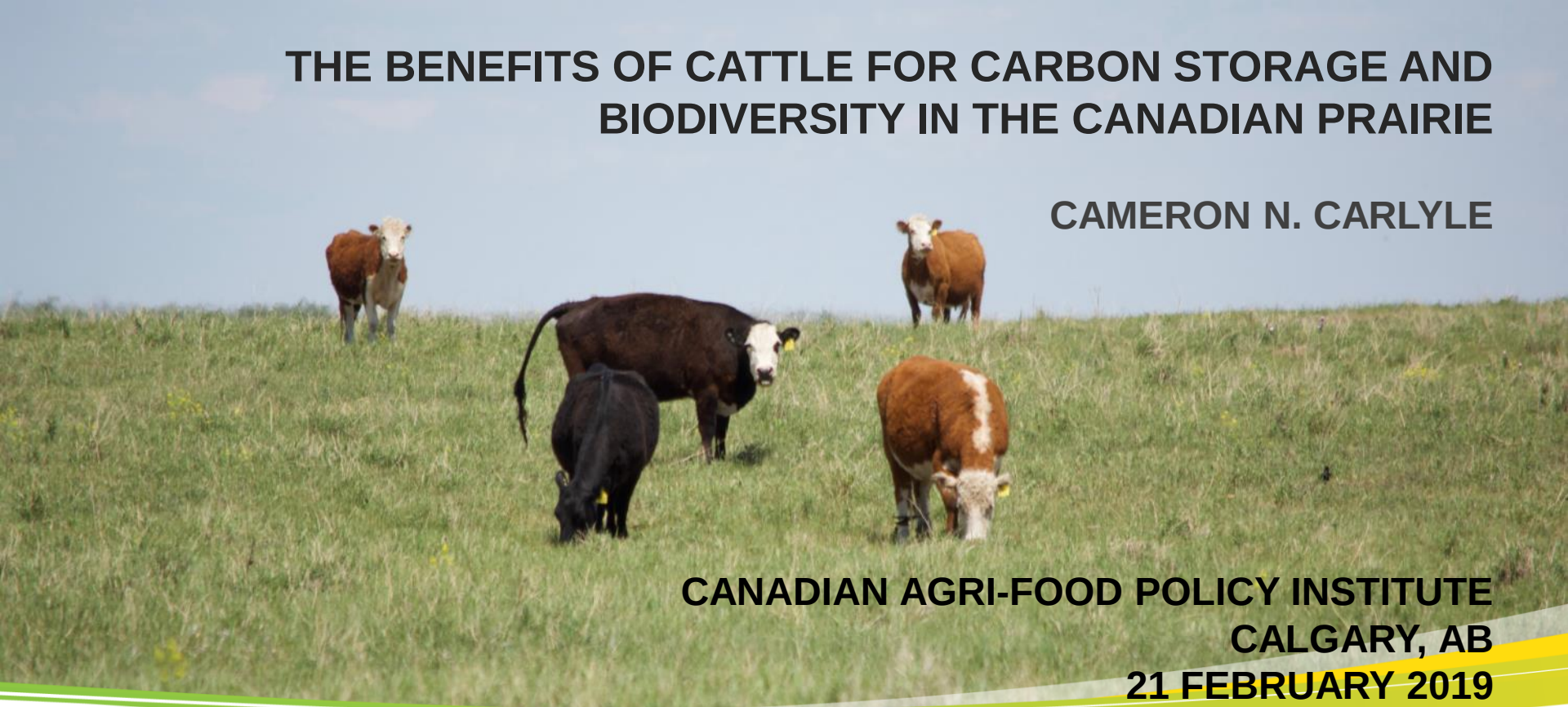
THE BENEFITS OF CATTLE FOR CARBON STORAGE AND BIODIVERSITY IN THE CANADIAN PRAIRIE

CAMERON N. CARLYLE



CANADIAN AGRI-FOOD POLICY INSTITUTE
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"uplifting the whole people"
— HENRY MARSHALL TORY, FOUNDING PRESIDENT, 1908

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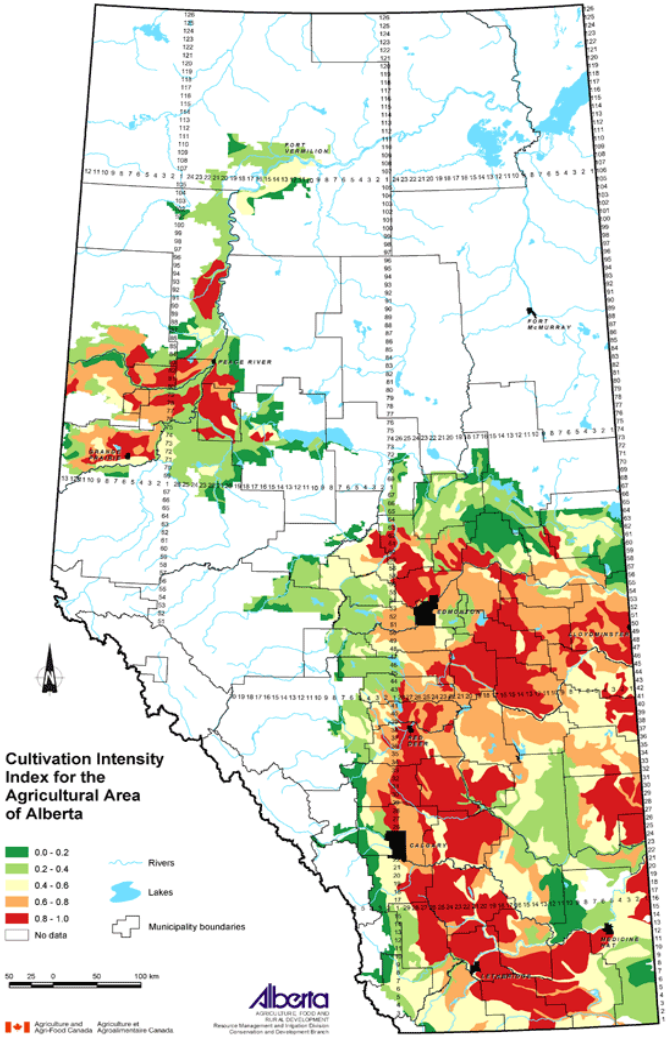
Research Support:

Grassland loss

60- 83% grassland conversion

- 2% / year loss of great plains (WWF, 2016)
- Alberta grasslands: +1.8% human footprint (ABMI,1999 to 2013)
- 40,000 fewer acres of natural area used for livestock (2016 Census)



Biodiversity loss

Habitat loss has led to the extirpation of:
Black-footed ferrets
Greater Prairie chicken
Grizzly bear

And many more are endangered or threatened:
Yucca moth
Burrowing owl
Sage thrasher
Harvest mouse
Greater short-horned lizard
Yellow-bellied racer
Soapweed
Slender mouse-ear-cress…

Species at risk public registry: www.registrelep-sararegistry.gc.ca

Grassland Ecosystem Goods and Services

“the services and benefits from ecological functions provided to humans”





Land use, cattle, stocking rates and grazing systems

How does land use affect EG&S?

Land use, cattle, stocking rates and grazing systems

Do cattle contribute to EG&S?

Land use, cattle, stocking rates and grazing systems

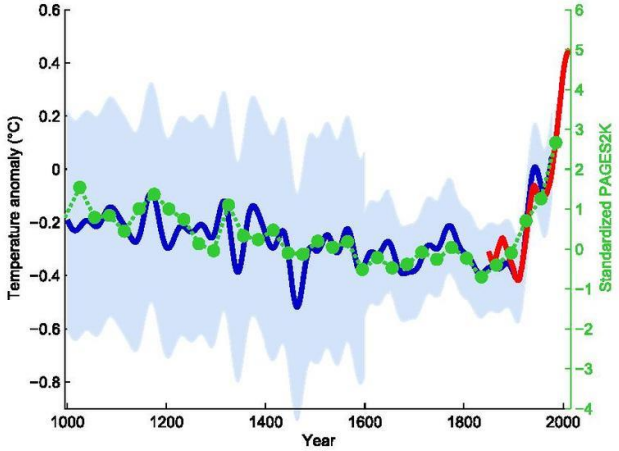
Can we identify cattle management practices that improve EG&S?

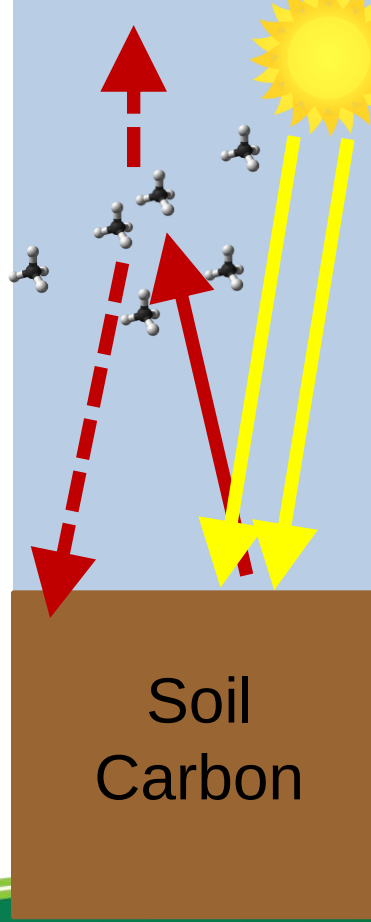
Stocking rates: intensity, the amount of use by cattle

Grazing systems: the season, duration, cattle density

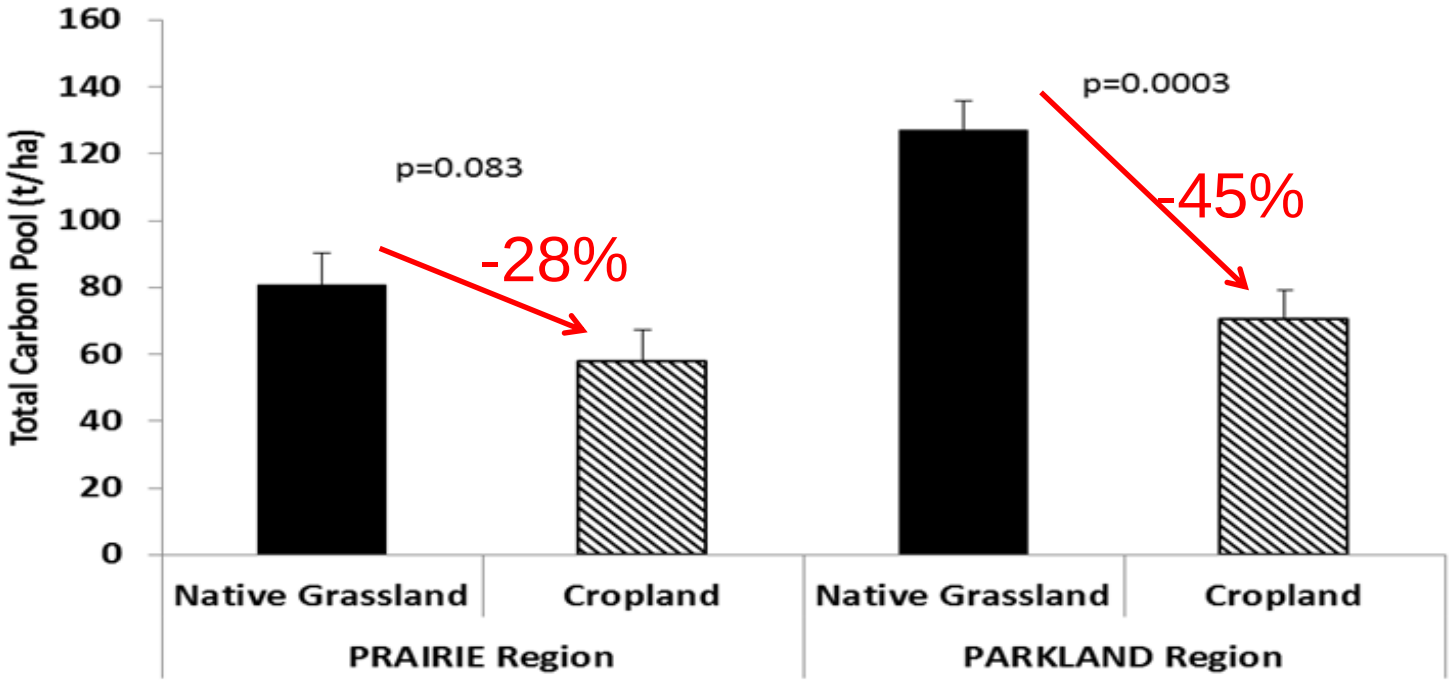
GHG, soil carbon, climate change

- The risk of drought is increasing
- Managing for soil carbon has production benefits
- Concern over GHG from cattle
- Opportunities for carbon offsets
- **No offset protocol for perennial vegetation**

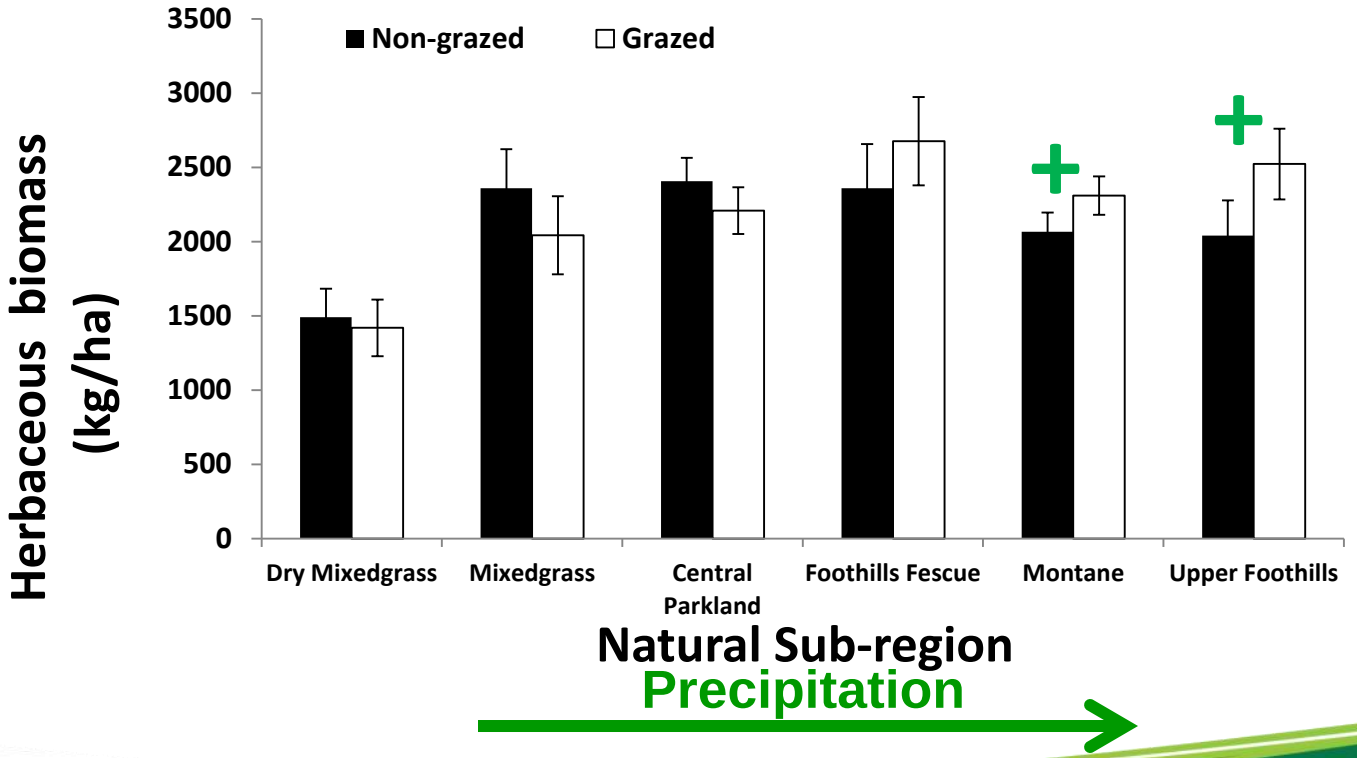




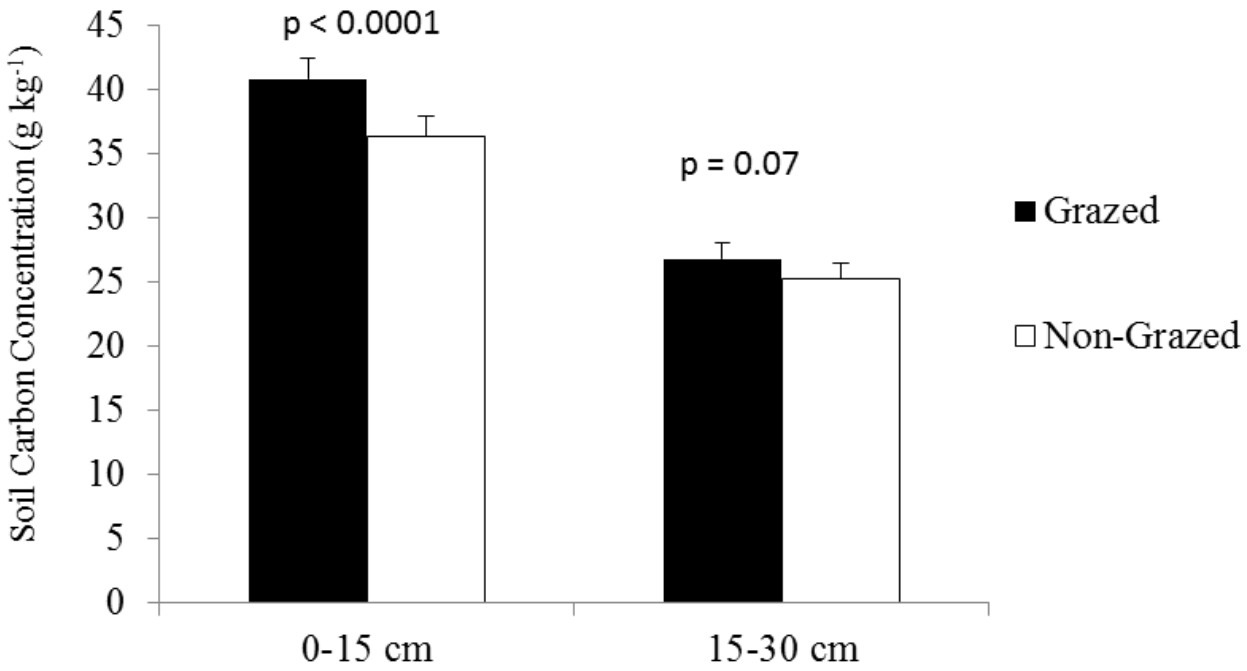
Cultivation reduces carbon storage



Moderate grazing increases plant biomass in wetter regions



Moderate grazing can increase carbon storage



Hewins et al. 2018.

What is the optimal stocking rate or grazing system to increase carbon storage?

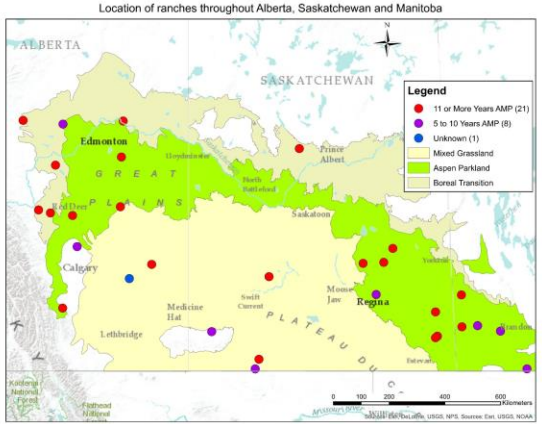
Adaptive multi-paddock grazing (AMP):

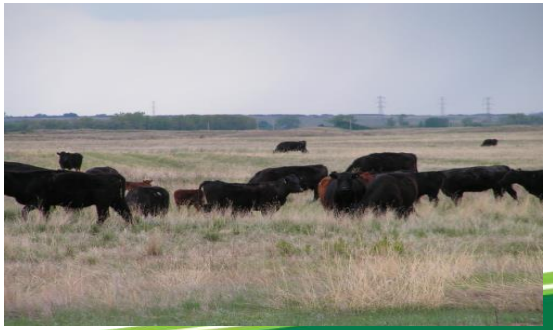
- high animal density
- fast rotations
- long rest periods

Preliminary results show:

- Limited effects on soil carbon
- Slight increase in GHG soil flux and soil microbial activity

Stocking rates!





Why study biodiversity in grazing systems?

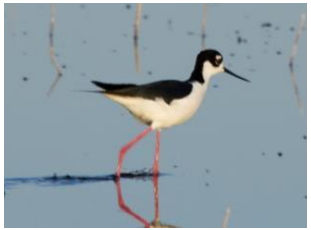
- Increased ecosystem services
- Increased resilience
- Perception that grazing negatively affects biodiversity









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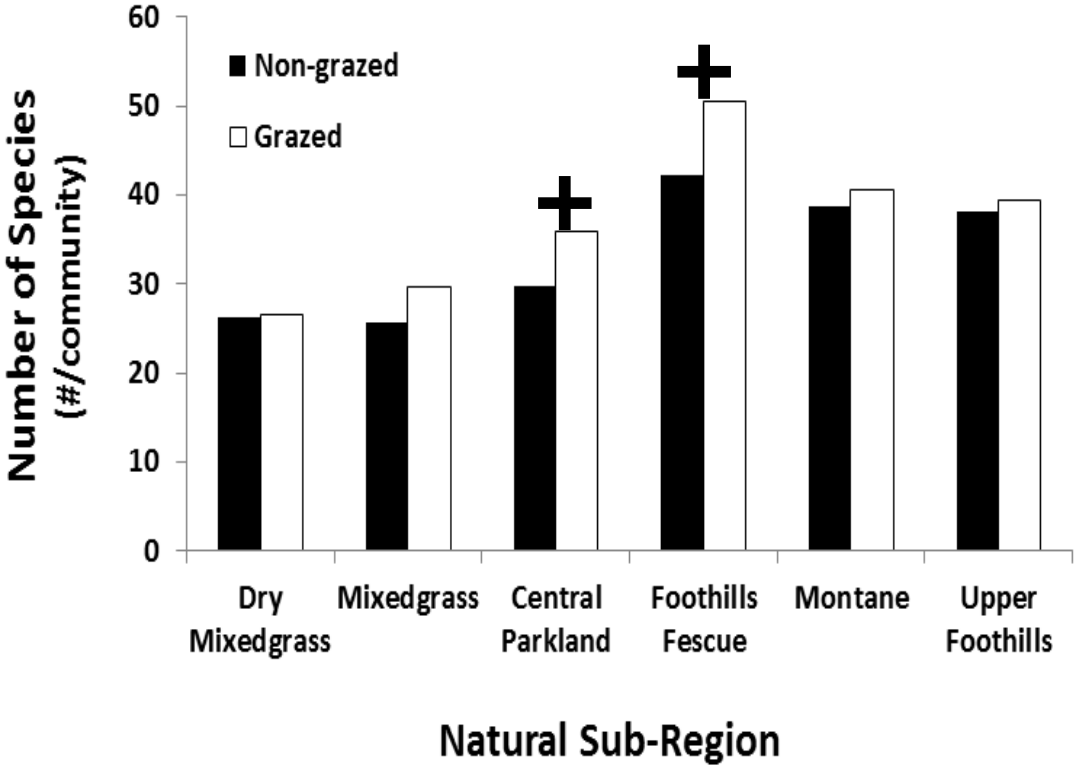
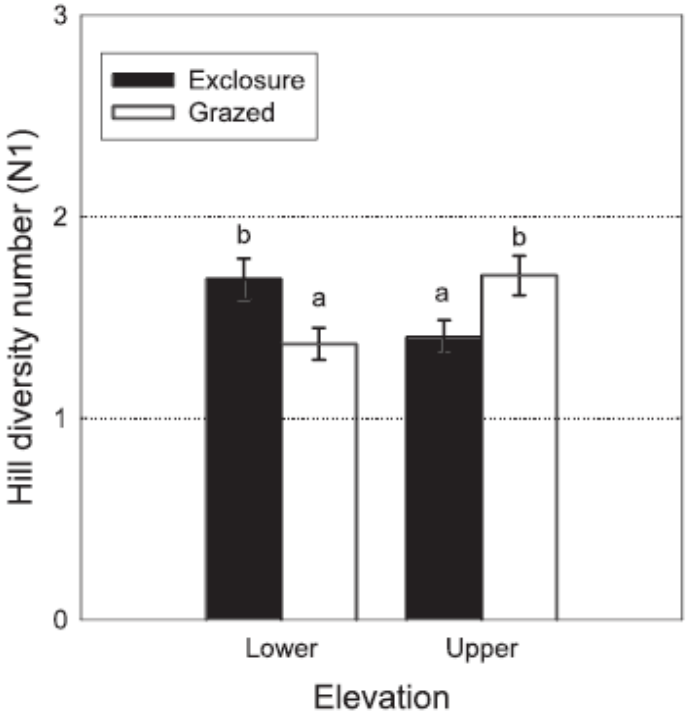
Moderate grazing can increase plant diversity



+ 3.1 species with grazing

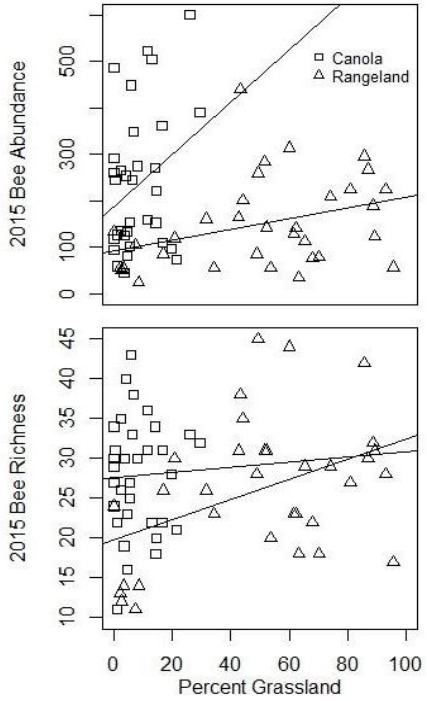
Lyseng et al. 2018

Cattle grazing affects ant diversity



Schmidt et al. 2012.

Grassland cover increases bee diversity and abundance

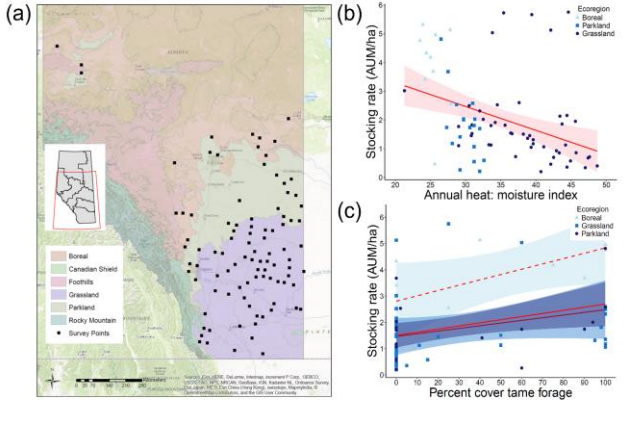


Beef & Biodiversity Project:

Relating site specific management data to biodiversity to address:

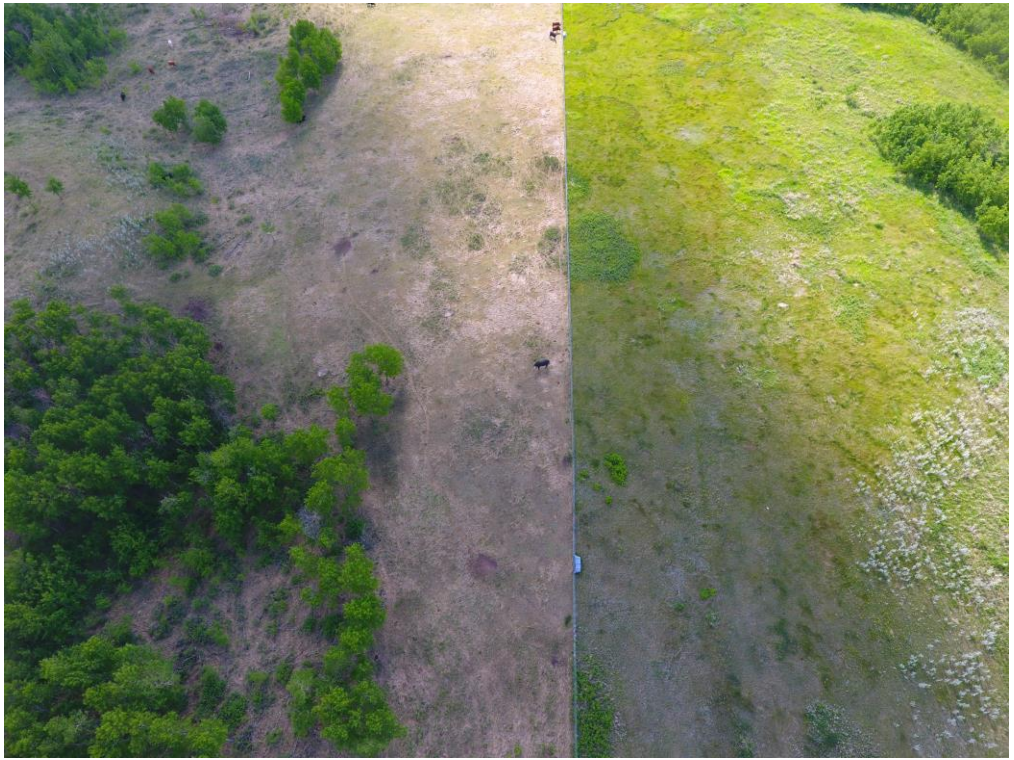
- What is the effect of stocking rate on different taxa?
- Can range health be used to predict biodiversity?

- Data addresses multiple taxa:
  - Vascular plants
  - Mites
  - Lichen
  - Mammals
  - Birds
  - Mosses



Summary: Carbon

- Native grasslands store more carbon
- Moderate grazing increases carbon compared to no-grazing
- Effects of grazing system and stocking rate are forthcoming



Summary: Biodiversity

- Grazing increases plant diversity compared to no-grazing
- Stocking rate is an important predictor of the diversity for many taxa, but not all
- Maintaining grasslands in the landscape is important for diversity

Thank you

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