

Biodiversity Metrics for Conservation Markets: Alberta Opportunities

Shannon White

Alberta Biodiversity Monitoring Institute & InnoTech Alberta

Majid Iravani

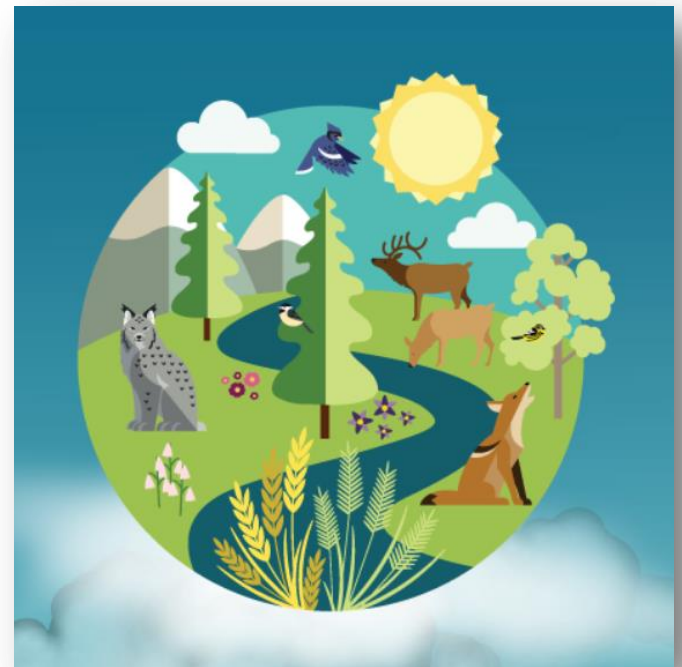
ABMI & University of Alberta



Outline



- Quick intro to ABMI
- Overview of biodiversity metrics in international sustainability platforms
 - Biodiversity assessment initiatives
 - Biodiversity impact metrics
 - Grassland conservation initiatives
- Strengths and weaknesses of approaches
- Biodiversity monitoring in Alberta and opportunities



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Alberta Biodiversity Monitoring Institute



Mission

We track changes in Alberta's wildlife and their habitats from border to border, and provide ongoing, relevant, scientifically credible information on Alberta's living resources. For Alberta's land-use decision makers. For Albertans.

Operating Principles

- Independent
- Scientifically credible
- Relevant and Accessible
- Transparent



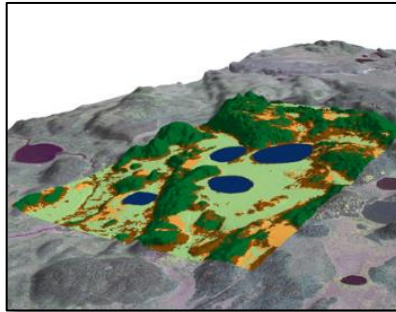
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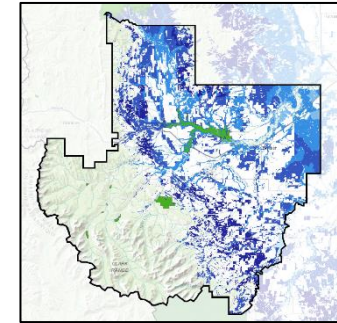
What we do



Species Monitoring



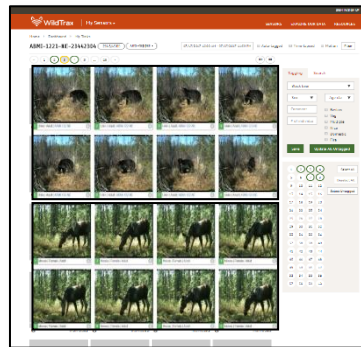
Geospatial and Machine Learning



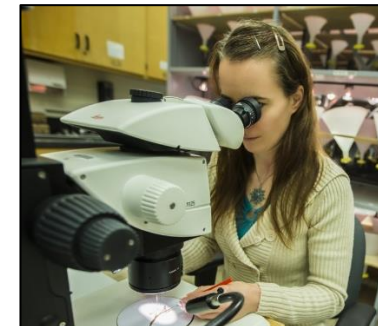
Application Programs



Knowledge Translation



Information Systems



Taxonomic Research

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BD and Agri-Food Systems



- Biodiversity: essential for sustainability of agri-food production systems
- 2030 Agenda for Sustainable Development: biodiversity at the center of activities for sustainable agricultural sectors



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BD Goals and Targets: Canada

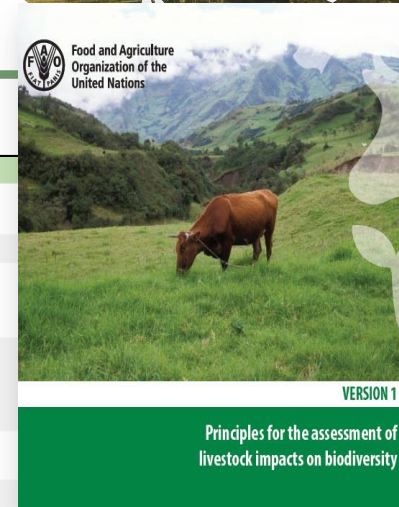


- Specific priorities for biodiversity conservation
 - Medium-term aspirational goals and targets
- Target 7: A stable or improved level of biodiversity and habitat capacity in agricultural working landscapes

BD Assessment Initiatives



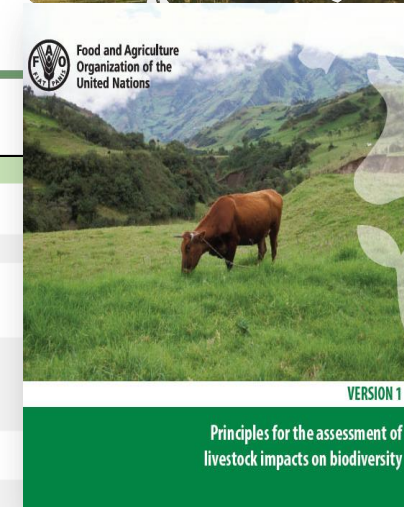
Approach	Owner/ Developer
Agrobiodiversity Index	Biodiversity International
Biodiversity Impact Metric	University of Cambridge
Biodiversity and Forest Landscape Restoration (FLR)	IUCN
Biodiversity in Standards & Labels	Lake Constance Foundation / Global Nature Fund and Partners
Biodiversity Performance Tool	Solagro and Partners
Species Threat Abatement and Recovery (STAR)	IUCN
Global Biodiversity Score	CDC Biodiversité
Globio Initiative	PBL NEAG, UNEP GRID-Arendal and UNEP-WCMC
Healthy Ecosystem Metric	University of Cambridge
Integrated Biodiversity Assessment Tool (IBAT)	IUCN, UN, Conservation and BirdLife International
Land Use Impacts on Biodiversity in LCA	Life Cycle Initiative / ETH Zurich
LC-Impact Method	European Consortium
Livestock Environmental Assessment and Performance LEAP	FAO
The Predicts Project	Natural History Museum & UN
Product Biodiversity Footprint	I Care & Consult, Sayari
The Restoration Opportunities Optimization Tool (ROOT)	IUCN and the Natural Capital Project



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“Market Infrastructure and Administrative Requirements to Support Offset Markets Project”

BD Impact Metrics



Approach	Metrics and measures
Agrobiodiversity Index	Status of diversity of genes, species, and habitats
Biodiversity Impact Metric	Loss of species and habitats
FLR	Provision of ecosystem services
Biodiversity in Standards & Labels	Loss of species and habitats
Biodiversity Performance Tool	Status of diversity of species and habitats
STAR	Changes to the Red List Index (RLI)
Global Biodiversity Score	Surface area of destroyed pristine natural areas
Globio Initiative	Mean Species Abundance (MSA)
Healthy Ecosystem Metric	Biodiversity Intactness Index (BII)
IBAT	Loss of species and habitats
LCA	Potential Species Loss from Land Use
LC-Impact Method	Potential Species Loss from Land Use
LEAP	Potentially disappeared fraction of species
The Predicts Project	Local Biodiversity Intactness Index (LBII)
Product Biodiversity Footprint	Potential disappeared fraction of species within a year
ROOT	Provision of ecosystem services



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Challenges



Embedding biodiversity consideration into agri-food sectors that impact or rely on biodiversity

- Complex relationships between agricultural practices and BD
- Quantifying current vs alternative practices difficult
- Disparate methodologies and terminology
- Lack of local BD data
- Metrics do not always scale down/across

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Effects of land-use change on community diversity and composition are highly variable among functional groups

STUART I. GRAHAM,^{1,6,7} MARGARET F. KINNAIRD,² TIMOTHY G. O'BRIEN,³ TOR-G VÅGEN,⁴ LEIGH A. WINOWIECKI,⁴ TRUMAN P. YOUNG,⁵ AND HILLARY S. YOUNG¹

Grassland Conservation Initiatives



Initiative	Standard/goal	Indicators
CRSB Sustainable Beef Production Standard	Manage natural resources responsibly and enhances ecosystem health	Grasslands, tame pastures and native habitat for wildlife is maintained or enhanced
US Beef Industry Sustainability Framework	Improve land resources sustainability through grazing management plans	Biological diversity and productive wildlife habitat are promoted in grasslands
Australian Beef Sustainability Framework	Improve land management practices for balance of tree and grass cover	Area of native vegetation is managed for conservation outcomes; grassland systems are maintained from unproductive encroachment of native and introduced woody species
Beef + Lamb NZ Environment Strategy	Thrive biodiversity through a tailored farm land environment plans	Under development: sector's threats and opportunities around native vegetation and habitat quality



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Challenges cont.



- Developing practical science-based tools to measure outcomes accurately
- Lack of clarity on indicators and how to achieve
- Potential conflicts between indicators

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Contents lists available at SciVerse ScienceDirect

Ecosystem Services

journal homepage: www.elsevier.com/locate/ecoser



Ineffective biodiversity policy due to five rebound effects

Sara Maestre Andrés^a, Laura Calvet Mir^a, Jeroen C.J.M. van den Bergh^{a,b,c,f,*}, Irene Ring^d, Peter H. Verburg^e

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Selecting BD Impact Metrics



- Biodiversity Intactness Index (BII) identified as the most appropriate metric for assessing the impact of land use on biodiversity

The BII [Biodiversity Intactness Index] is based on **estimates** of the **average abundance** of originally present species for any defined area **relative** to their abundance in **undisturbed habitat**.




- “We propose three indicators that would together measure the required progress in biodiversity recovery.”

nature
sustainability

Comment | Published: 14 September 2018

Aiming higher to bend the curve of biodiversity loss

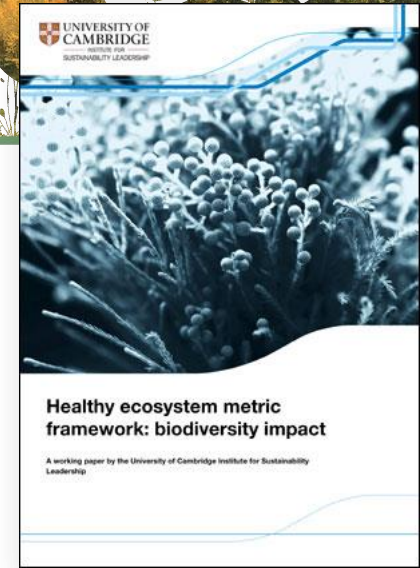
Georgina M. Mace , Mike Barrett, Neil D. Burgess, Sarah E. Cornell, Robin Freeman, Monique Grooten & Andy Purvis

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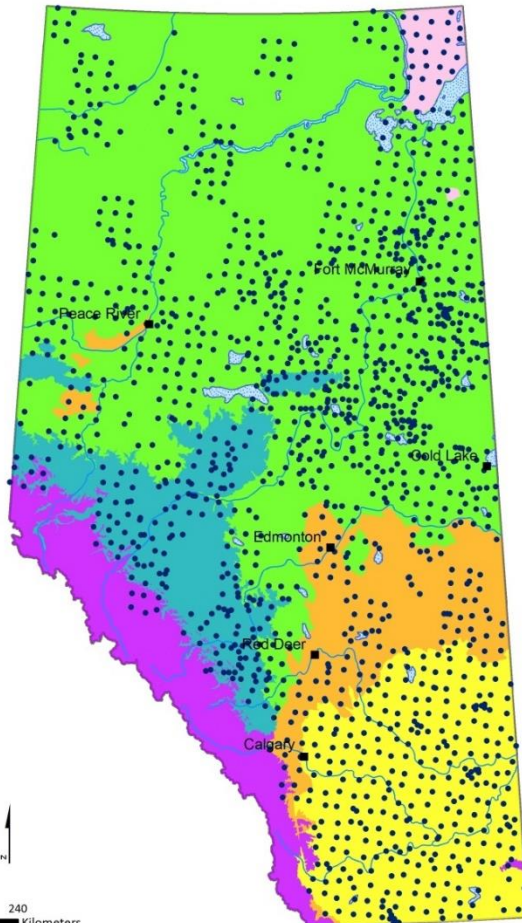
- “We propose three indicators that would together measure the required progress in biodiversity recovery.”

Local BD data



1656 systematic sites + supplementary

>3000 species detected



Natural Regions

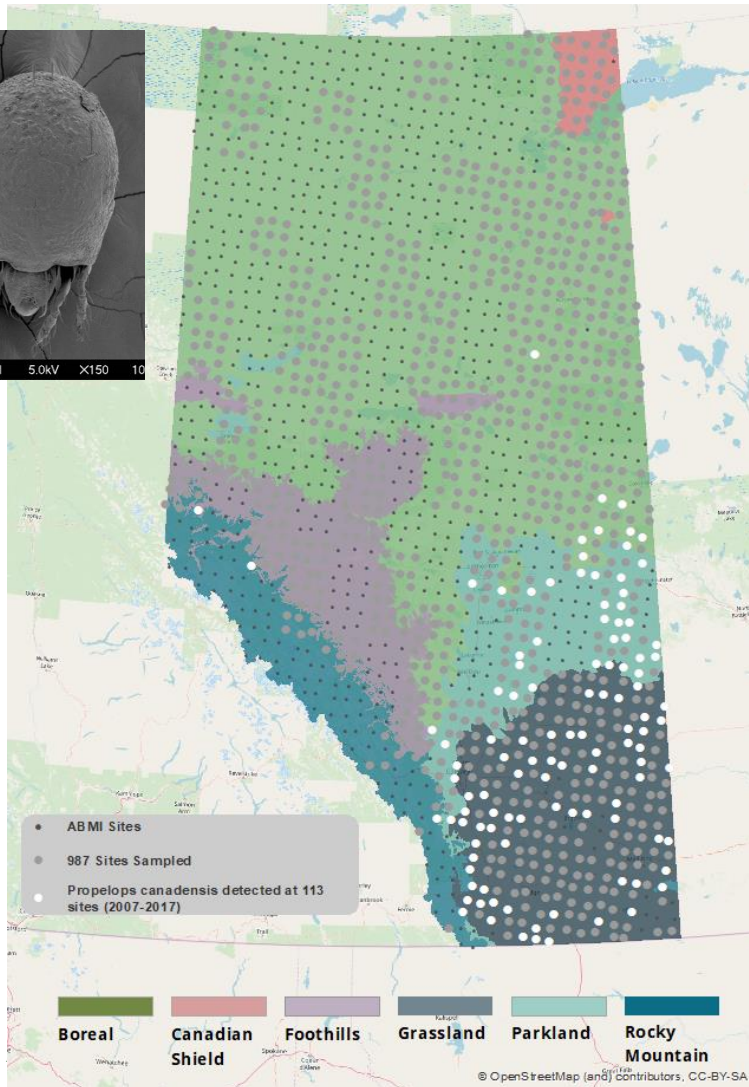
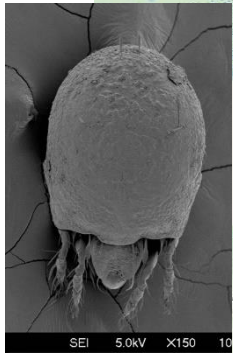
- Boreal Forest
- Canadian Shield
- Foothills
- Grassland
- Parkland
- Rocky Mountain

0 30 60 120 180 240 Kilometers

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Local BD data



>3000 species detected



BII for Alberta

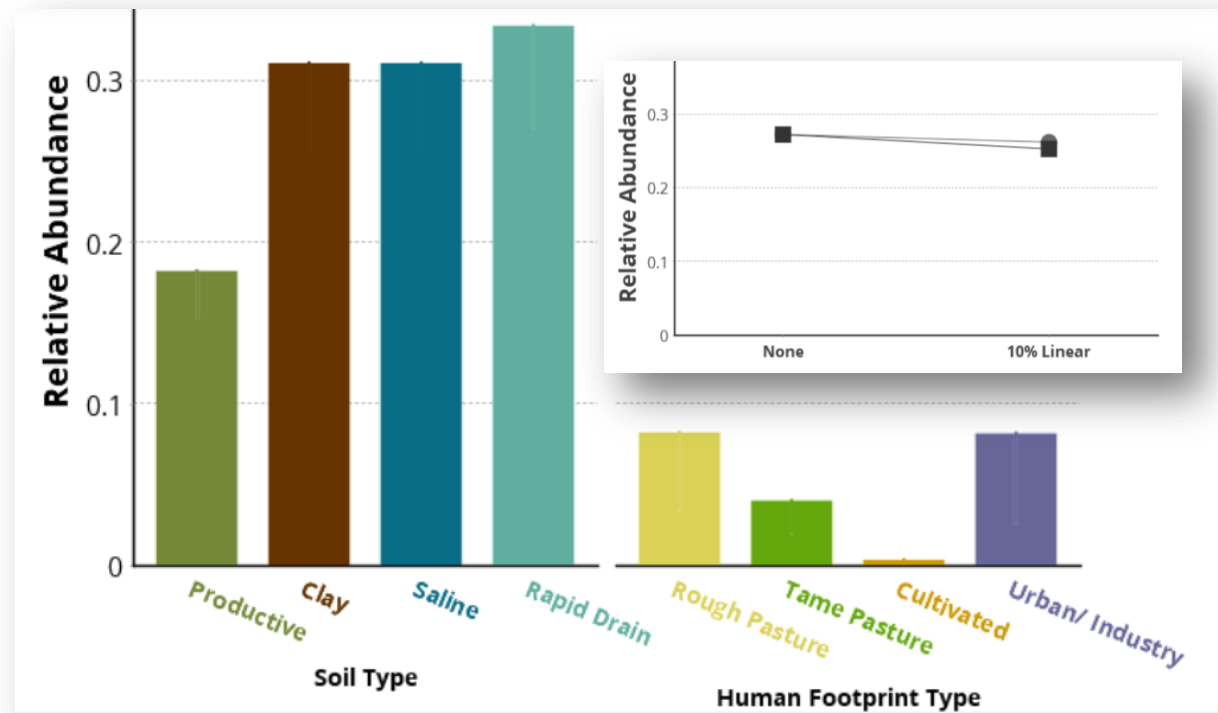


Methods summary

Field & Remote Sensing Data → Species-Habitat Models → Apply models to current and back filled maps → Intactness Index → Reporting



Plains rough fescue
(*Festuca hallii*)



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BII for Alberta

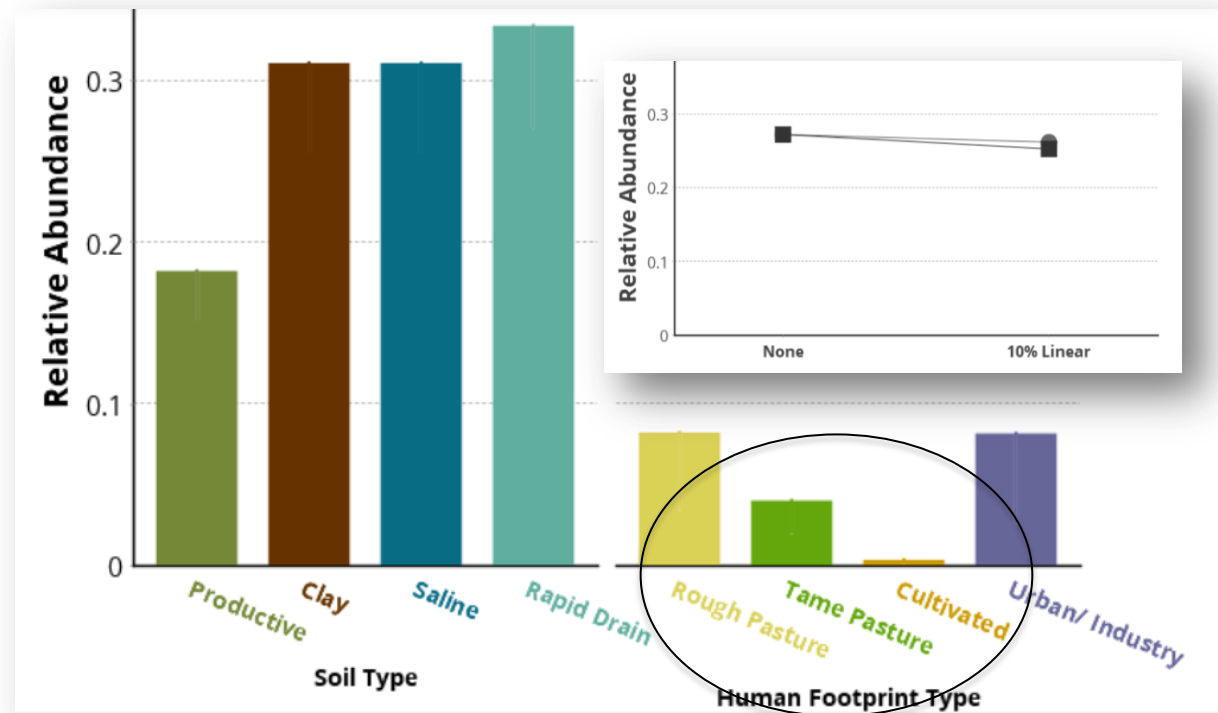


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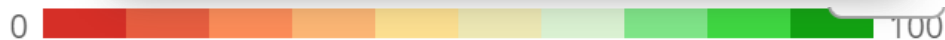
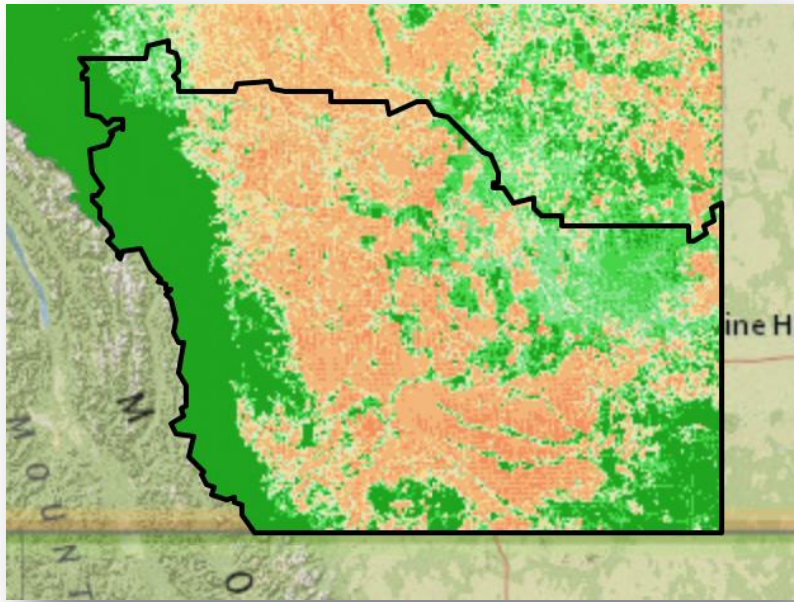
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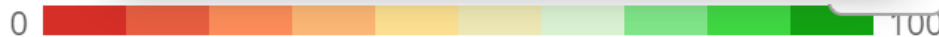
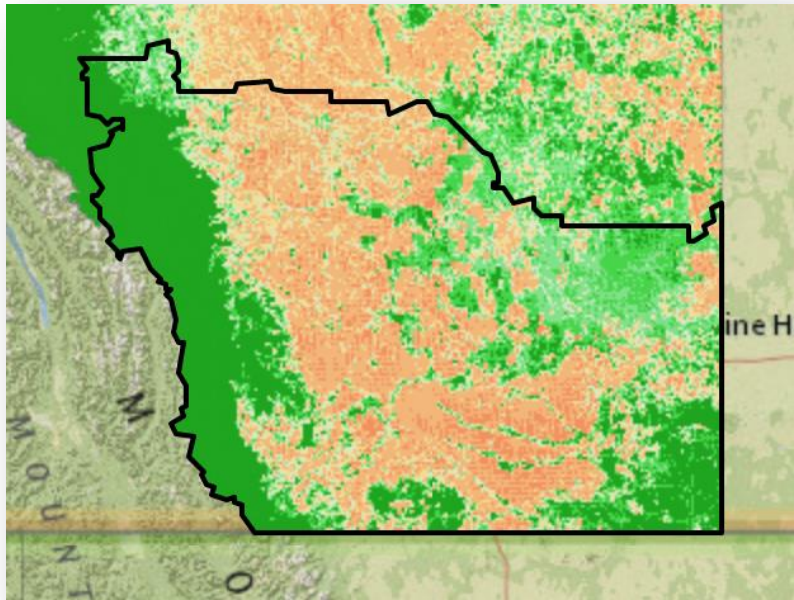
Native vascular plant BII: 63%

BII for Alberta

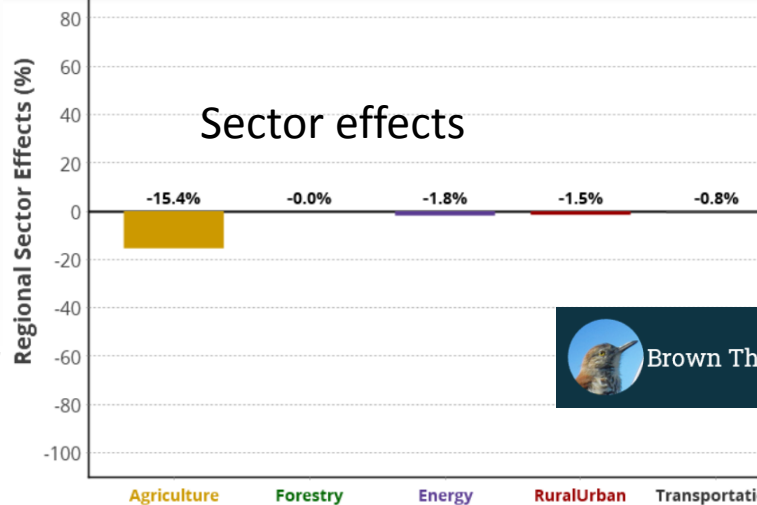
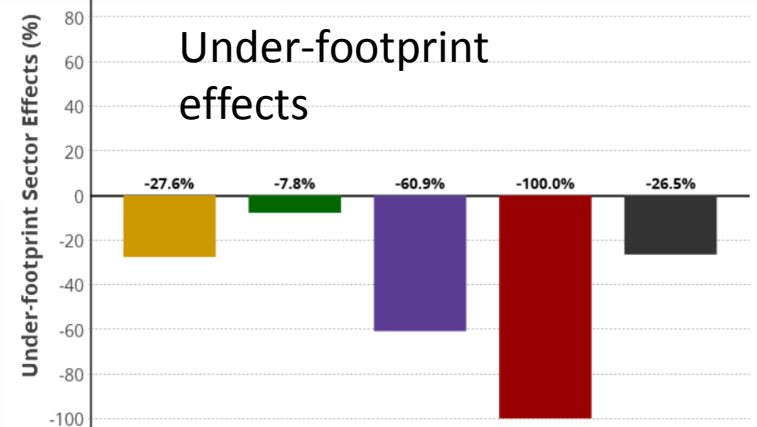


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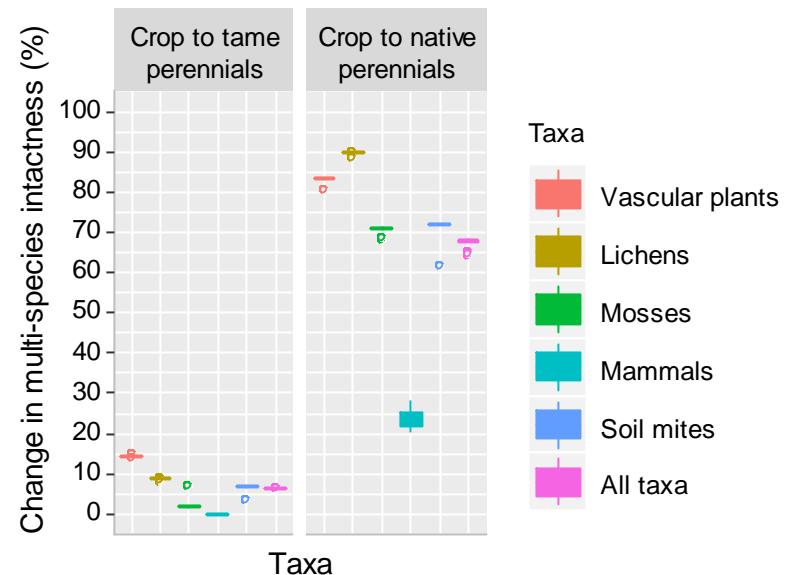
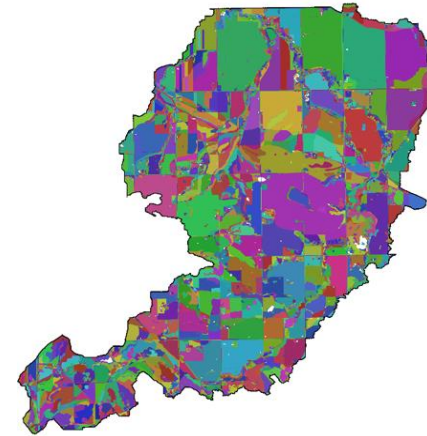
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BII: Applications



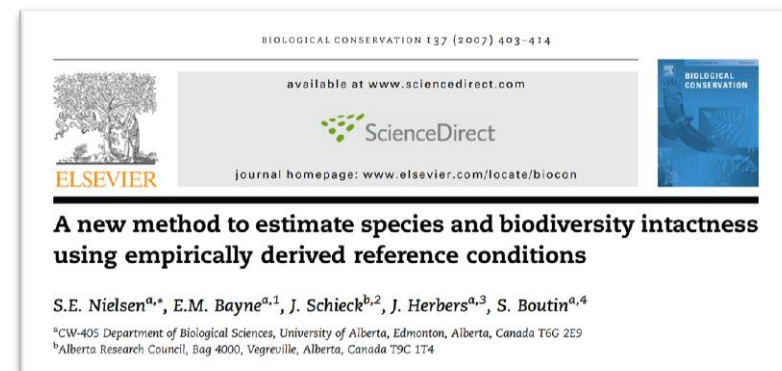
- Well-established framework used widely in Alberta
 - e.g., Regional Land-Use Planning, Forest Management Planning
- “Development of information and science to support the provision of ecosystem services on agricultural land” project
- Well-suited for agricultural sustainability reporting



BII: Advancements



- BII represents BD “condition” for areas of interest
 - Developing framework to incorporate “importance”
- Considerations for market implementation: e.g. additionality, verification
- Formally incorporate effects of grazing
- Incorporation of more BMPs



Thank you & Questions

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