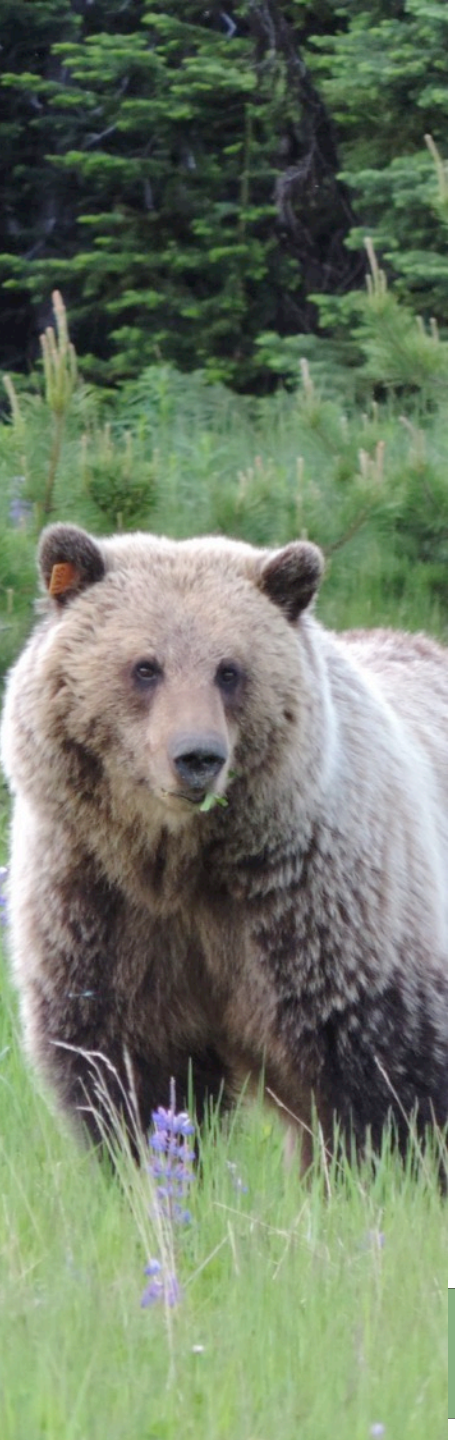
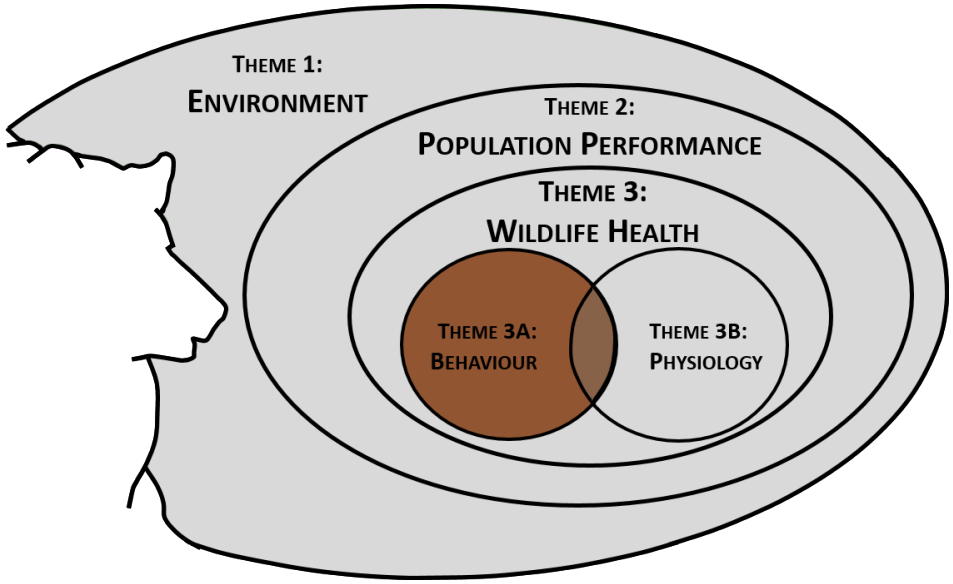


Grizzly-PAW: Grizzly Population Assessment in yelloWhead: Integrated Approaches Toward Conserving Grizzly Bears On A Human-Dominated Landscape Of Western Alberta.

Annual General Meeting – 3

Sean Kearney

Calgary, AB | October 18, 2019



Research questions

- Q4. Have changing landscape conditions associated with anthropogenic natural resource extraction activities resulted in changes in habitat selection by grizzly bears within the study area?
- Q5. Are the movement patterns of grizzly bears being impacted by natural resource extraction activities, including the development and use of roads and linear features?

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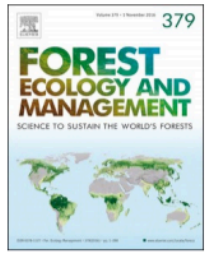
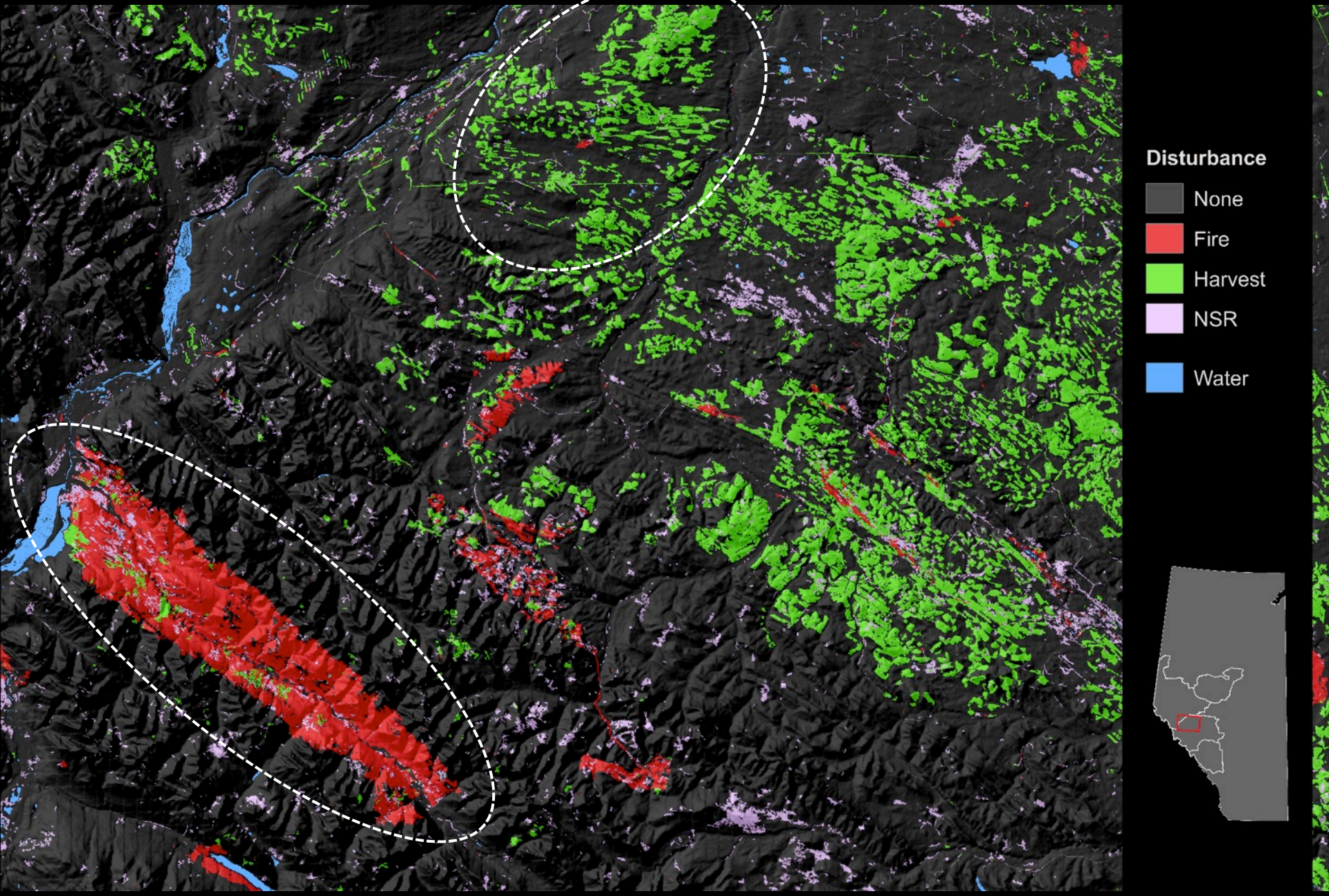
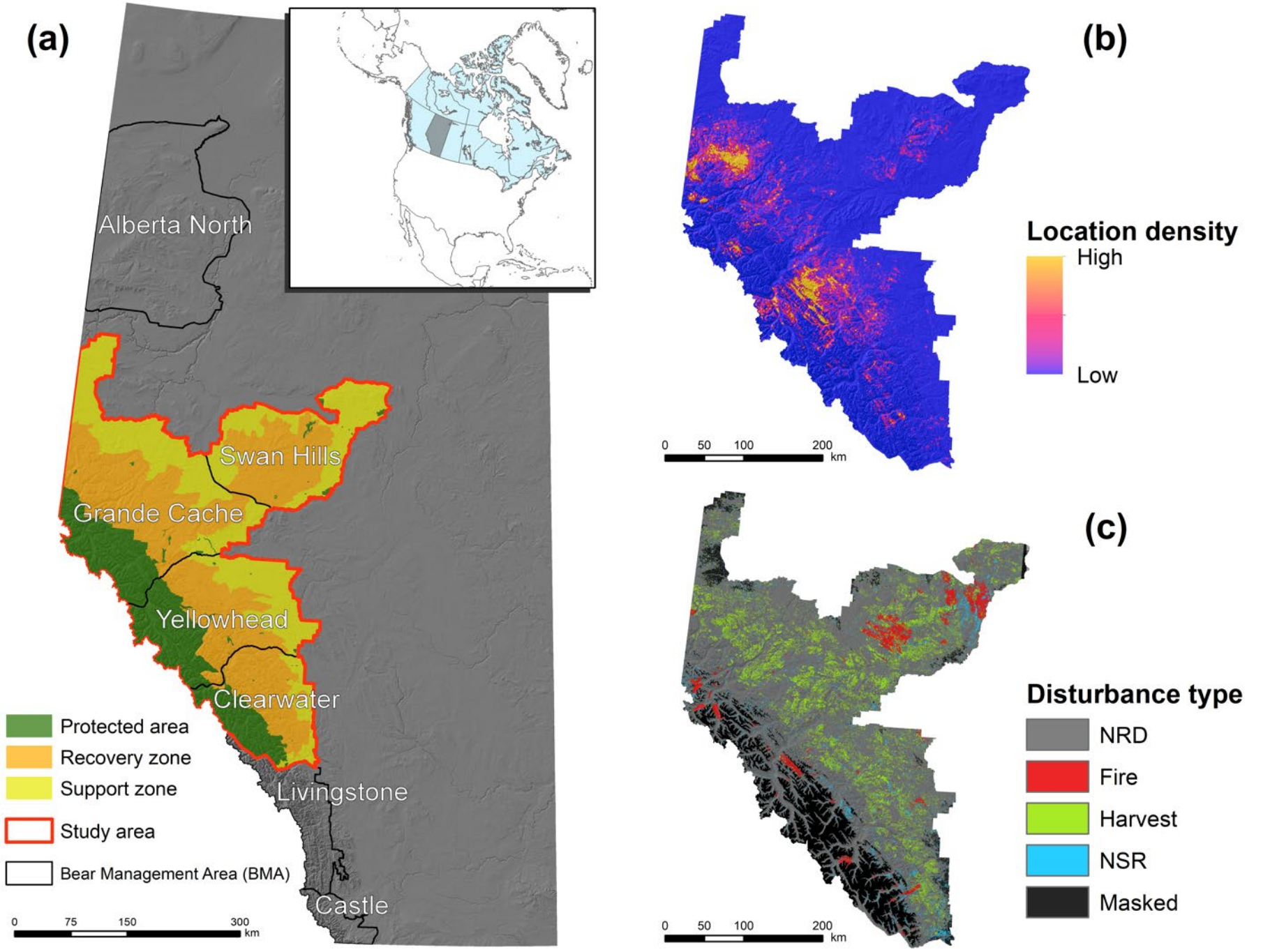
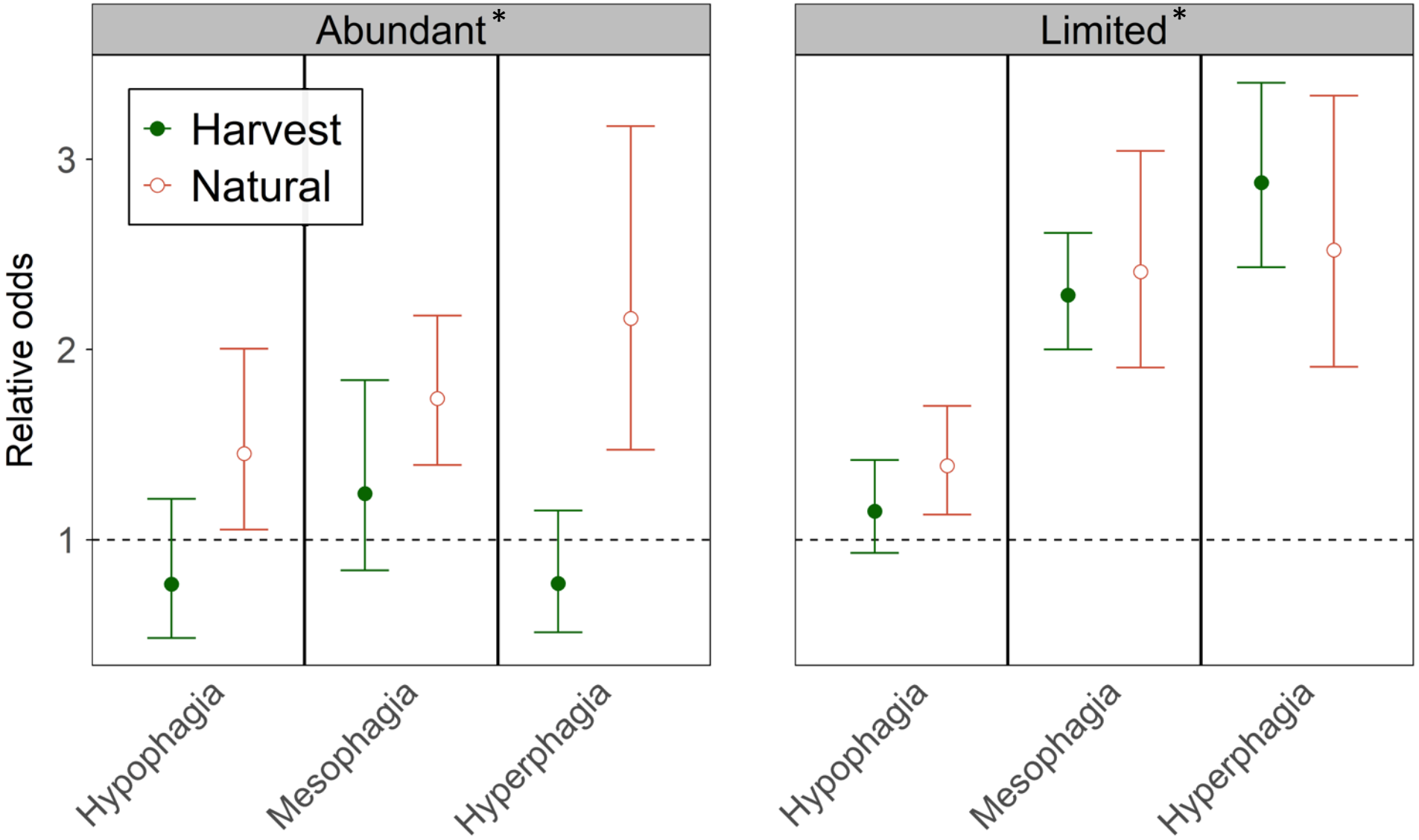


Grizzly bear selection of recently harvested forests is dependent on forest recovery rate and landscape composition

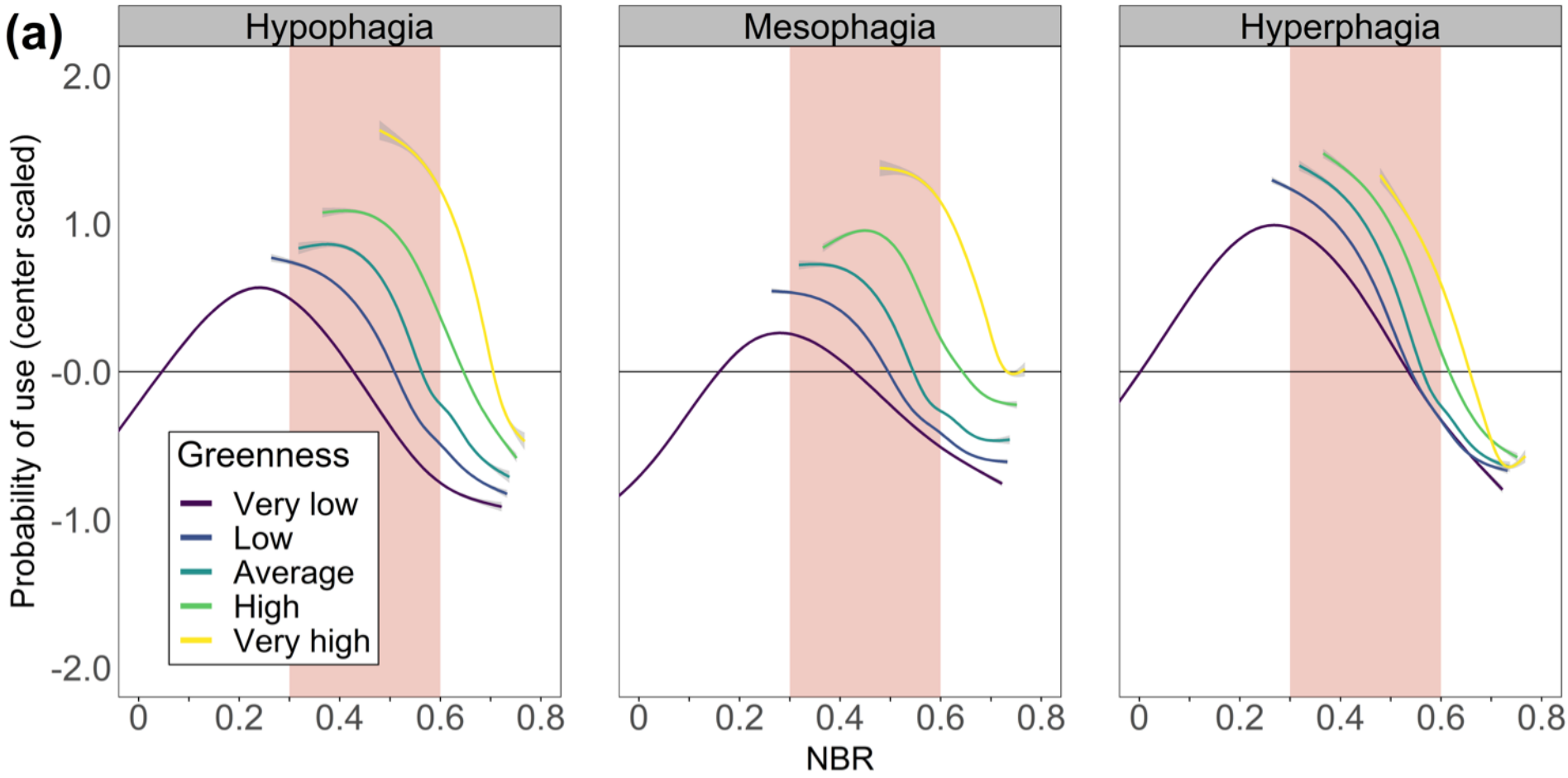
Sean P. Kearney[a,*], Nicholas C. Coops[a], Gordon B. Stenhouse[b,c], Scott E. Nielsen[d], Txomin Hermosilla[e], Joanne C. White[e], Michael A. Wulder[e]

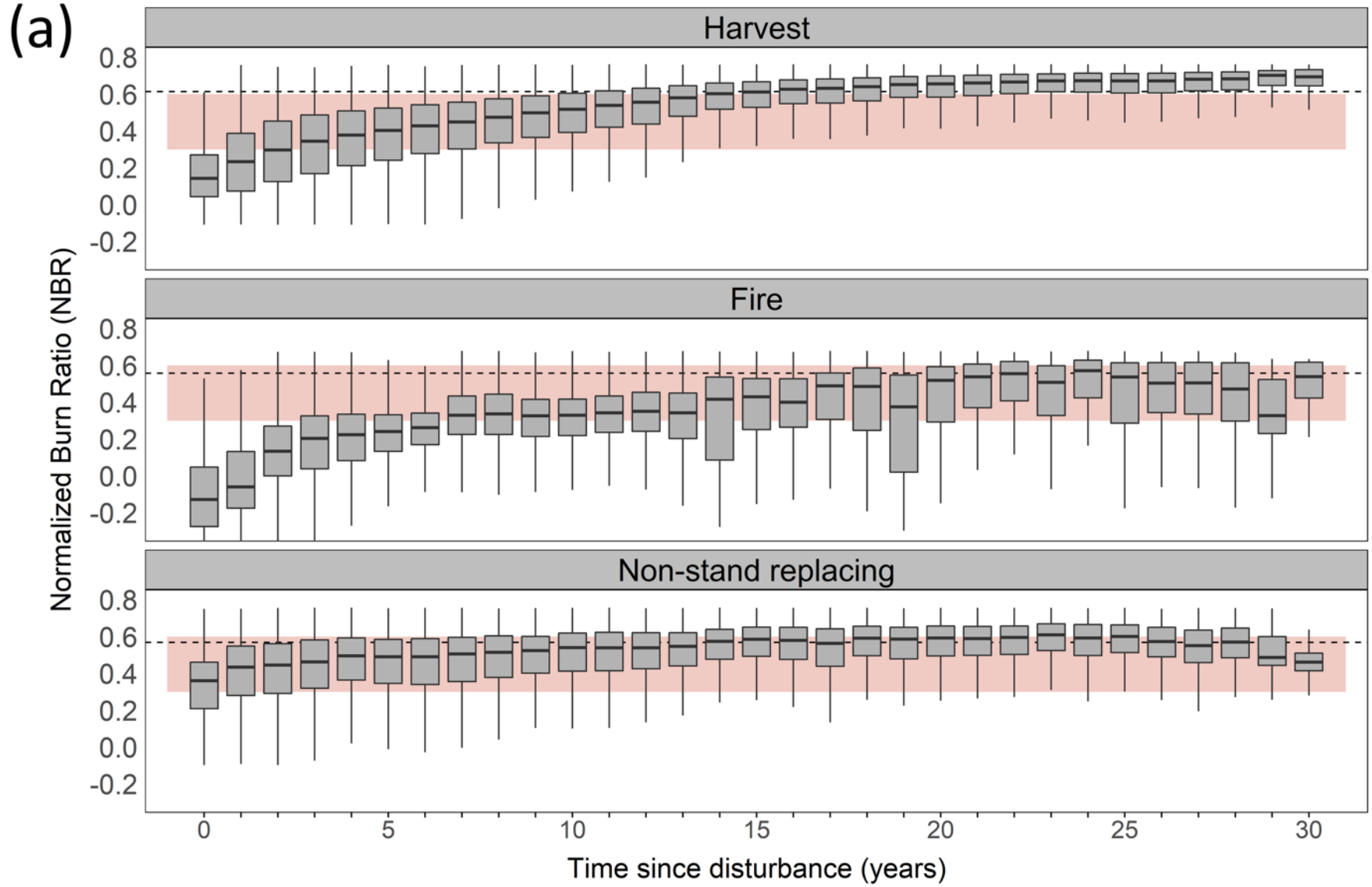

Disturbance
None
Fire
Harvest
NSR
Water


(a)
Alberta North
Swan Hills
Grande Cache
Yellowhead
Clearwater
Livingstone
Castle
Protected area
Recovery zone
Support zone
Study area
Bear Management Area (BMA)
0 75 150 300 km
(b)
Location density
High
Low
0 50 100 200 km
(c)
Disturbance type
NRD
Fire
Harvest
NSR
Masked
0 50 100 200 km



*availability of natural disturbances


(a)
Hypophagia
Mesophagia
Hyperphagia
Probability of use (center scaled)
2.0
1.0
-0.0
-1.0
-2.0
0
0.2
0.4
0.6
0.8
NBR
Greenness
Very low
Low
Average
High
Very high


(a)
Harvest
Fire
Non-stand replacing
Normalized Burn Ratio (NBR)
0.8
0.6
0.4
0.2
0.0
-0.2
0
5
10
15
20
25
30
Time since disturbance (years)

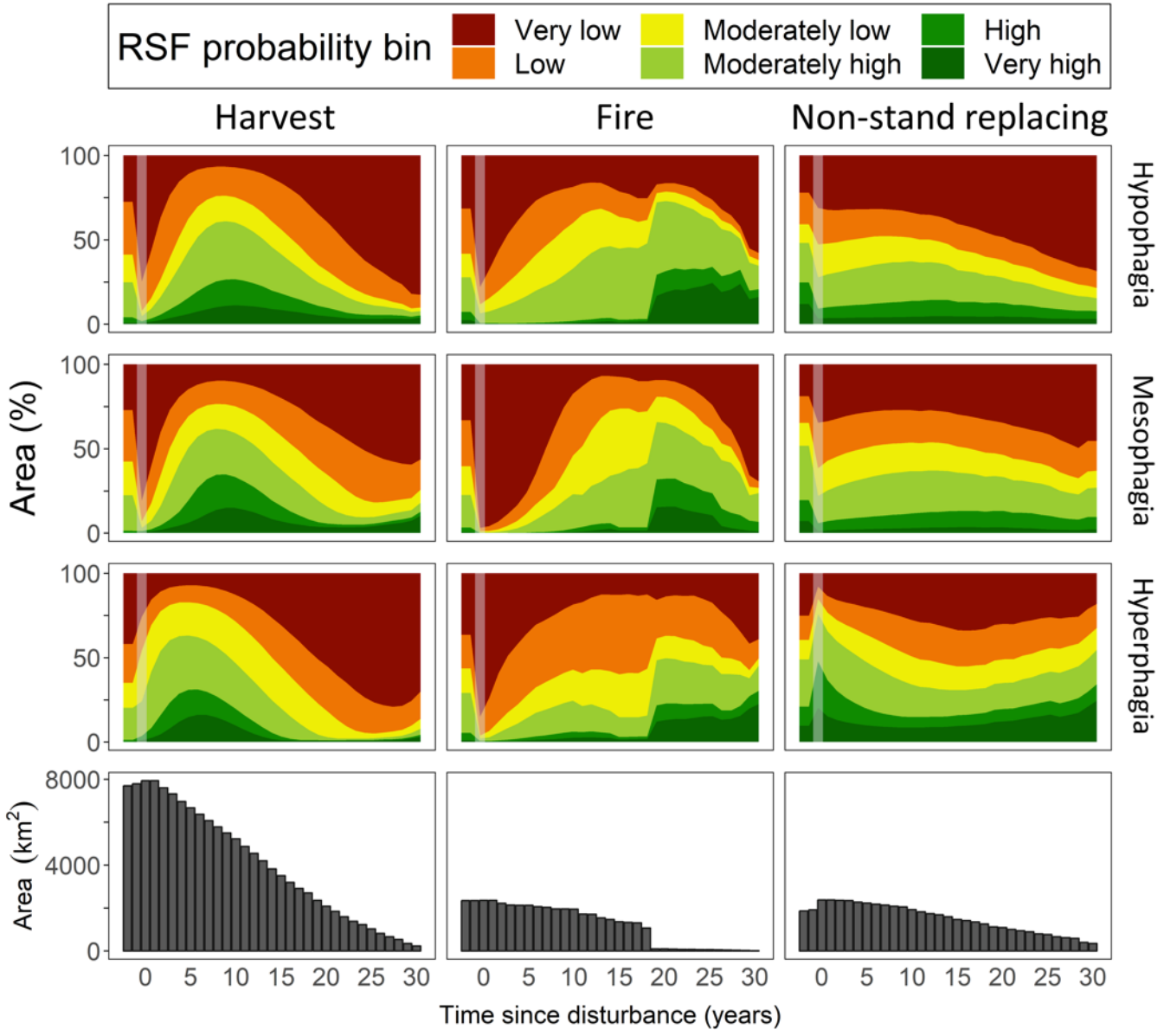

RSF probability bin
Very low
Low
Moderately low
Moderately high
High
Very high
Harvest
Fire
Non-stand replacing
Hypophagia
Mesophagia
Hyperphagia
Area (%)
100
50
0
Area (km²)
8000
4000
0
0 5 10 15 20 25 30
Time since disturbance (years)

Photo: Aaron Huey/National Geographic

Automated rural road detection and classification

Developed and compared three road classifications that relate to use/traffic

1. Network based approach
2. Image-based approach
3. Reference (simplification of the GOA classes)

Network-based classification

Recreation

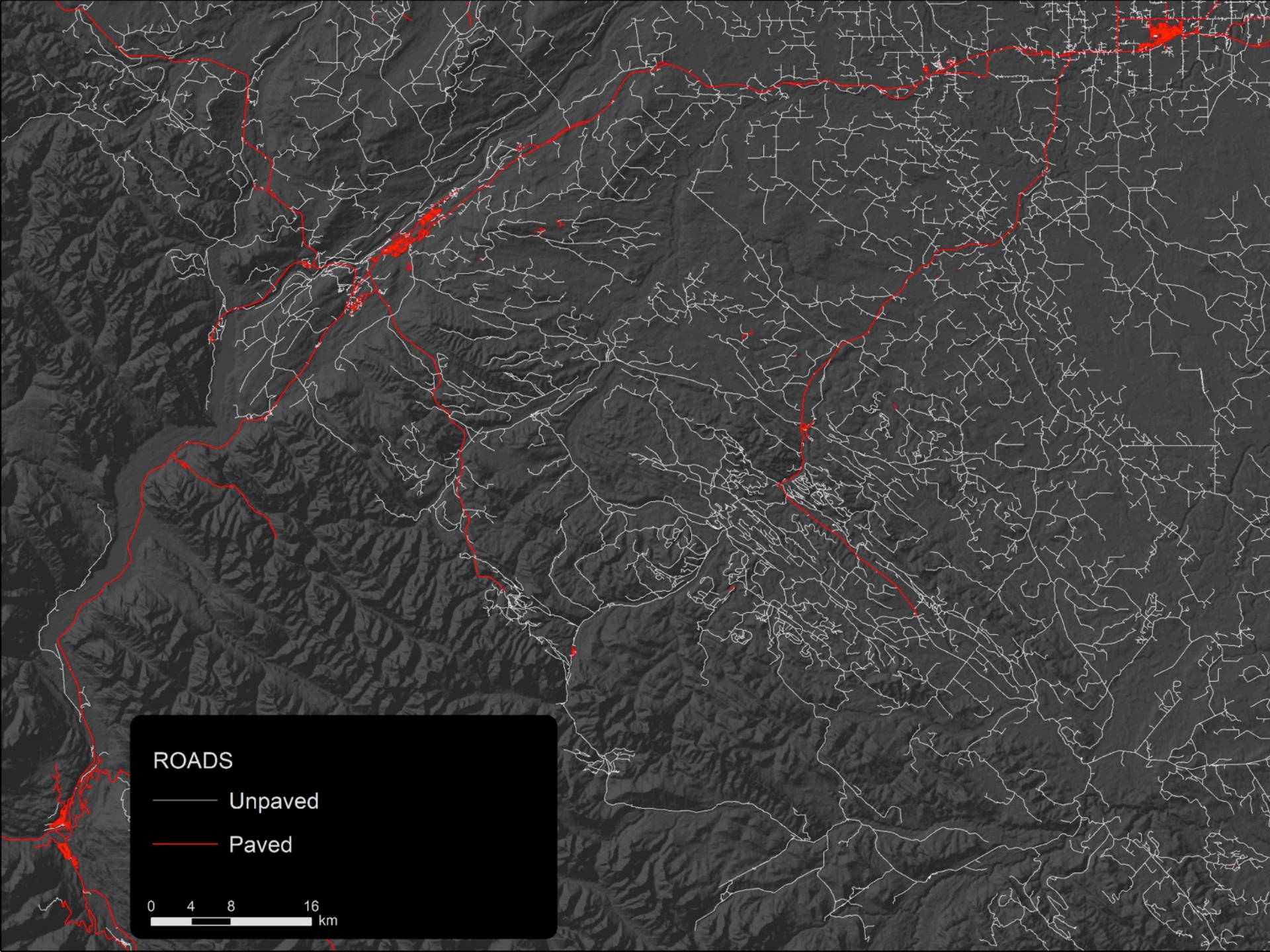
Industry

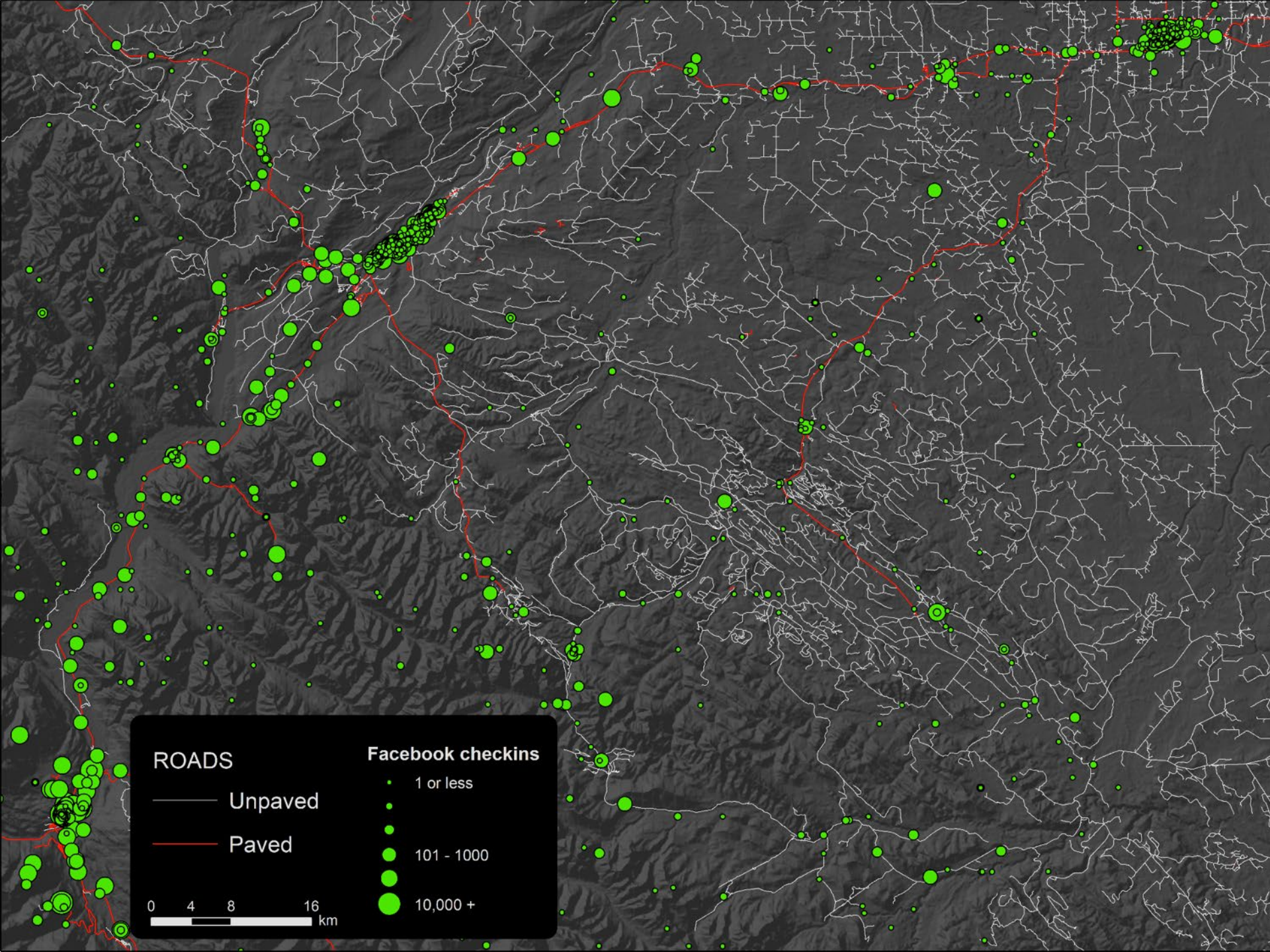
Forestry

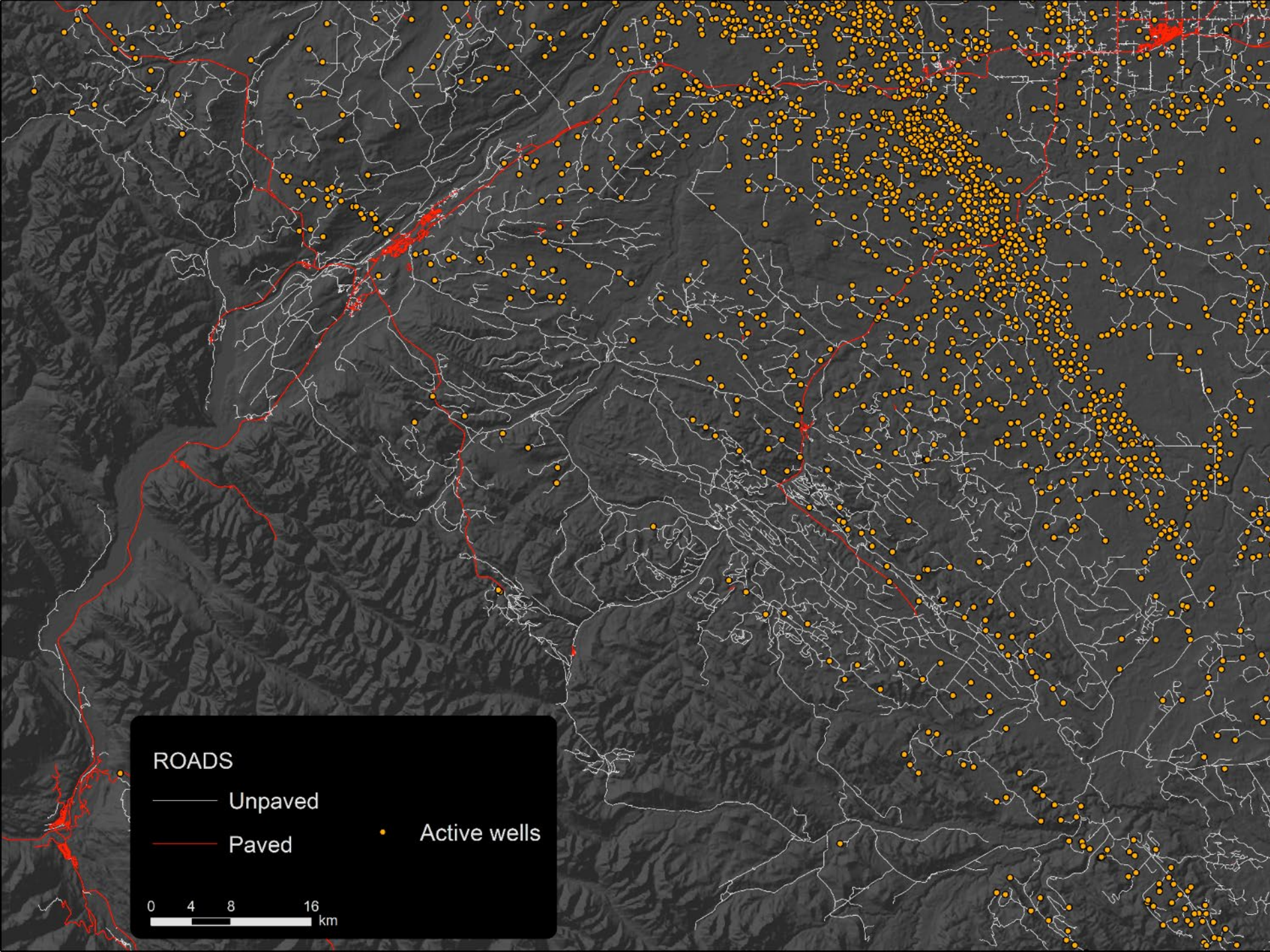
- Satellite-detected

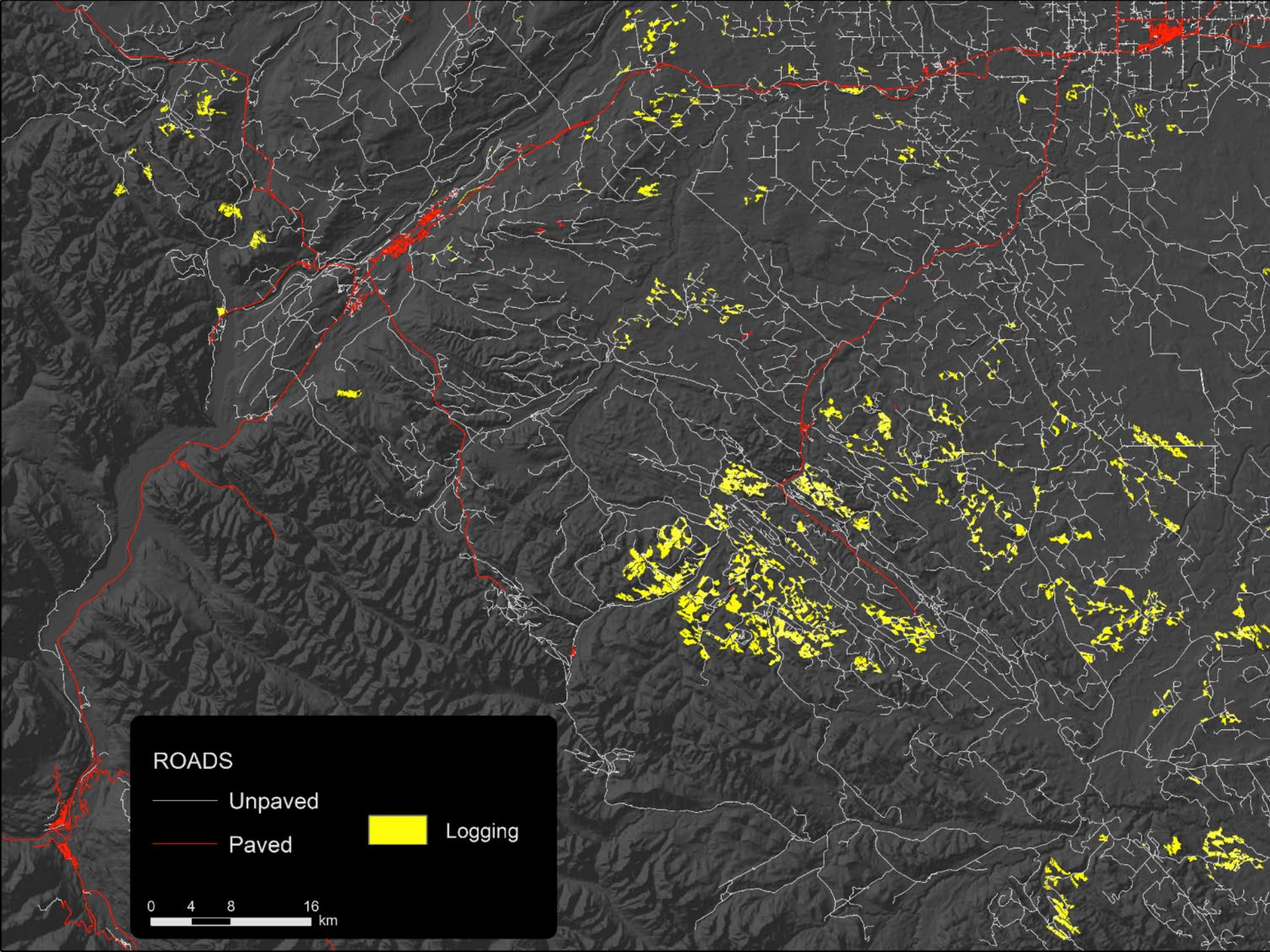
Oil/Gas

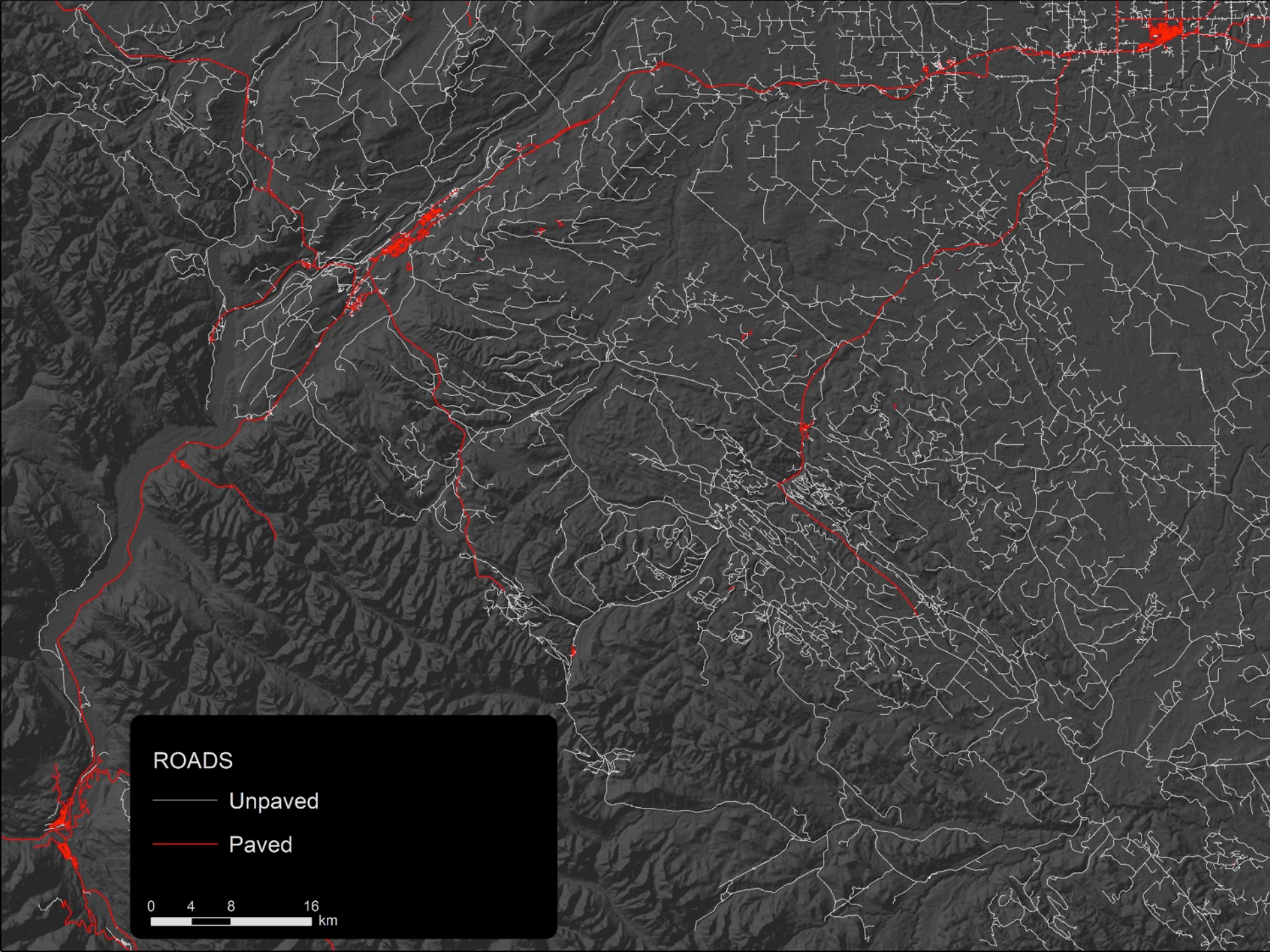
- Active wells

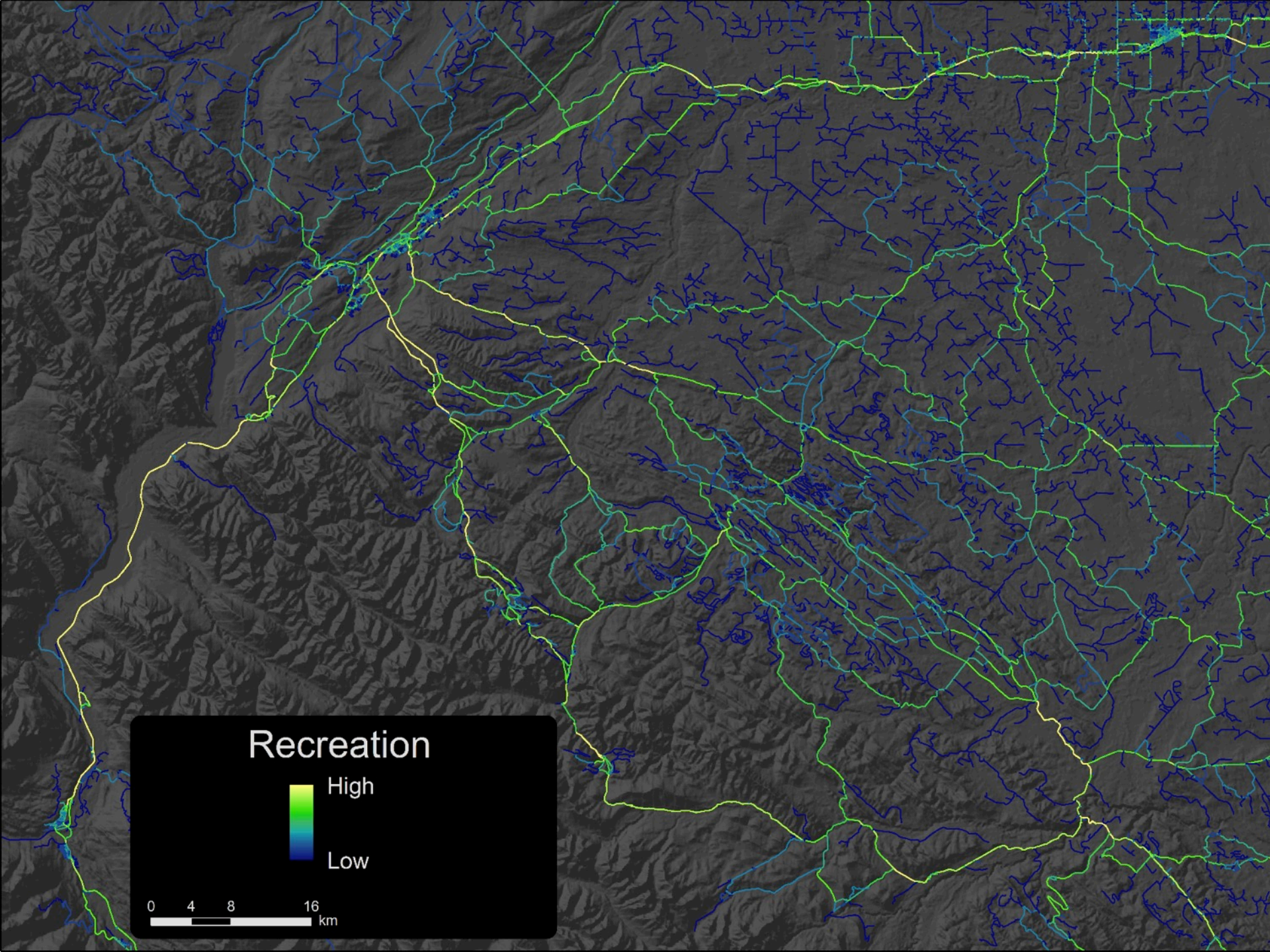

ROADS
Unpaved
Paved
0 4 8 16
km

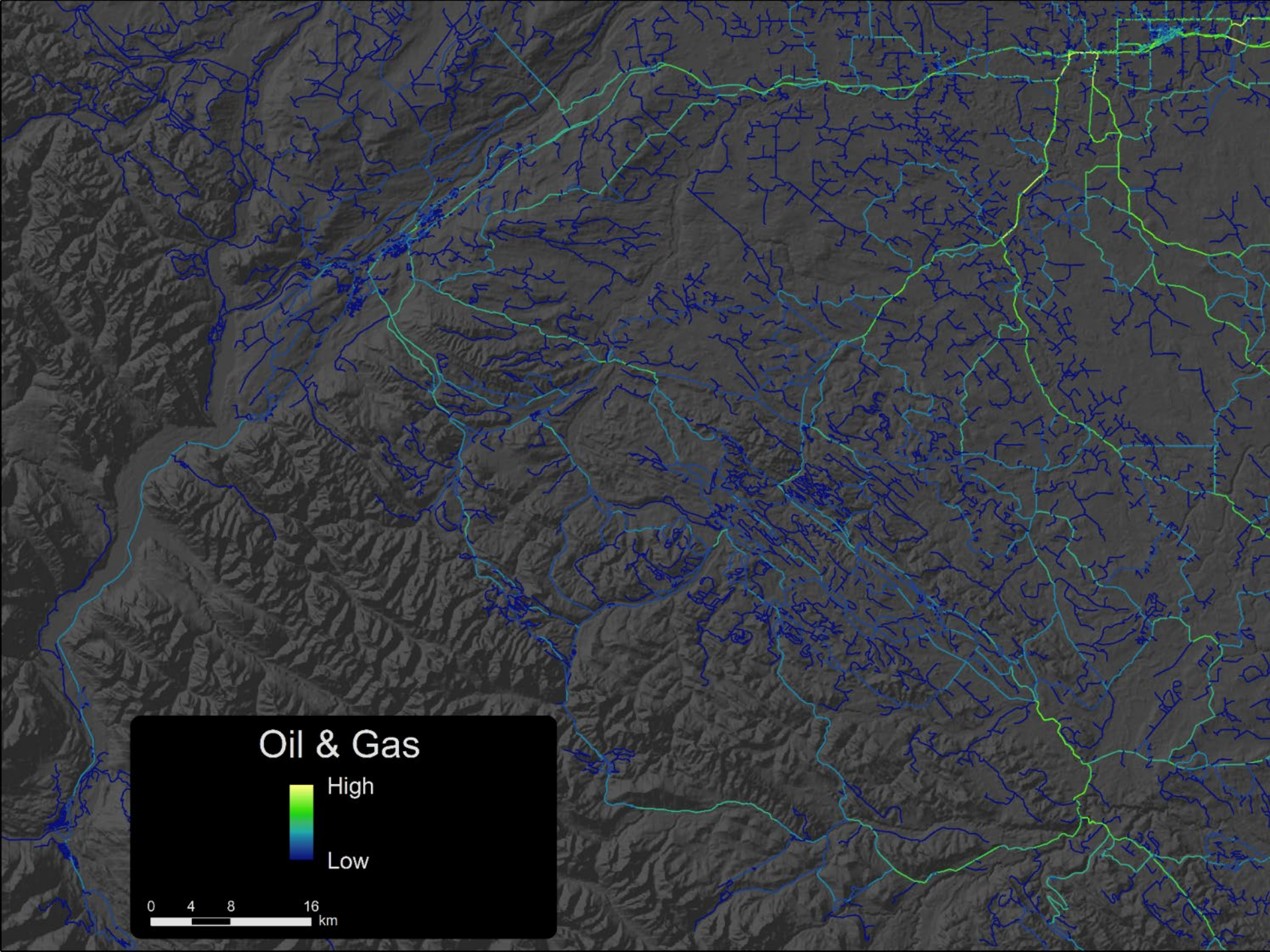

ROADS
Unpaved
Paved
0 4 8 16
km
Facebook checkins
1 or less
101 - 1000
10,000 +


ROADS
Unpaved
Paved
Active wells
0 4 8 16
km


ROADS
Unpaved
Paved
Logging
0 4 8 16
km


ROADS
Unpaved
Paved
0 4 8 16
km


Recreation
High
Low
0 4 8 16
km


Oil & Gas
High
Low
0 4 8 16
km

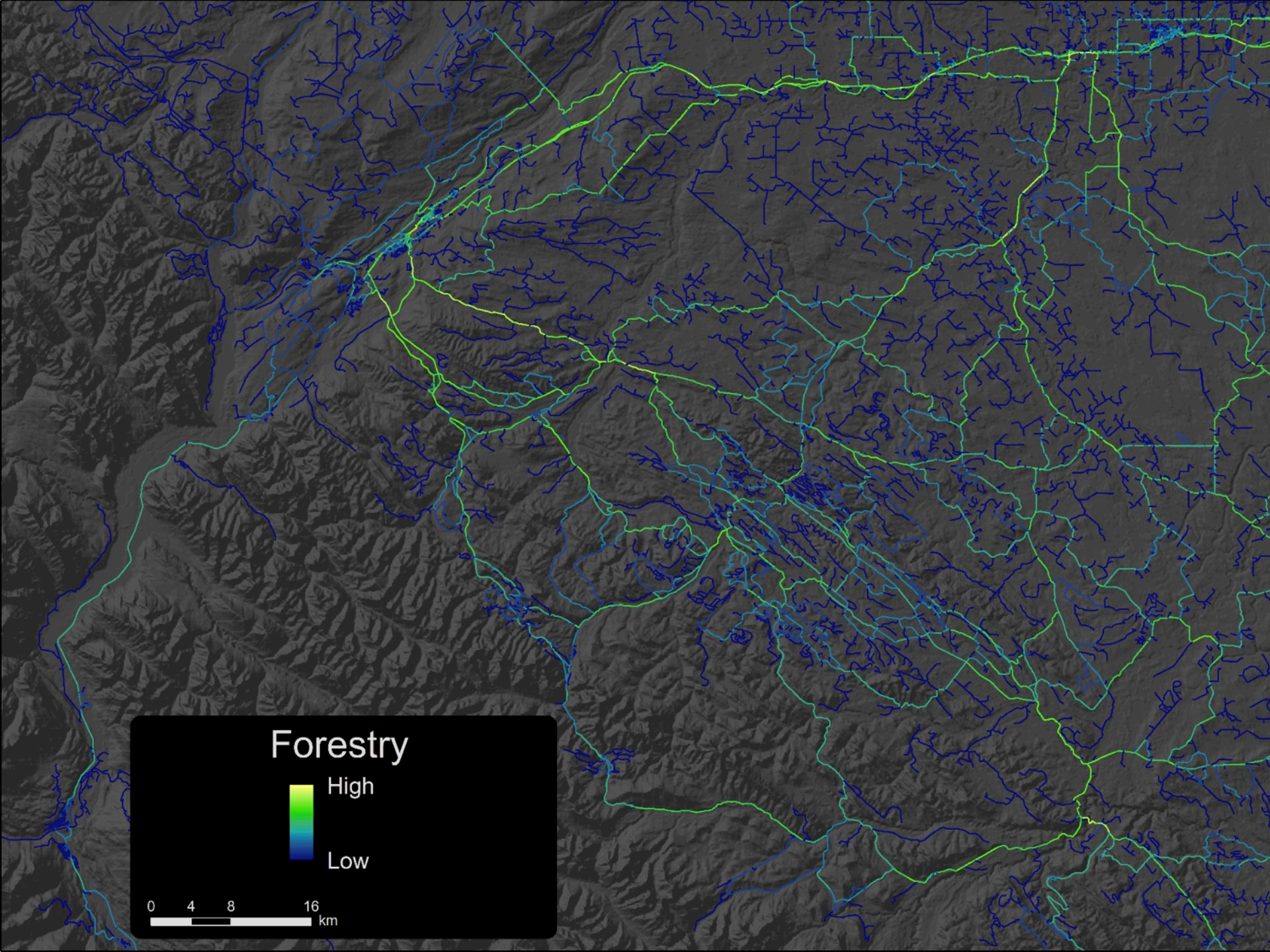
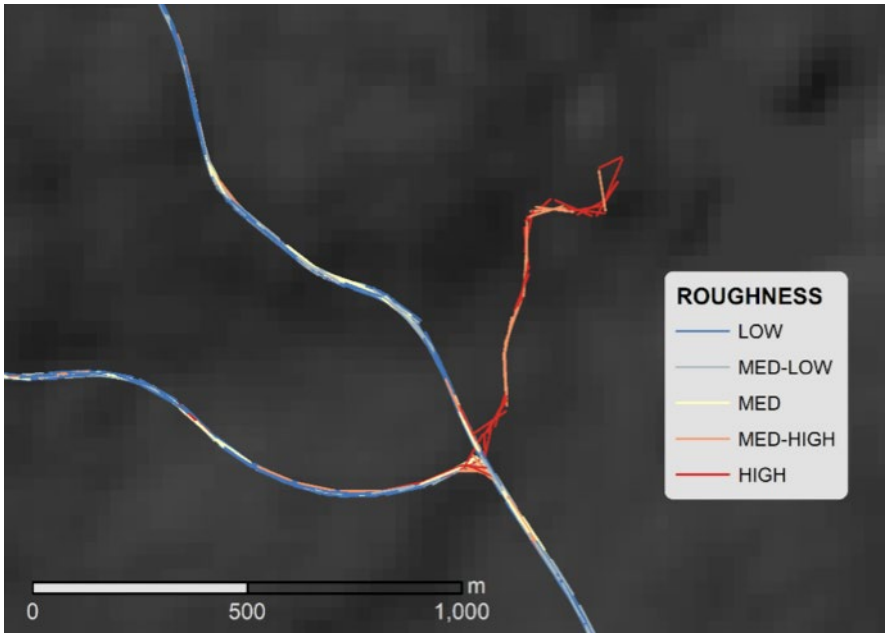

Forestry
High
Low
0 4 8 16
km

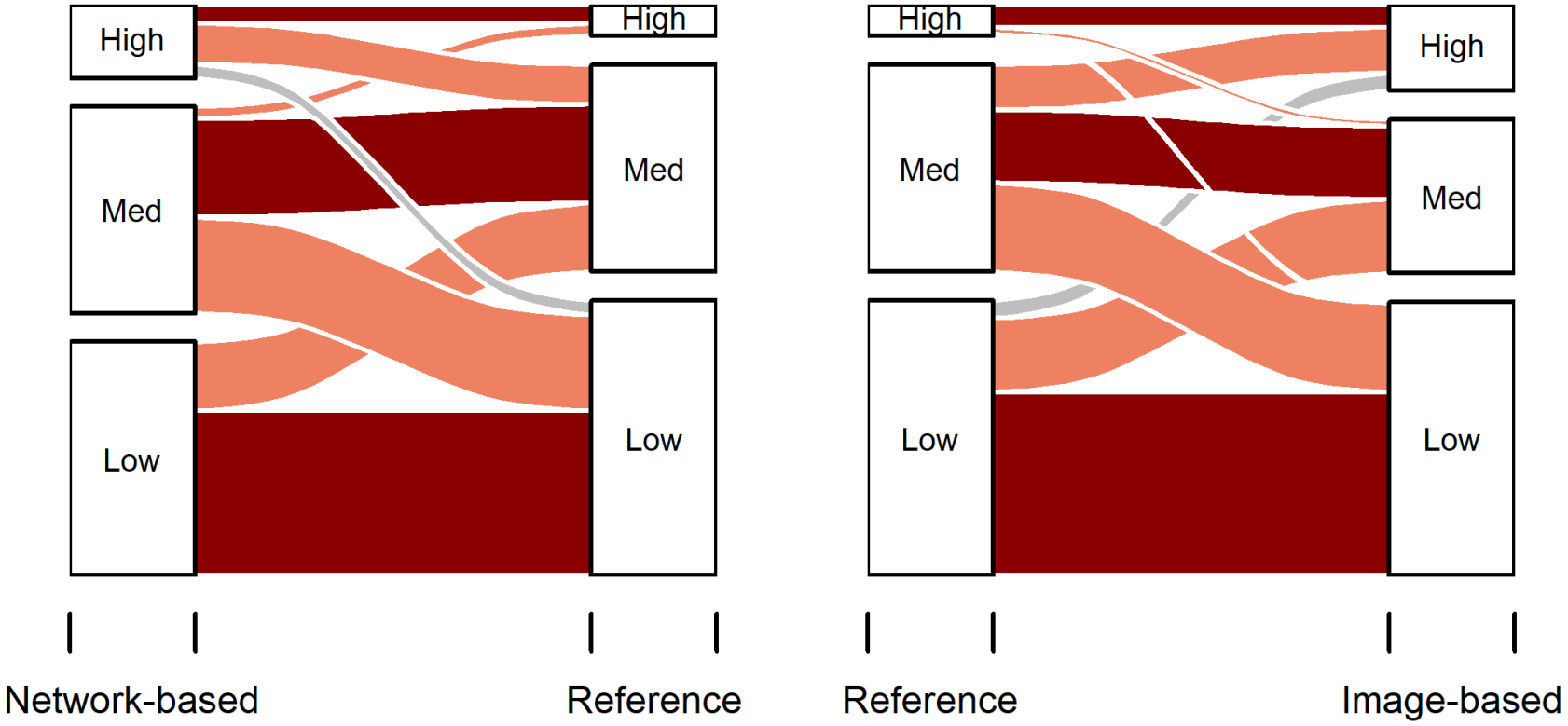
Image-based classification



Reference (GOA) classification

- High: 2-lane gravel
- Med: 1-lane gravel
- Low: all other unpaved (e.g., ‘unimproved’, ‘truck-trail’, ‘temporary’, etc.)

Preliminary results



Preliminary results

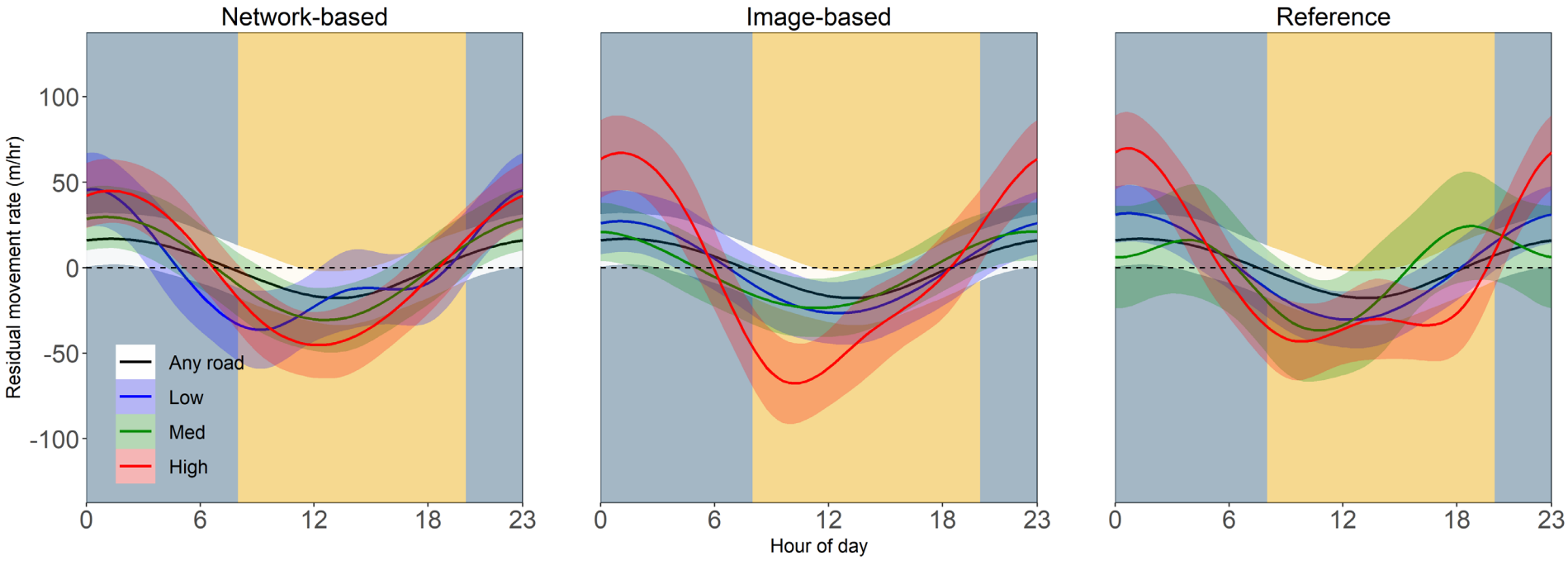
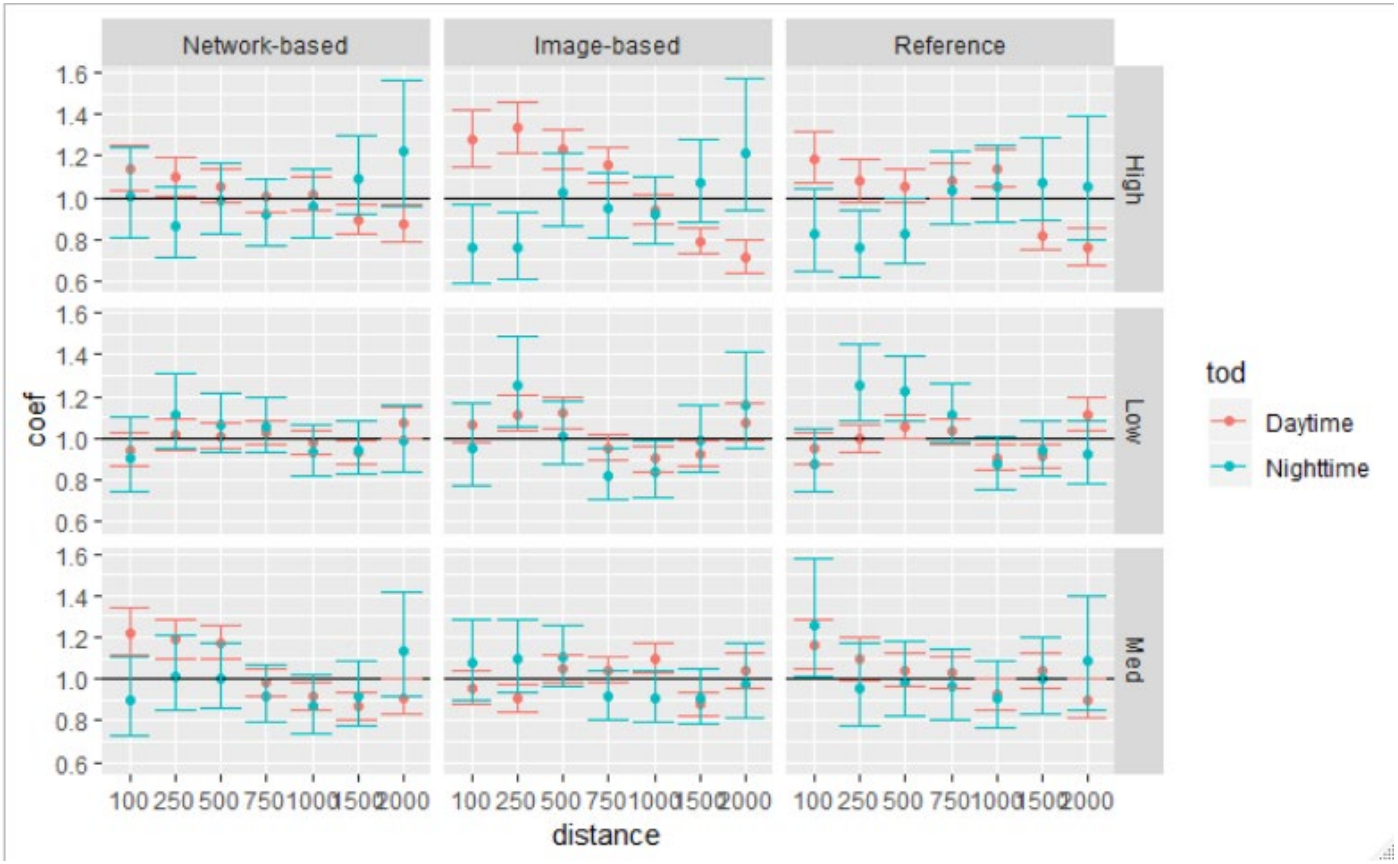


Figure: Diurnal deviation from expected movement rates by road class for the three classifications

Preliminary results

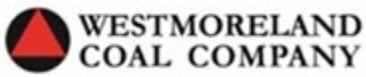
Fine-scale selection (step selection function)

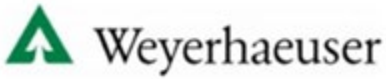


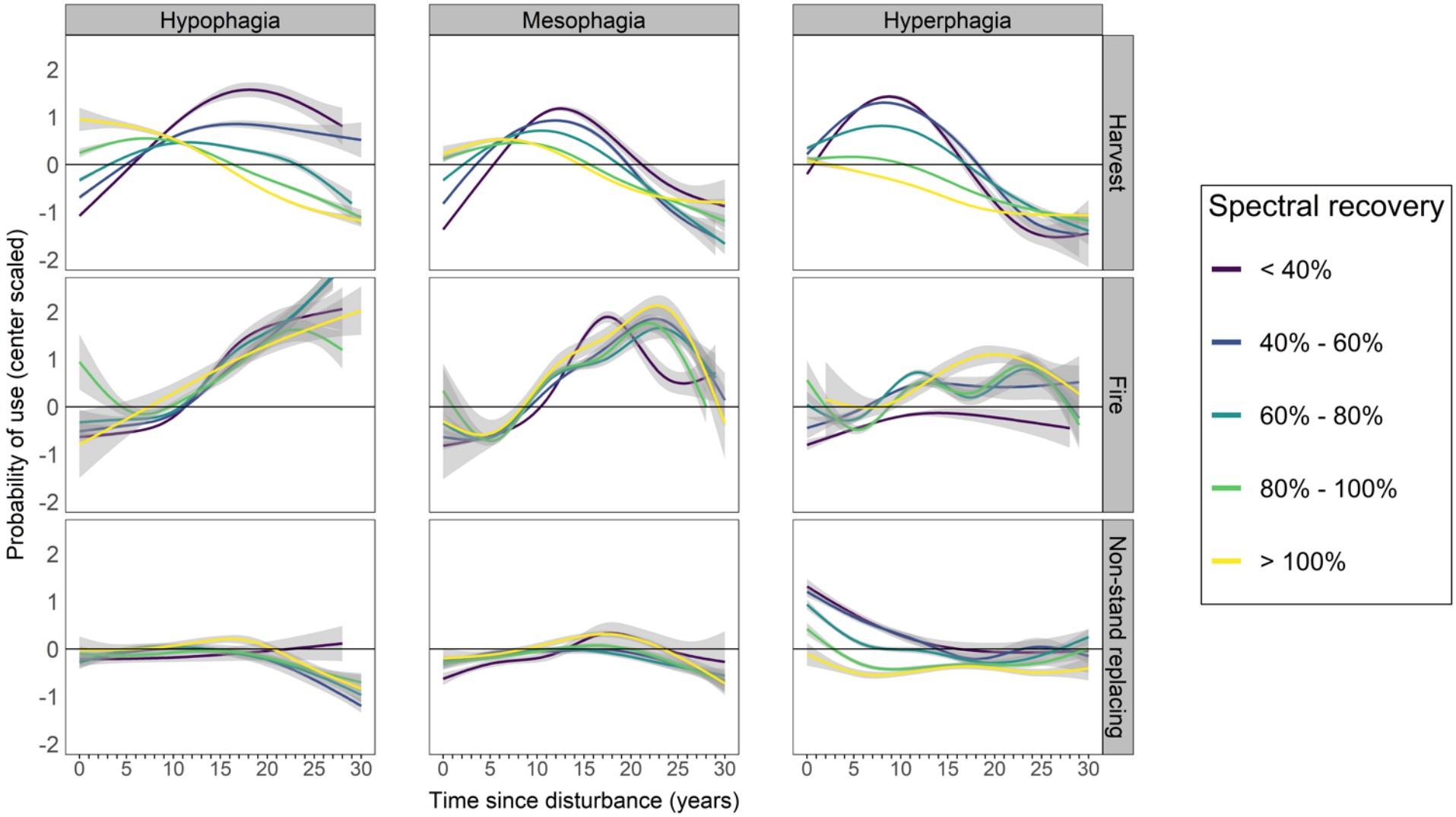
Early conclusions

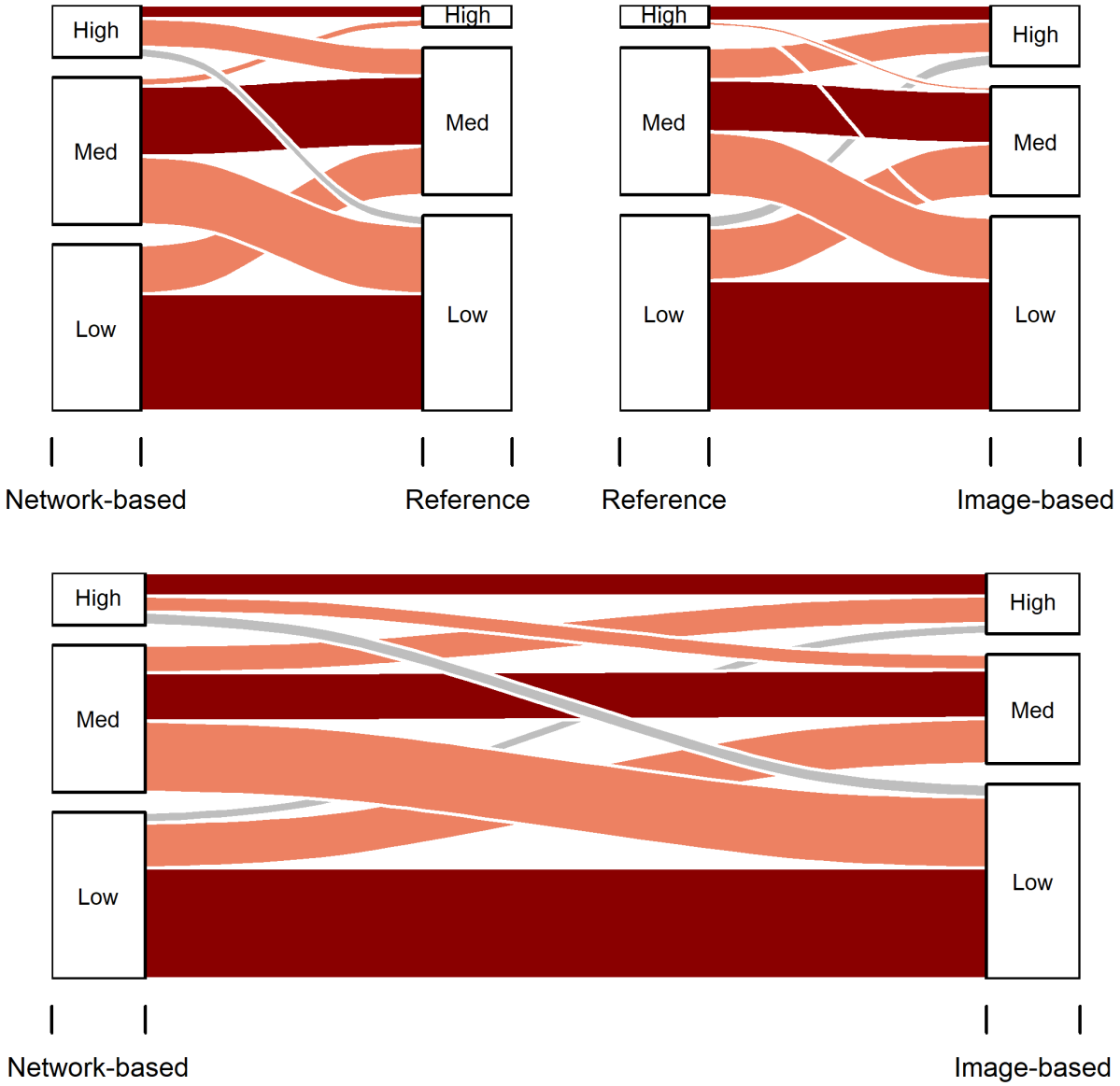
- Simple GOA reclassification shows similar patterns to more complex approaches
- Image-based classification approach may best explain grizzly bear movement patterns near roads
  - Promising for regions without existing data
- Network-based approach may require refinement

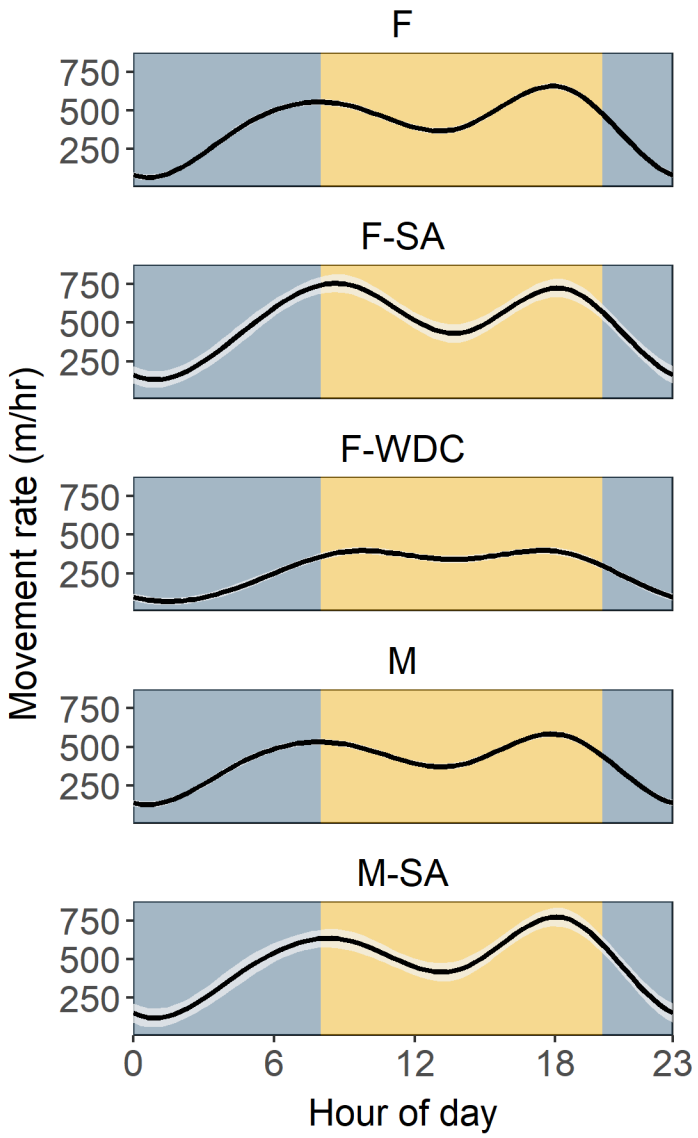
Thank You for Attending

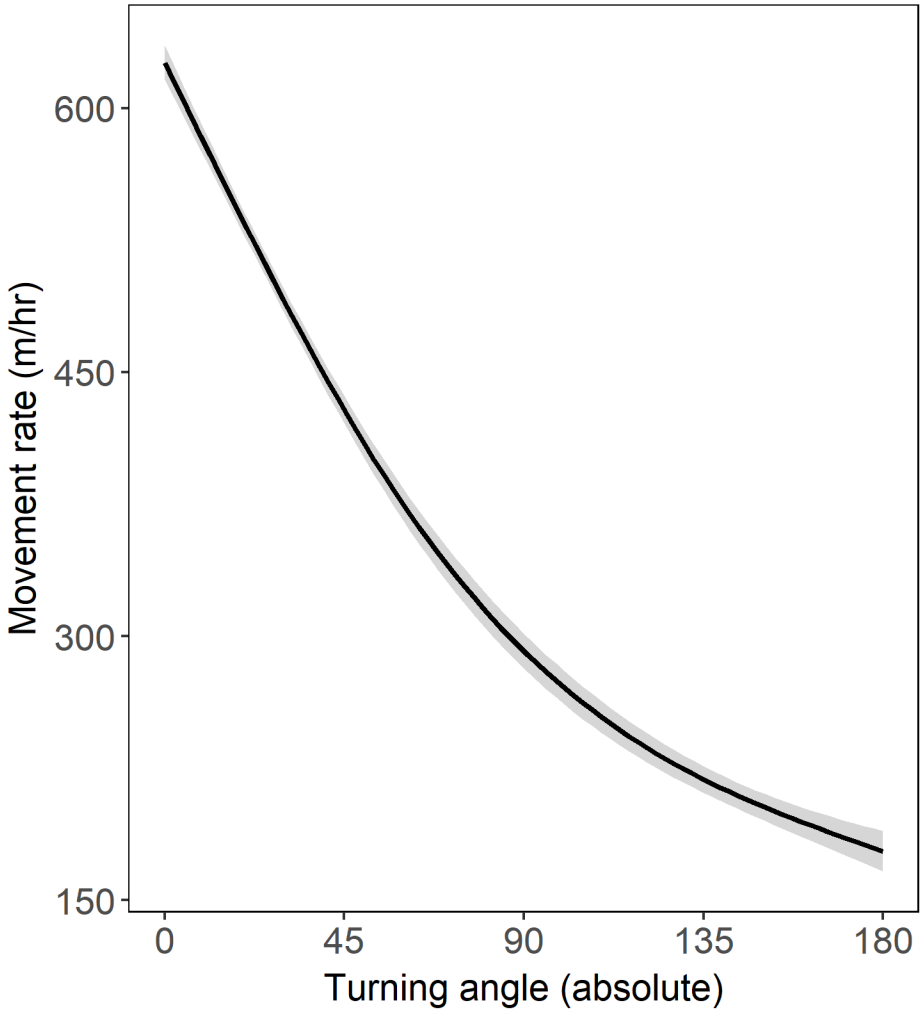





Hypophagia
Mesophagia
Hyperphagia
Harvest
Fire
Non-stand replacing
Probability of use (center scaled)
Time since disturbance (years)
Spectral recovery
< 40%
40% - 60%
60% - 80%
80% - 100%
> 100%


High
Med
Low
High
Med
Low
Network-based
Reference
High
Med
Low
High
Med
Low
Reference
Image-based
High
Med
Low
High
Med
Low
Network-based
Image-based


F
F-SA
F-WDC
M
M-SA
750
500
250
Movement rate (m/hr)
0
6
12
18
23
Hour of day


600
450
300
150
Movement rate (m/hr)
0
45
90
135
180
Turning angle (absolute)